PN-ACD-519

99148

THE EXPORT OF POWER FROM NEPAL - EVALUATION OF OPPORTUNITIES

Prepared for

His Majesty's Government of Nepal
Ministry of Water Resources
Electricity Development Center

Under the

USAID/Nepal Private Electricity Project
Contract No 367-C-00-95-05117-00
Project No 367-1073-3

Final Report with
Draft Appendix B

August 1997

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Notice

The computer model NEPSIM which is referred to in this report entitled, "The Export of Power from Nepal - Evaluation and Opportunities" has been replaced by an enhanced version named, PROBEN which carries out the same type of calculations as NEPSIM, but provides more accurate results PROBEN also provides additional capabilities, such as risk calculations, which were not available in NEPSIM For the use of PROBEN the reader is directed to the report entitled, "Nepal Project Benefits Model PROBEN - Model Documentation"

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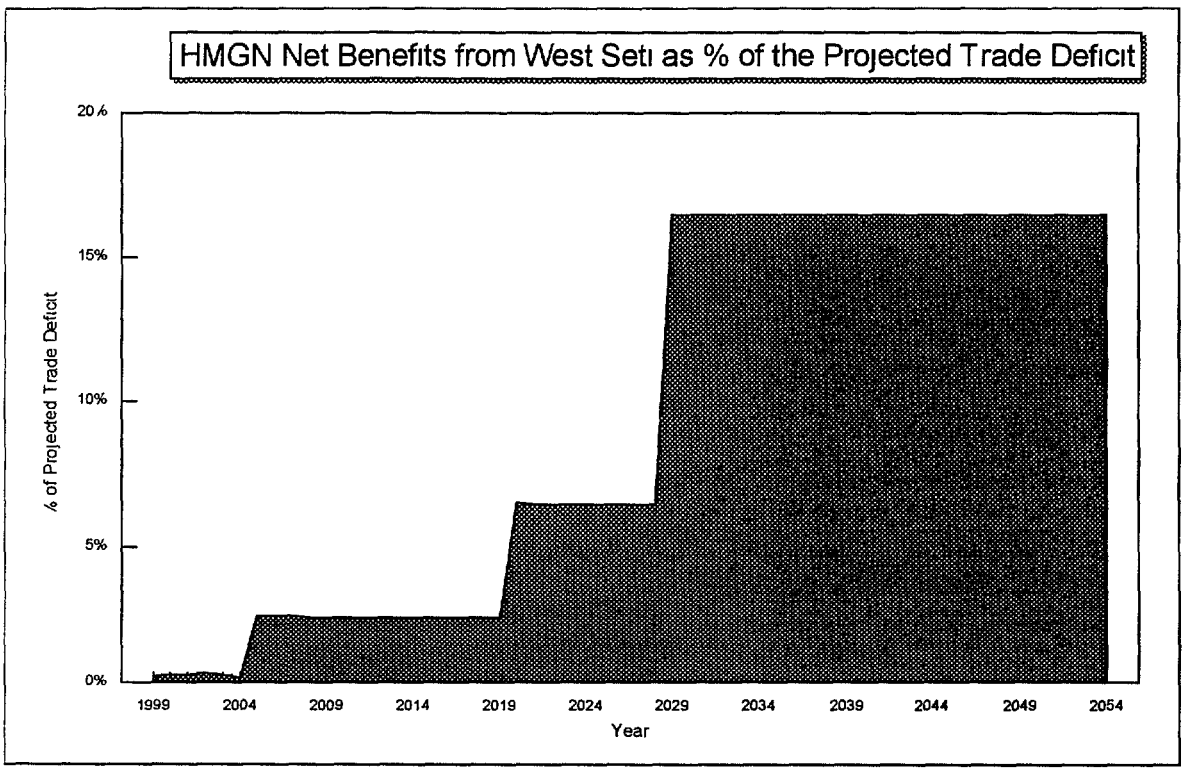
Executive Summary

For many years now, there have been major electricity shortfalls throughout India, and currently in the regions of Northern India the electricity supply is only 66% of the demand Over the next 15 years, electricity demand in India is expected to double, but the limited financing capability of Indian institutions means that they will only be able to supply about half of this incremental demand At the same time, Nepal is blessed with economic hydroelectric power potential greatly in excess of Nepal demand projections An excellent opportunity therefore exists for the long-term export of electricity from Nepal to India, and possibly to other neighboring states, and the potential benefits to the economy are enormous

The balance of trade deficit is perhaps the most serious problem facing the economy of Nepal Over the period of the Eighth Five Year Plan (1992-1997), for every 100 Rupees spent on imports, Nepal will have earned only 50 from exports During the same period, the national balance of trade deficit is likely to have grown twice as much as planned, to around US $ 1 1 billion/year by 1996/97 If the trade deficit continues at current levels, Figure 1 shows that the benefits to His Majesty's Government of Nepal (HMGN) from the 750 MW West Seti project alone would reduce the national trade deficit by roughly one sixth following ownership transfer Considering that West Seti is less than 4% of the capacity of the top nine potential hydropower projects, it is apparent that investment in power export could transform the economy of Nepal in the long-term from unsustainability to relative prosperity

Figure 1



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Most public power utilities in the sub-continent already have high levels of debt and poor credit ratings, which severely limit the role that they can play in future development In Nepal, as in India and throughout much of the world, governments are turning to private enterprise to try to stimulate the pace of power sector development HMGN has taken a number of initiatives to encourage private sector power development for both the domestic and export markets, notably the passage of new legislation with the adoption of new policies and private sector incentives, the establishment of the Electricity Development Center (EDC), and the creation of Power Development Fund (PDF)

With the introduction of the private sector, the number of major stakeholders in any project, especially an export project, expands still further All of the stakeholder groups are important and a solution for sharing the costs, benefits and risks must be found that is acceptable to all, because if any one of the groups refuses to cooperate, it will be more difficult for the project to proceed Clearly, this will require compromises so that all parties can feel that they will benefit This will be much easier to achieve if we are able to quantify all of the costs and benefits to the various parties and to assess the impact that the policies of each group has on the others

Each stakeholder group will incur both costs and benefits from the project The costs to one group are often a benefit to some other group Aside from direct costs and benefits, there are a number of indirect impacts A full economic viability analysis of any particular project would require quantification of both the direct and indirect costs and benefits to each group, and a demonstration that from the point of view of each of the major stakeholder groups the total benefits exceed the total costs In the case of the developer, financial viability is essential, and is therefore his primary concern From HMGN's point of view, on the other hand, the economics will be the most important criterion It is likely that if HMGN's direct benefits exceed the direct costs, then the indirect net benefits will also be positive However, before project approval this should be confirmed by an economic feasibility study In the meantime, the evaluation procedures developed in this report have been confined to the analysis of only the direct costs and benefits

As part of this assignment, a customized computer model, the Nepal Export of Power Simulation Model, (NEPSIM) has been developed for EDC This unique tool will assist HMGN in evaluating alternative policy impacts and formulating electricity export policy, analyzing and comparing developer proposals, and in negotiations with potential developers NEPSIM will analyze the economics of projects in terms of the resulting direct net benefits to HMGN It will also determine the developer's financial viability NEPSIM also has the ability to quantify downstream benefits, as a preamble to negotiations on the sharing of those benefits Details of the NEPSIM model are available in Appendix B of this report, which is the NEPSIM User's Manual and Documentation Thirteen EDC and Ministry of Water Resources (MOWR) staff have been trained in the use of NEPSIM, and the software and appropriate hardware has been transferred to EDC

If it appears, based on the input assumptions, that the developer will be unable to earn an adequate real rate of return on equity (at least 20%), and assure an adequate debt service coverage ratio (at least 1 5 under average conditions), then it is unlikely that the project will proceed any further, unless concessions are made by one of the other parties

Assuming that NEPSIM analysis confirms potential developer financial viability, then the most crucial factor will be the ability to finance all elements of the project The critical issues are

- Can the developer raise the necessary debt financing?
- Can the developer convert his revenues (for example Indian Rupees) into foreign currency for debt service and profit repatriation? Unless India moves to full currency convertibility, this will require guarantees from the Government of India (GOI) or other financial sector authorities

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- Can the State Electricity Boards (SEBs) finance the transmission and distribution infrastructure required to deliver the imported power to the consumer? Financing guarantees are probably required here also
- Can the purchaser maintain the payments specified in the Power Purchase Agreement (PPA)? Again, official guarantees may be required to cover the risk

The report also summarizes a number of other potential bottlenecks and risks in the private power export business These include the implications of having too many or too few developers competing for a project, the importance of addressing of environmental and socio-economic impact mitigation and compensation, the challenge of agreeing on the exploitation and sharing of downstream benefits, and the potential impact of siltation on project viability

An attempt has been made to summarize the main steps to be followed in the private development of power for export The process is complex and the procedures are still evolving and not yet fully crystallized Unlike the case for domestic projects, each export project must be negotiated separately, with sometimes differing results This introduces uncertainties for the potential developer Matters are exacerbated by a number of potential conflicts within various pieces of legislation, and a lack of clarity as to when certain provisions apply (for example Article 126 of the Constitution which specifies that two thirds parliamentary approval is required for resource sharing with other countries)

Eight key private power export questions facing HMGN are addressed in Section 9 In each case an approach is suggested, and an example is usually given, involving the application of the NEPSIM model

Finally, Section 10 provides a number of recommendations that should help to expedite the private development of power for export from Nepal

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1 Introduction

The objectives of this assignment were twofold

- To review the current status in Nepal with regard to the promotion of privately-developed hydropower projects for export
- To develop a methodology for valuation of export-related hydropower projects

Accordingly, the first part of this report starts with a brief review of the market for power exports and the current realities of export project financing (which has led to a recognition of the central role that the private sector will have to play) This is followed by an outline of the sometimes conflicting interests of the various stakeholders, a discussion of the various power export costs and benefits which must be considered, and an overview of the steps that a private developer must follow prior to project approval The first part ends with a summary of the main bottlenecks and risks in private power development for export It should be noted that the related issues of the relevant legislation, and the supporting institutional framework, are not addressed here, as they have been covered in other recent reports (see the Bibliography in Appendix D, References 3, 6, 11, 21 and 23)

The second part of the report addresses in more detail some of the key questions facing HMGN in promoting private power development for export In response to the need for a methodology to quantify the direct benefits and costs and to reflect the complex inter-relationships between the various parties, the Nepal Export of Power Simulation Model (NEPSIM) has been custom-developed, and is summarized in this report The report closes with some examples of the insights that the NEPSIM model can provide, followed by a series of recommendations for the future

Thirteen EDC and MOWR staff have been trained in the use of NEPSIM, and the software, full model documentation, and appropriate computer hardware will be left with the EDC The NEPSIM model should prove to be an extremely powerful tool to Nepal in the years ahead

- For evaluating alternative policy impacts and formulating policy
- For analyzing and comparing Developer proposals
- In negotiations with potential Developers

While NEPSIM has been developed primarily for power export projects, it also has the flexibility to provide useful insights on projects dedicated to serving power consumers in Nepal

The full participation and assistance of the staff of the Electricity Development Center during the course of this project is gratefully acknowledged Particular thanks go to Mr Rex Tolman of Acres International, who developed the Downstream Benefits section of the NEPSIM model, and who was responsible for generalizing the model and making it user-friendly

2 The Market for Power Exports

A recent USAID-funded report, which studied the financing ability of Indian institutions to meet the future demand for power concluded that

> *"The GOI estimates that India's electric capacity needs to increase from 80,000 MW in 1995 to 160 000 MW in 2010 Our analysis shows that the Indian institutions can provide between 40% and 50% of this need "* [1]

Already in the sub-continent there is a serious shortfall between electricity demand and supply It is apparent that this gap is likely to grow larger, primarily as a result of the inability of public institutions to finance the necessary development In Northern India alone, the supply is presently only two thirds of demand, and the deficit is expected to grow from 9,600 MW in the year 2000 to 20,800 MW by 2010

Figure 2 illustrates the problem for India and also the export opportunity for Nepal At present, the demand in Nepal is only 0 3% of that in India Over the next 15 years, Nepal's share will grow, but it will remain less than 1% of the total At the same time, the hydropower potential in Nepal is considerable As shown in Table 1, the nine largest undeveloped power projects being considered in Nepal could supply about 20,575 MW - far beyond the roughly 1,000 MW that is expected to be the Nepal demand by the year 2010 Of the additional 80,000 MW that will be required by India in the next 15 years, Indian institutions may be able to finance as much as 40,000 MW This leaves a further shortfall of 40,000 MW, part of which could be supplied by exports from Nepal

Table 1

Major Potential Hydropower Projects in Nepal

Name of Project	Installed Capacity MW	Average Energy GWh/year	Type
Karnali (Chisipani)	10 800	20 842	Storage
Pancheshwar	6 480	10 671	Storage
West Seti	750	3 202	Storage
Kali Gandaki-2	660	3 470	Storage
Burhi Gandaki	600	2 495	Storage
Arun III	402	2 891	Pondage
Upper Arun	335	2 050	Pondage
Lower Arun	308	2 275	Pondage
Upper Karnali	240	1 665	Pondage
Total	20 575	49 561	Pondage

There has been a concerted effort within India to encourage the independent power producers (IPPS) within India to help to supply the growing power demand However, progress has been slower than desired primarily because of the difficulty in obtaining project financing, especially debt financing In the past, the Government of India has offered central guarantees on selected projects, but GOI is reluctant to continue pledging national credit for the private power financing Given the generally poor credit of the SEBs, the financing problem for domestic supply remains, although various security mechanism solutions are being considered

[1] The Financing Capability of Indian Institutions to Provide Alternatives to Sovereign Guarantees Hagler Bailly Consulting Inc December 1995

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For a power exporter from Nepal, the most likely purchaser would be one of the neighboring SEBs Unfortunately, the SEBs closest to Nepal are experiencing particular difficulties in terms of credit-worthiness Alternatively, the IPP in Nepal could export to non-SEB buyers in India, including major private power-consuming industries, or to the Power Grid Corporation of India, Ltd , which is developing a major national grid interconnecting all of the Indian regions

Aside from the power export market in India, Nepal is also situated close to Bangladesh, which will have significant supply problems of its own In addition, one of the largest international private sector energy enterprises[2] has even raised the possibility of development of a major Nepal hydropower project for export to China Clearly, therefore, a significant theoretical market will exist for power exports from Nepal in the years ahead

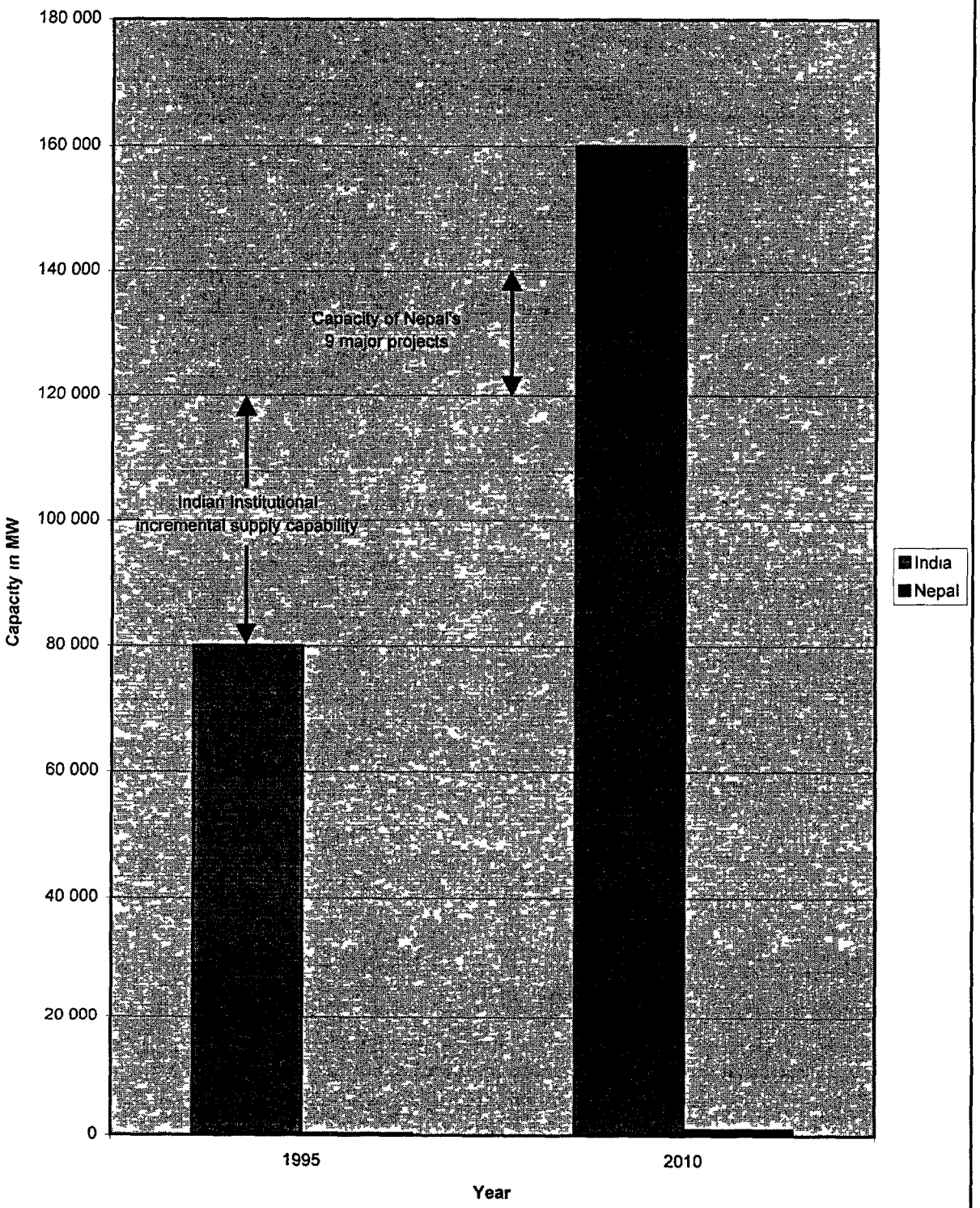
The constraint will not be in the potential supply or demand, but in non-technical factors such as

- The financial viability of the exporter and importer(s) and the control of financial risks to acceptable levels
- Environmental impacts, and the adequacy of mitigation and compensation measures
- HMGN approval for project implementation, and the agreement of Nepal and India on the sharing of any downstream benefits

[2]Enron Renewable Energy Corporation

Figure 2

REQUIRED CAPACITY IN INDIA AND NEPAL



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3 Export Project Financing (Reliance on the Private Sector)

A number of factors have combined in recent years in Nepal, as elsewhere in the world, and particularly in the developing world, to make the public sector financing of major hydropower development increasingly difficult Where significant hydropower potential exists, as in Nepal, there tends to be significant economies of scale - that is the unit costs of power from large projects are generally much less than from small projects Given the extremely high capital costs of hydropower, and its high foreign exchange component, this means that even though the development may be economically attractive, financing the economic development of the resource creates a particularly heavy financial burden in the near-term Governments have competing demands for limited capital, and the borrowing capacity of state institutions such as the Nepal Electricity Authority (NEA) is limited because of their already-high debt levels, weak credit rating, and the reluctance of the central government to provide the necessary guarantees In addition, growing environmental concerns mean that projects are subject to increasing levels of critical scrutiny by the international development banks and donors At the same time, traditional international sources of soft financing and grant funding are facing constraints of their own, and, with the fall of the communist bloc nations, the international aid pie has to be sliced more finely

Consequently, HMGN has attempted to accelerate hydropower development by opening the power industry to the private sector Enabling legislation has been passed and new policies with private sector incentives adopted The EDC has been established, with a current staff of 120 almost two thirds of whom are professional, and is now responsible for oversight of all private electricity generation projects larger than 1 MW, along with related transmission and distribution facilities A further initiative is the planned establishment of the Nepal Power Development Fund (PDF)[1], initially based on an International Development Association (IDA) credit, the size of which is yet to be fixed Originally, the fund will be used to provide long-term financial assistance to eligible private projects serving the demand in Nepal Subsequently, as loans are paid back and the fund grows, export projects may also become eligible It is hoped that these measures will encourage private investment and participation and thereby stimulate the pace of power development to serve demand in both Nepal and the export markets

The admission of the private sector should help to reactivate power development, but it also introduces new players with different perspectives and objectives New mechanisms and approaches are required, to recognize and balance the interests of the various groups, if agreement and progress for mutual benefit is to be achieved

Aside from the need to secure all the necessary HMGN approvals, the key financial challenge on the Nepal side of the border for the Independent Power Producers (IPPs) will be their ability to finance the project and to ensure their financial viability during construction and operation

While the introduction of IPPs should help with supply–side financing in Nepal, developers will also face a large number of demand-side financial challenges in India

[1]Nepal Power Development Fund Recommendations and Guidelines for Fund Implementation, Acres International July 1997

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These relate to

- The ability of the exporter to sell the power at a price which is sufficiently less than the importer s least cost alternative to make it attractive
- The ability to convert Indian Rupee payments into hard currency for IPP debt service and profit repatriation
- The ability of the importing State or enterprise to finance the transmission and distribution infrastructure necessary to get power to the customer in India
- The ability of the importers to maintain the necessary payments for imported power

In each case, the developer may require guarantees from either GOI or other official financial institutions to keep financial risks to an acceptable level

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4 The Major Stakeholders and Their Interests

Table 2 lists the major players or stakeholders involved in private sector development of hydropower projects in Nepal It can be seen that their interests are frequently in conflict - some groups wish to maximize the export tariff while the importer wants to minimize it HMGN wants to be compensated as much as possible for the use of its resources, but this will tend to reduce the viability of the developer and/or increase the cost to the consumer All of the stakeholder groups are important and a solution for sharing the costs, benefits and risks must be found that is acceptable to all, because if any one of the groups refuses to cooperate, it will be more difficult for the project to proceed

Clearly, this will require compromises so that all parties can feel that they will benefit This will be much easier to achieve if we are able to quantify all of the costs and benefits to the various parties and to assess the impact that the policies of each group has on the others

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Table 2

Stakeholders - Their Costs, Benefits and Objectives

Stakeholder Group	Possible Costs	Potential Benefits	Objectives
Impacted by Dam and Reservoir	▸ Displacement and loss of land and property ▸ Loss of income lifestyle disruption ▸ Environmental degradation	▸ Employment and training ▸ Improved social infrastructure and services ▸ Improved regional access and trade	▸ Maximum practical mitigation of impacts ▸ Employment and infrastructure benefits ▸ Full compensation for all negative environmental and socio-economic impacts
HMGN	▸ Resource use opportunity costs ▸ Environmental impact costs ▸ Prefeasibility studies and surveys ▸ Investment to capture d/s benefits ▸ Post transfer O&M costs	▸ Increased revenues ▸ Economic stimulus and employment ▸ Improved regional access and trade ▸ Project transfer ▸ Improved power sector	▸ Maximum net benefits including d/s share ▸ Minimum costs to HMGN ▸ Minimum adverse environmental impact ▸ No financial burden or guarantees from project
Developer	▸ Project equity debt service and operating costs ▸ Project transfer	▸ Profitable return on investment	▸ Maximum profit ▸ Financial viability and debt service security ▸ Ability to convert revenues to forex of debt service and profit repatriation
Financiers	▸ Loaned capital	▸ Interest earned	▸ Debt service security and minimum risk ▸ Developer financial viability ▸ Project economic viability ▸ No adverse publicity
NEA and its Customers	▸ Purchase price of power ▸ Transmission and distribution costs	▸ Improved system reliability ▸ Expanded transmission and distribution network ▸ Financing difficulties avoided	▸ Maximum supply for minimum price ▸ Customer service and satisfaction ▸ Improved system reliability
Importer	▸ Purchase price of power ▸ Transmission and distribution costs	▸ Improved system reliability ▸ Expanded transmission and distribution network ▸ Financing difficulties avoided	▸ Maximum supply for minimum price ▸ Customer service and satisfaction ▸ Improved system reliability
Government of India	▸ Currency convertibility guarantees ▸ SEB power payment guarantees ▸ Investment to capture d/s benefits	▸ Economic stimulus of improved power sector ▸ Downstream benefits	▸ Maximum net benefits including d/s share ▸ Minimum costs to government of India ▸ Maximum practical power self sufficiency
Downstream Beneficiaries	▸ Investment to capture d/s benefits	▸ Downstream benefits	▸ Maximum net benefits ▸ Minimum investment burden

5 Potential Costs and Benefits

The previous section showed that the allocation of the costs and benefits varies between the different stakeholders Costs to one may be benefits to another It is, therefore, necessary to look at project viability from various points of view, depending upon the costs they bear and the benefits they share

The main project costs are the direct capital and operation and maintenance costs The capital cost, which typically includes interest during construction (IDC), will be partially covered by the developer's equity investment, and the balance will be covered by debt financing Initially, operation and maintenance costs are usually expressed as an annual percentage of the original capital cost The main revenues will be from the sale of electricity in India and Nepal

5 1 Indirect Costs and Benefits

Apart from the direct costs and benefits of any hydropower project, which can be measured in terms of the resulting direct expenditures and revenues, there is a wide range of secondary or indirect economic impacts which are more difficult to measure but which are nevertheless important

In the case of private sector development, the financial burden placed on HMGN will be minor (the developer will bear the financial risks), and the main question will be whether HMGN is adequately compensated for the use of its resources Towards this end a real discount rate (net of inflation) of 10% has been used in the economic analyses to reflect the social opportunity cost in Nepal A full-scale economic analysis would also apply shadow prices to reflect the full economic cost of key commodities If this were done, the shadow price multiplier for scarce skilled manpower or cement, for example, might be high, whereas the multiplier for underemployed low skilled labor might be less than one

On the benefits side, shadow pricing could include a foreign exchange shadow price multiplier applied to the HMGN share of export revenues Similarly, allowance would have to be made for other indirect economic benefits of the project These would include placing a value on resulting skills development, local business development, and infrastructure development, and allowing for the multiplier effect of project employment and spending The economic benefits of improved regional access, opening the country to improved trade, social services and tourism would also have to be weighed against any corresponding negative socio-economic impacts

The economies of scale from such a project are a major consideration Typically, the unit cost of power from a large hydropower project is much less than that for a small project Consequently, if some of the power from a large export project could be allocated to the NEA system, the resulting cost should be lower than from a smaller project built solely to serve the demand in Nepal However, a number of technical problems would have to be overcome because at present the NEA system is not synchronized with those in India Apart from the transmission and distribution costs, this would result in additional powerhouse costs to isolate the two systems

Perhaps most importantly, a power export project could have a dramatic impact on Nepal's Balance of Trade, which at present is seriously negative and worsening In Figure 1, an analysis is made to demonstrate the kind of positive impact that a representative project could have in improving the balance of trade deficit When one considers that there are numerous such potential projects, several of which are very much larger than the example given, this, with its implications for future national credit-worthiness, would be the major indirect economic benefit for Nepal

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In balance, it is very likely that the indirect benefits of private power development in Nepal will exceed the indirect costs, and therefore, in the interests of simplicity, this report will concentrate on an analysis of only the direct costs and benefits Provided that an adequate socio-economic and Environmental Action Plan, with appropriate levels of impact mitigation and compensation, is part of the development, then, if a project can be shown to be economically and financially viable with respect to only the direct costs and benefits, the overall economic viability can be reasonably assumed A study of the macroeconomic impact of potential power export projects should be undertaken when possible

5 2 Socio-economic and Environmental Impacts

For major power export projects, a detailed Environmental Impact Assessment (EIA) and Environmental Action Plan (EAP) would be required before the final evaluation of the project is made, public hearings held, and a Generation License issued However, these studies can be costly and time consuming, and it is unlikely that private developers would be willing to incur such costs until they have the security of a conditional Project Agreement and an Export Agreement Detailed engineering would probably be deferred until after the issuance of the Generation and Transmission License, financial closure, and the signing of a PPA

As a general principle, the intent should be that mitigation and compensation is sufficient to ensure that those who experience adverse socio-economic impacts are left no worse off than before the project Similarly, environmental mitigation and compensation should try to achieve net environmental benefits Unfortunately, the economic quantification of environmental costs and benefits (as opposed to expenditures) is very difficult and subjective, and the achievement of net benefits is not always possible In such cases, the other benefits of development must be sufficient to compensate HMGN for the costs

5 3 Electricity Royalties

Electricity Royalties are currently set in a two-tier system, with one rate applying for the first 15 years of operation, after which they jump to a higher rate and are fixed thereafter The capacity charge is related to the installed capacity while the energy royalty is related to the annual energy revenue [1] The resulting pattern of royalties for a typical export project is shown on page B-91 of Appendix B It can be seen that energy royalties are considerably greater than those from capacity, which gradually decline in real value over time Because of the discounting effect on delayed revenues, the first 15 years account for about half of the present value of total royalties Overall, electricity royalties would account for over 10% of the total HMGN benefits from a typical power export project

5 4 Taxes and Fees

The calculation of assumed tax rates for a typical project, as an effective percentage of capital costs, operating costs, and operating revenues, is given in Appendix C This calculation is based on assumed weighted average shares for the major cost components, such as labor, equipment and materials, etc and the assumptions are for illustrative purposes only They should be adjusted, subject to specific project costs and negotiations, and as policies clarify and change

[1] The Capacity Royalty is 100 NRs/kW/year for the first 15 years, rising to 1,000 NRs/kW/year thereafter The Energy Royalty is 2% of total energy revenue for the first 15 years rising to 10% thereafter

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Taxes and fees which may be applied to the project include

(a) **Corporate Income Tax**
For electricity generation , transmission and distribution licensees this is specified at 10% less than the general rate prevailing after a 15 year tax holiday The current incremental rate is 20%, and HMGN states that the effective rate levied against developers will therefore be 18% [2]

(b) **Export Tax**
The Electricity Act states that the exporter of electricity shall have to pay export duty as prescribed The actual rate will be determined in the Agreement between HMGN and the developer

(c) **Mortgage Registration Fee**
A percentage of the debt financing may be levied by HMGN, as specified in the prevailing legislation In some cases, developers have negotiated terms which exclude the application of this fee

(d) **Personal Income Taxes**
These will apply as specified in the prevailing legislation

(e) **Customs, Sales Tax and Excise Duty**
Customs duty and sales tax shall be levied at the prevailing rate on the import of construction equipment, machinery, tools and their spare parts required for operation and maintenance if they are produced and sold by local industries Only 1% customs duty shall be applied to the import of goods if they are not produced in Nepal It is unclear what rate shall be applied if the local supply is insufficient or of a lower quality The Sales Tax has recently been replaced by a VAT Tax of 14% In some cases, developers have negotiated terms which exclude the application of this tax

(f) **Local Taxes**
A local levy may be applied to goods brought into a region However, if the goods are simply in transit or will be taken back out, the levy is generally not applied, but may require a deposit in the interim prior to removal Rates may vary from region to region

(g) **India Import Tax**
In some cases, an import tax on imported electricity may be levied by India

5 5 Ownership Transfer

While the privately-developed power export project will be owned and operated by the developer for a sufficient period to make the developer's investment profitable, it is expected that ultimately, the ownership of the project will be transferred to HMGN, under the build-own-operate-transfer (BOOT) principle The details of transfer would be the subject of negotiation with the developer prior to project approval The typical life expectancy of a hydropower project should be at least 50 years depending upon siltation and electro-mechanical equipment would require increasing maintenance or replacement as it ages The value of the asset at transfer is calculated

[2] Some developers had, apparently wrongly assumed that an absolute 10% reduction would apply, i e in this case 20% - 10% = 10% The fact that such a misunderstanding could occur illustrates the need for greater clarity in some of the legislation

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in terms of the present worth of the post-transfer benefits and costs Because the post-transfer power revenues would normally greatly exceed such costs, therefore, depending upon the details of the agreement, the potential value of the asset transfer can be one of the most important benefits to HMGN (see the pie chart on page B-92 of Appendix B)

5 6 Downstream Benefits

Aside from the supply of electricity, the project may create other downstream benefits in both Nepal and India Flood control benefits might result if it is possible to store part of the river flow at the time of the peak, and thus reduce the flood damage that would otherwise have occurred Similarly, it may be possible to regulate the release of water to improve the flows available for downstream irrigation during the normal low flow period To maximize combined power and downstream benefits would require reservoir operation with this objective in mind - an operating mode which may tend to reduce the maximum power generation potential To the extent that such multi-purpose operation reduced power revenues, it would have to be a condition of the license to a private developer Alternatively, a developer incentive for multi-purpose operation would be required If operation to produce downstream benefits in India is to be worthwhile, a prior agreement on the quantification and sharing of net benefits would be required between India and Nepal So far, this has only been achieved in principle with respect to the Mahakali River and the Pancheshwar multipurpose project [3]

5 7 Other HMGN Direct Costs and Benefits

The government incurs a number of pre-development costs, including the cost of data collection and feasibility studies and land dedicated to the project HMGN may wish to treat these costs as its contribution to equity Alternatively, it may negotiate some other form of payment in compensation On the benefit side, a value may be attributed to project access and infrastructure which is available for public use

[3] Treaty Between HMGN and GOI concerning the integrated development of the Mahakali River, including Sarada Barrage Tanakpur Barrage and Pancheshwar Project

6 Steps to Private Export Project Implementation

The flowchart in Figure 3 illustrates the main steps that must be followed by HMGN and the developer as they move towards private project implementation It can be seen that the process is relatively complex and involves a number of interim stages of approval or agreement among the various parties In the interests of simplicity, not all steps are shown, and the procedure is likely to vary somewhat, depending upon the particular project concerned

The development process can be started either by HMGN deciding to seek proposals, or by a developer-initiated proposal At the same time, Parliamentary approval may be required, and negotiations should be initiated with India on the quantification and sharing of potential downstream benefits, if they exist Parliamentary approvals and international negotiations can take a long time, and the process must be started very early if they are not to hold up the entire project schedule

Once the proposal(s) have been submitted, there follows a process of initial evaluation from the technical, legal, regulatory, economic and financial points of view, with the economic and financial evaluation being based on NEPSIM model simulation The results of these evaluations will indicate the preferred developer If the results of initial negotiations between HMGN (through EDC) and the developer are satisfactory, the developer will be given sufficient assurance by HMGN to allow him to progress to the next stage The assurance may take the form of a Survey License and Letter of Intent, if an update of the Feasibility Study is required, or the issuance of a conditional Project Agreement and a conditional Export Agreement

Armed with this conditional level of project exclusivity and approval, the developer can then proceed with detailed negotiations with the major parties as required including the importer(s), the SEBs, NEA, his proposed contractors, financiers and investors, and the Government of India This should lead to the initialing of Finance Agreements and Power Purchase Agreement(s) (PPA) At the same time, the detailed Environmental Impact Assessment (EIA) and Environmental Action Plan (EAP) will be required, possibly before the conditional Financing Agreements can be initialed

At this stage, there would be the final detailed technical, legal/regulatory and economic and financial evaluations This would be followed by public hearings, and assuming that all the foregoing steps are passed satisfactorily, would result in the joint issuance of the Financial Closure documents, the signing of the PPA, and the Generation and Transmission Licences Only then would the developer be ready to award contracts to his contractors and proceed with the detailed engineering and project construction

Following commissioning and the agreed period of operation, ownership of the project would then be handed back to HMGN

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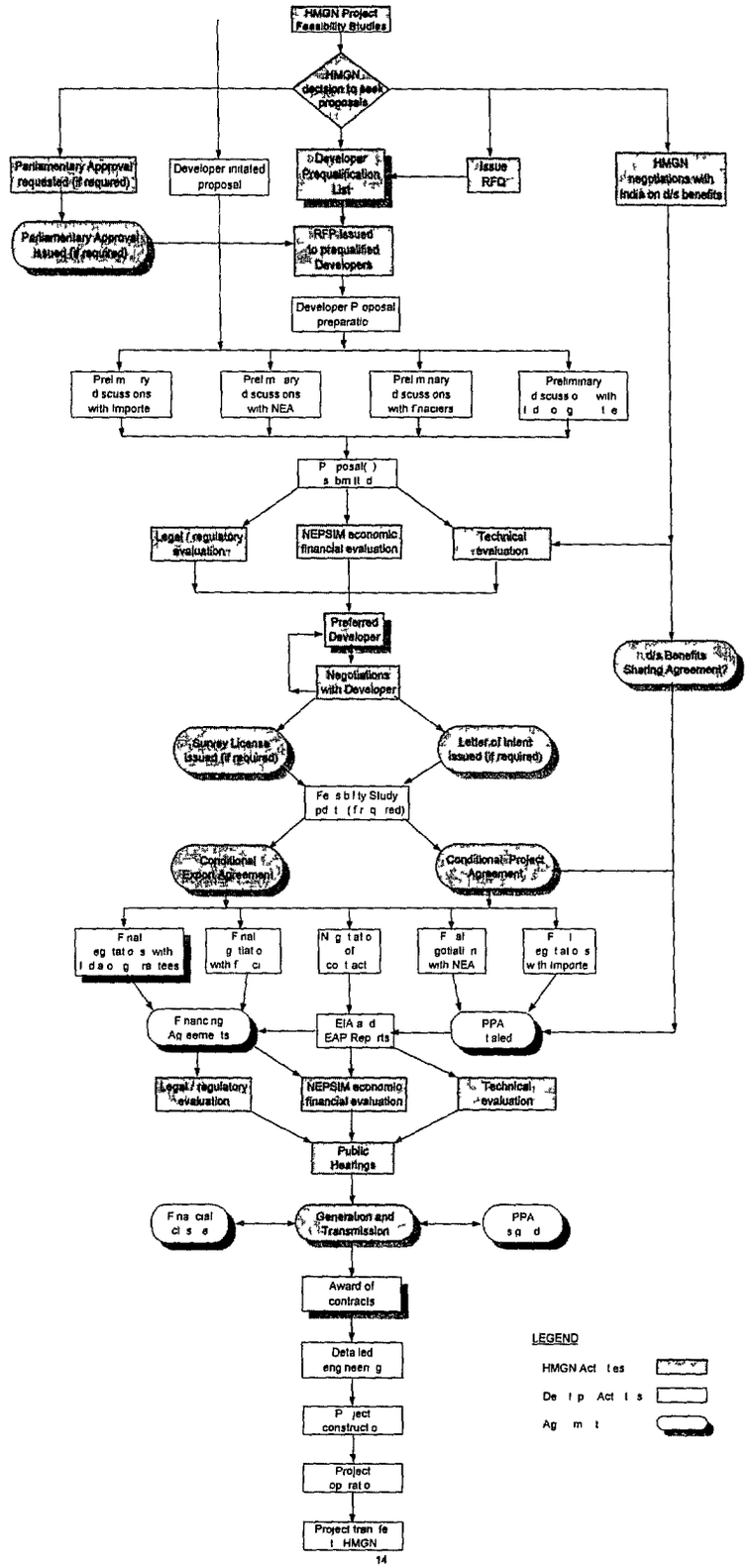
Figure 3
STEPS TO PRIVATE EXPORT PROJECT IMPLEMENTATION



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7 Power Export Bottlenecks and Risks

7 1 Financing

The developer's ability to finance the project is crucial The two fundamental requirements will be to secure the necessary guarantees to minimize the financial risks, and to be able to demonstrate financial viability under the terms and conditions agreed to with the various parties The main indicators of financial viability are the rate of return on equity, and the debt service coverage ratio Some developers have indicated that for power projects in Nepal, a minimum real[1] rate of return on equity of 20% would be required According to a number of financiers, the debt service coverage ratio[2] should not be less than 1 5 in any year, under average flow conditions Under low hydrology conditions, the ratio should not fall below 1 25

To the extent that the developer is paid for power exports in Indian Rupees, he will require guarantees that he will be able to convert his Indian Rupees into foreign exchange for debt service and profit repatriation Since HMGN has stated clearly that it will not provide such guarantees, they will have to come from the Government of India It is possible that GOI may move away from foreign exchange controls to full currency convertibility However, if this does not happen, some other currency convertibility guarantee approach will probably be required that has the backing of the official financial sector authorities

A potential constraint to export will be the limited ability of the SEBs to finance the necessary transmission and distribution infrastructure to get the imported power to the consumer Considering the poor credit rating and high debt levels of SEBs in Northern India, the developer will probably require guarantees from other Indian institutions Unless a take-or pay contract is signed with the importer, the availability of infrastructure financing guarantees will be a critical success factor

Another risk facing the developer is if the SEBs are unable to maintain payments for the power received Again, unless appropriate guarantees are provided by GOI or some other credit-worthy institution, this could be an obstacle to project implementation

The developer will be sensitive to the future rate of depreciation of the Indian Rupee relative to the harder currencies of his debt and equity

7 2 HMGN Approvals, Policies and Procedures

Article 126 of the Constitution says it is necessary to get a two thirds majority vote of both houses of parliament for "sharing" (international export) of natural resources It is unclear whether this applies to hydropower There has been some discussion of the fact that parliamentary approval may not be required if the resource is leased rather than owned by the developer This raises the question of the difference between use and/or ownership involving land use and water use It is not known how long the Parliamentary approval process might take,

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[1] Real in this case means net of inflation or after discounting for inflation

[2] The definition used is Debt Service Coverage Ratio = EBITDA/Debt Service, where EBITDA means earnings before interest taxes depreciation and amortization In practice EBITDA was taken as total operating revenues less operation and maintenance expenditures taxes and fees but before corporate income taxes

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however, if Parliamentary approval is required for hydropower projects, it should be secured before developers are expected to spend significant amounts of time and money on refining their proposals

The process leading up to project approval is complex, variable, and unclear It has occasionally been suggested that the developer should be willing to complete his detailed engineering before a Project Agreement has been issued It is highly unlikely that developers will be willing to invest so heavily until they are sure of getting approval

There are a number of legislative conflicts and inconsistencies The developer is sometimes unsure which legislation takes precedence

It is unclear what taxes will be imposed by HMGN This applies particularly to the export tax , the mortgage registration fee, the expectation of free power to HMGN, and local taxes Every case appears to be different and subject to negotiation This makes it difficult for developers to decide whether there is any merit in submitting a proposal In addition, the question of import duties is unclear In some cases an item to be imported may be manufactured in Nepal and is therefore subject to the higher import duty even though the quantity of the domestic product is too little or the quality inferior

7 3 Competition

Developers will be reluctant to submit a proposal if the short list of invitees is too long

More developers competing for a particular project will increase the benefits that they may be willing to offer HMGN On the other hand, however, if they are all negotiating with the same prospective power importers, this will tend to reduce the price that the importer will have to pay This in turn reduces the developer s profitability, and as a result also reduces the corporate income tax paid and HMGN dividends if HMGN has an equity share Thus, a point of diminishing returns is reached if too many developers are invited to bid

A single developer will be in a stronger negotiating position with the importer On the other hand, he will be less pressured to offer the most favorable terms to HMGN

When a Request for Proposals (RFP) is issued, EDC must take care to balance the costs of involving too few or too many developers in the competitive bid process

7 4 Environment

Environmental impacts are an extremely important consideration affecting potential project viability This is especially true of the larger projects, which are more suited for export, and which because of their size have correspondingly greater impacts The importance of adequate treatment of environmental factors was stressed in a recent USAID-funded report prepared for EDC on the subject [3]

[3] Strengthening EDC s Capacity for Environmental Review and Management of Power Sector Projects Acres International April 1996

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International financiers are particularly sensitive to the environmental and socio-economic impacts of the projects they are asked to finance Developers, on the other hand, may be reluctant to do more than absolutely necessary in the way of impact mitigation and compensation, as such costs tend to reduce project profitability

Environmental costs tend to rise the more they are studied

It will be very important, therefore, for HMGN to ensure that it has the necessary skills, institutional structure, policies, and procedures to ensure that the national economic and environmental interests are protected in a balanced and practical way

7 5 Downstream Benefits

If the project is approved before an agreement on the sharing of downstream net benefits is reached with India, it is less likely that a fair agreement can be reached after the fact

If the project implementation is delayed in order to secure agreement on downstream benefit sharing, the lost benefits from power generation soon exceed the potential additional benefits from downstream benefit sharing There is a general lack of specific information about downstream benefits The NEPSIM model has the capacity to calculate the potential benefits, but it is dependent on the availability of appropriate input data This will require more research and the cooperation of potential downstream beneficiaries

If the operating regime to maximize downstream benefits is different from that to maximize power benefits, developers will be reluctant to change unless it is a specific condition of the Generation License, or unless compensation incentives are offered by HMGN

7 6 Siltation

Siltation can have a considerable impact on the useful life of a project (through reduction of reservoir live storage and hydraulic erosion of civil structures and mechanical equipment) In addition, downstream siltation can sometimes affect the required operating regime

The potential risks and impacts of siltation should therefore be a factor in the investment decision

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8 Overview of the NEPSIM Model and its Use

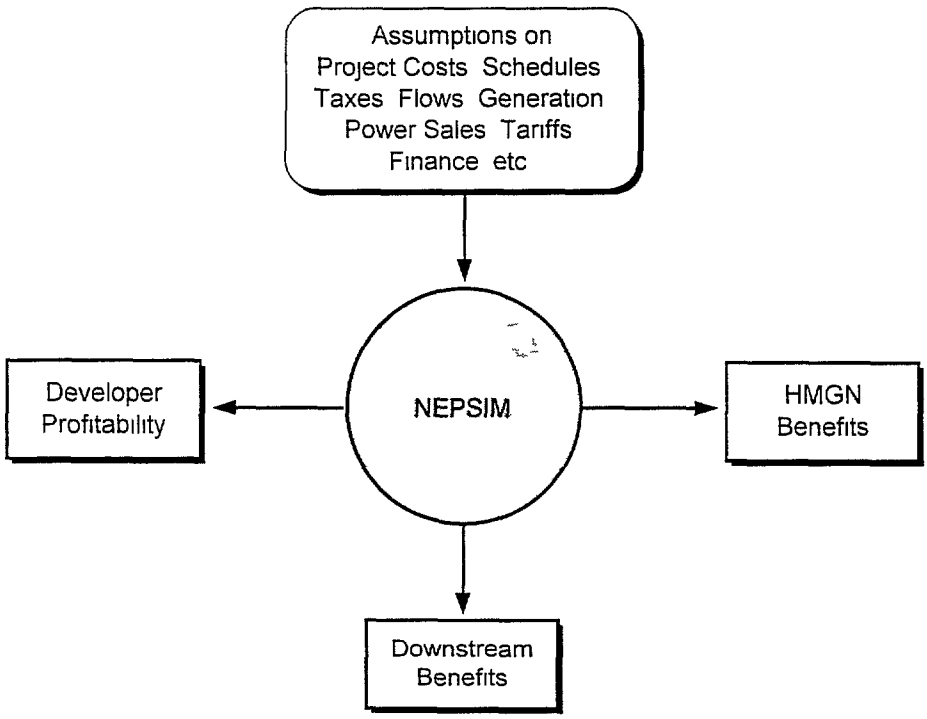
The Nepal Export of Power Simulation Model has been custom-designed and built for EDC as part of this assignment Full details of the model are given in the NEPSIM User's Manual and Model Documentation, Appendix B At the request of EDC, the model has been developed using Lotus 1-2-3 The model and associated files take up about 4 MB and can be compressed onto a single 1 4 MB diskette The model has been made as general, flexible, and user-friendly as possible

Essentially, the user inputs the data for a project in the input section, this can be very detailed or quite general, depending upon the available information A total of 129 different input arrays can be accommodated, but useful insights can be obtained from just a fraction of this input The model then automatically calculates the outputs, including a summary page of key indicators, a number of graphical summaries, and the results of a wide range of sensitivity studies

Figure 4 is a simple illustration of the main inputs and outputs The three main categories of outputs are Developer Profitability, HMGN Benefits, and Downstream Benefits It should be noted that export tariffs are an input to the model and not an output

Figure 4

INPUTS AND OUTPUTS IN THE NEPSIM MODEL



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Normally, the starting point will be a proposal from a developer on a particular project Project costs the financing plan and loan terms, development schedules, plant capacity, power production and tariff inputs can be based on the proposal Economic variables, such as inflation and currency exchange rates, can be based on the developer's assumptions or independent judgement Taxes and fees can then be input according to HMGN policy If downstream benefit information is available it should also be input, along with assumptions on the sharing of those benefits

The results of the simulation can be examined to determine developer financial viability, as measured by his real rate of return on equity and the debt service coverage ratio in the worst year If these parameters are too low either the cost will have to be reduced, sales tariffs increased, HMGN taxes and fees reduced, project handover delayed, or some combination of the four Conversely, if the return on equity is above 20%, HMGN benefits can be increased in a number of ways In this way policy options can be tested

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9 The Key Questions in Private Development of Power for Export (How NEPSIM Can Help)

9 1 What Should Nepal Charge for the Resource Use?

The direct revenues to Nepal from private export project development can come from a considerable number of different sources, not all of which will apply in every case

- Electrical Energy and Capacity Royalties
- Free power given to HMGN by the developer for on-sale to NEA
- The return on HMGN s equity in the project (e g due to pre-development expenses)
- Corporate Income Taxes paid by the developer, his contractors and suppliers
- Export Tax levied on power exports
- HMGN's share of export revenues
- Mortgage Registration Fees
- Personal Income Taxes paid by individuals employed as a result of the project
- Customs Import Duties
- Sales Tax or VAT
- Local Taxes
- Direct Infrastructure benefits
- Benefits of transfer of ownership of the project to HMGN
- Net downstream benefits in Nepal
- Nepal's share of the downstream benefits in India

The sum total of these direct benefits is, essentially, what HMGN charges for the use of the resource With the exception of the last two, most of the foregoing direct benefits to HMGN are direct cost to the developer, and as such they either reduce the developer s financial viability and/or increase the cost of exported power

There is no simple formula to determine what HMGN should charge A full economic viability analysis of the project, taking into account direct and indirect costs and benefits, would indicate whether the project is economically viable, and certainly the project should not proceed unless it is economically viable However, such an analysis would not answer the question of how much HMGN should charge Rather, it is a pragmatic question of what the market will bear By plugging the assumed PPA terms into NEPSIM, it is possible to determine what combination and level of HMGN benefits would tip the balance from developer financial viability to non-viability NEPSIM will also indicate the resulting shares of total net benefits, which are HMGN total net benefits, plus developer after tax profits, plus India's share of downstream net benefits At that point, HMGN must decide whether its net benefits are sufficient compensation for the use of the resources If not, the decision should be to defer the project for the time-being

9 2 Is the Export Price Viable and Fair?

Developer financial viability under the PPA terms can be quickly determined using NEPSIM, as explained above However, the question of whether the export price is fair is more complex The selling price obviously has to be greater than the cost of production, otherwise there is no incentive to invest or produce On the other hand, the price should probably be less than the alternative cost of power to the importer, otherwise he has little incentive to import, unless he is unable to finance the development of his alternative source

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The question is complicated further because there are different types of power (e g capacity, primary energy secondary energy, etc) and different possible times of delivery Thus there can be a wide range of possible tariff structures and levels In addition, the rate(s) of escalation of the tariffs and the currency(ies) of payment are important considerations Further, the allocation of risks (e g a take or pay contract) and the necessity for financial guarantees also influence the price

While some work has been done on the subject from time to time[1], an up-to-date study, based on a review of the literature and consultations with potential importers, is highly desirable, and would go a long way to answering the question of whether a particular PPA is fair It must be remembered, however, that provided the developer has the right incentives, he will be motivated to try to secure the best export agreement possible

9 3 What Would be the Developer's Profit and is it Fair?

NEPSIM makes the calculation of the developer's profit a simple matter, once the input data are available Developers say that considering the risks involved, a real rate of return on equity of at least 20% will be required Anything less than 20% and the developer is unlikely to find the project attractive

Is 20% fair? Yes, considering that HMGN would not have to incur any financial liability, beyond making the resource available, and would stand to earn considerable income, of which a third or so might be in foreign exchange A major export project would have a very positive impact on the economy of Nepal But it will not happen unless there is a sufficient benefit to the developer Is 30% too much? Probably It then becomes a question of how to share the excess profit fairly between HMGN and the developer

9 4 How to Share any Excess Profits Fairly?

It is conceivable that a developer might be able to control the costs and negotiate a favourable PPA so that the return on equity was significantly more than 20% If HMGN were to raise the taxes and fees to capture all of the "excess" profits above those that yield a 20% return, then the developer would have no incentive to generate such before tax profits However, if HMGN were to share any excess profits above the 20% level equally with the developer, then an incentive does exist and both parties can be winners This can be achieved in a number of ways

One of the simplest solutions involves the use of NEPSIM, or the developer s model if the two yield fairly similar results [2] The actual developer's return on equity will not be known until the end of the developer's operating period However, a close estimate can be made immediately prior to project construction At that time the terms of the PPA will be known, the turnkey price of the project will be set, the financing terms and the project operating agreement will have been fixed, and the basic HMGN terms and conditions will have been agreed

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[1] For example Karnali (Chisipani) Multipurpose Project Feasibility Study Main Report Himalayan Power Consultants December 1989

[2] All models of this type and complexity involve a number of over-simplifications otherwise they would become too unwieldy Therefore it is very unlikely that any two independent models will yield exactly the same results

Based on these known factors, the likely future return on equity can be determined with a much higher degree of confidence

If an Export Tax were to be used to give HMGN half of the "excess" profits, it would be possible, based on sensitivity analyses for the particular project, to produce a curve like that in Figure 5 This shows, for any anticipated return on equity, the Export Tax that would bring the return on equity half way back to the 20% minimum Thus, if such a formula were agreed in advance, the developer would be assured of at least a 20% return, and he would know that he would be able to keep half of any excess profits earned This approach would have the advantage of fixing the rules at the beginning - it would not be necessary to revisit the question every year The appropriate formula would of course have to be determined on a project-specific basis, and it would not be possible to apply the terms from one project to another

9 5 How to Compare and Evaluate Export Proposals?

As shown in Figure 3, developer proposals will be subject to evaluation from the legal/regulatory point of view, the technical point of view, and (using NEPSIM) the economic and financial point of view These evaluations will occur at least twice, initially to select the most favourable among competing proposals, and later, just prior to the decision of whether to award the project to a particular developer and issue a Generation and Transmission License NEPSIM simulations will probably also be used during the negotiation process with the preferred developer

The prototype Request for Proposals documentation[3] has been developed with NEPSIM in mind, and the data to be provided by the developers will have to be in a consistent format to facilitate entry as input data to NEPSIM The individual developer's estimates for power production, project costs, financing terms, and sales tariffs should be used Care should be taken in the initial comparison to use the same assumptions for all developers with respect to HMGN taxes and fees, inflation, exchange rates etc Also, downstream benefit assumptions should be the same unless a developer proposes a different size of development or different operating mode

Based on the NEPSIM simulations for each developer proposal, the first step should be to confirm potential developer financial viability, as measured by their real rates of return on equity and the minimum debt service coverage ratios What is important here is that the minimum financial criteria can be met and the project appears potentially viable A proposal with a developer ROE of 27% should not necessarily be considered superior to one of 20% The second step is then to compare the proposals in terms of the resulting benefits to HMGN NEPSIM calculates the Present Value of Direct Net Benefits to HMGN Assuming that the proposal is technically feasible and acceptable from the legal/regulatory points of view, then the key criterion is the Net Benefit to Nepal It is this figure that should be used as the basis for choosing between developers, and that negotiations should be aimed towards maximising

[3] Request for Proposals for 402 MW Arun-III Hydroelectric Project on Build Operate Own and Transfer (BOOT) Basis, Second Draft Acres International April 1997 Note that Arun III was used as the prototype project not as an endorsement but because it is the only project of that size for which design documentation has been completed

9 6 How to Choose Between Free Power or a Share in Revenues?

For some projects, HMGN may have the option of taking a certain percentage of the power production for resale to NEA, or a similar percentage of the net export revenues earned by the developer The choice depends upon a number of factors, including whether it would reduce the saleability of the remaining power for export, the incremental capital costs required in Nepal to allow power sharing, and the assumed tariff that NEA would pay relative to the proposed export tariff Because of the economies of scale of larger projects, the unit price of an export project should normally be lower than from a project suited for the demand in Nepal alone Ideally, therefore, NEA's system planning staff should be involved in answering the question

NEPSIM will indicate which option would result in the greatest net direct benefits to HMGN, but a full economic analysis, considering the direct and indirect costs and benefits of the options, would be required to determine with confidence what is in the greater national interest

9 7 What Should be the License Period?

Obviously, the developer will be eager to secure as long an operating period as possible before transferring ownership of the project to HMGN At the same time, the potential post-transfer benefits to HMGN are very significant Negotiations on the appropriate license period can be assisted considerably by NEPSIM simulations Sensitivity studies for varying periods of ownership will show the impact on developer profitability and HMGN Net Benefits and this will become another point for negotiation between the two parties It should be noted that after 25 or so years, the impact of any operating extension has relatively little benefit to the developer in terms of an increased ROE, whereas the decrease in HMGN Net Benefits is more significant This is because the discount rate used to calculate the present worth of HMGN net benefits is only 10%, which is much lower than the 20% or so ROE required by the developer Thus, longer-term benefits are more important to HMGN because they are discounted less

9 8 How to Share in Downstream Indian Benefits?

NEPSIM incorporates a powerful module to calculate potential irrigation, flood control and other downstream benefits in both Nepal and India But as with all computer programs, its value depends upon the reliability of the input data The problem, therefore, is not in calculating the potential benefits but in collecting the necessary input data It is apparent that the cooperation of India is required if the exercise is to lead towards an agreement on benefit sharing

So far, a Treaty has been signed between India and Nepal for the integrated development of the Mahakali River[4], and this establishes certain principles for cost and benefit sharing that may be extended to other rivers More study is now required on the potential downstream benefits on other rivers Once the respective benefits and costs are known, it is more likely that a fair basis for sharing any net benefits can be agreed

[4] Treaty Between HMGN and GOI Concerning the Integrated Development of the Mahakali River Including Sarada Barrage Tankapur Barrage and Pancheshwar Project

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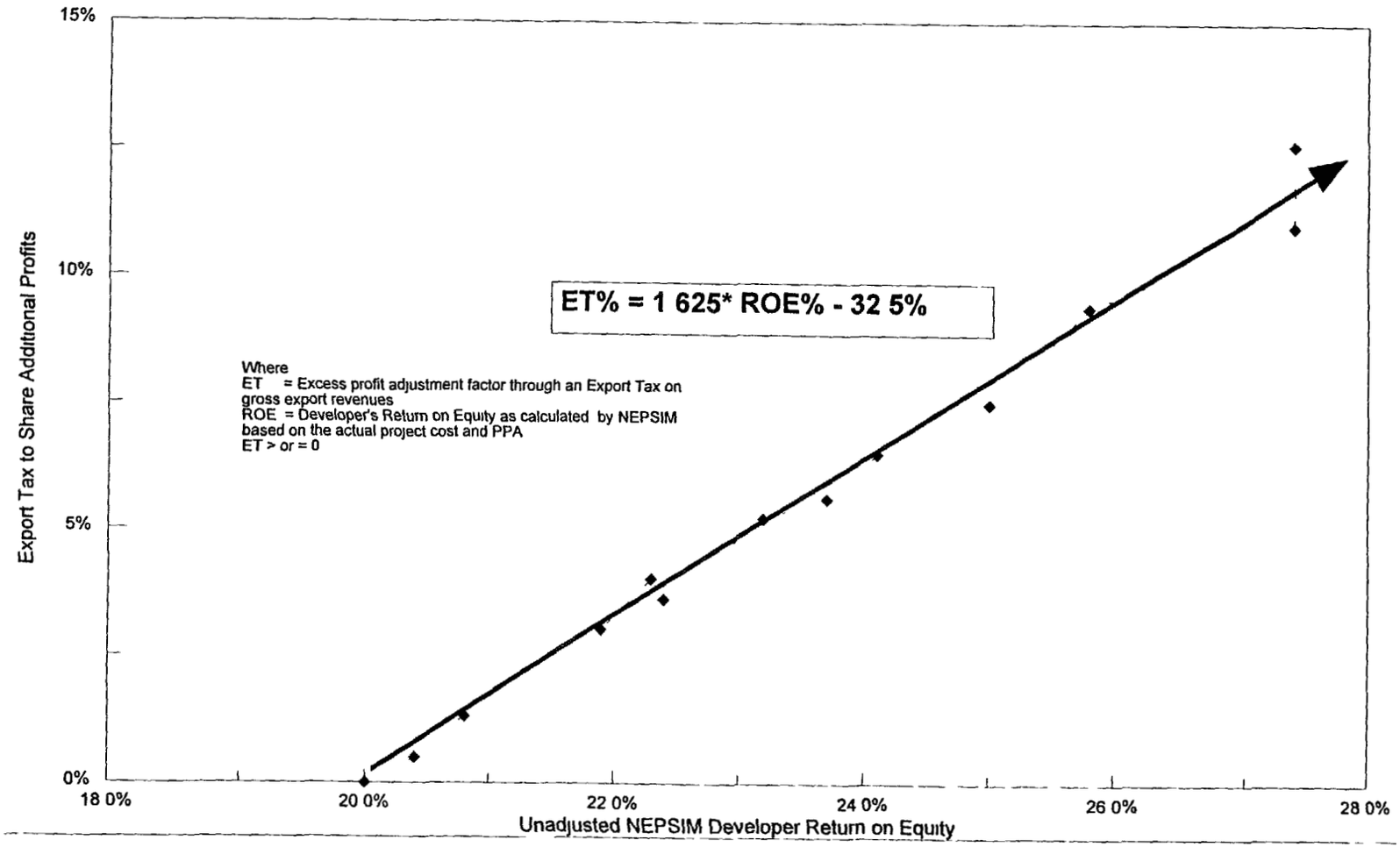
It was pointed out in Section 6 that the negotiation with India on downstream benefits could take a long time If a decision is taken unilaterally by Nepal to proceed with a particular power project, it would be much more difficult after the fact to reach an agreement with India on downstream benefit sharing Therefore, this issue must be addressed as early in the process as possible in order to avoid project implementation delays

A critical consideration is the fact that if the project is delayed in order to agree on downstream benefit sharing, a point is reached beyond which the losses in power benefits exceed the potential gains from downstream benefits The figure at the bottom of Page B-93 in Appendix B, which is produced as part of every NEPSIM simulation, illustrates this principle for a hypothetical project In the example, any delay of more than a year would result in a net loss of benefits to HMGN

Figure 5

Possible Adjustment for Actual Profitability

Based on a hypothetical project cost Operating Agreement financing and PPA



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10 Recommendations

The variable that has the greatest impact on both developer profitability and HMGN net direct benefits is the price of exported power IPPs therefore have a considerable incentive to try to maximize the export revenues However, potential developers can only afford to spend a limited amount of time in assessing power export market opportunities The subject is complex, and because prices will probably be some function of the importer's alternative cost, it is fairly difficult to make an independent judgement of the fairness of terms offered by the prospective purchaser

An up-to-date study of alternative power costs and acceptable import tariffs in the Northern India export market area would therefore be very helpful to both HMGN and IPPs The LRMC for new plant and operating costs for existing plant are required for the main types of plant and fuel sources in the primary market area The study should differentiate between the market for firm, secondary, peaking and emergency supply Price sensitivity to the Capacity Factor and seasonal variations in demand and value would be important, as would the likely currency of payment, tariff escalation rates, and the possible/preferred tariff levels and structures An estimate of likely wheeling charges and the acceptability of take or pay contracts would also be desirable

The environmental and socio-economic impacts of each hydropower project, and the adequacy of proposed mitigation and compensation measures, will be a major concern of international development agencies and financiers At the same time, developers will be reluctant to study the matter in depth until they are close to project approval Environmental issues cannot be left until the last minute It will therefore be necessary for HMGN to strengthen the institutional structures, policies, procedures, and staff skills so as to ensure that national economic and environmental interests are protected in a balanced and practical way Reference 23 in the Bibliography contains specific recommendations

With the development of NEPSIM, HMGN now has a powerful new tool to assist in power export policy formulation, and for analyzing and comparing developer proposals EDC and MOWR staff trained in the use of the model NEPSIM should be encouraged to develop this new skill Certainly, the more NEPSIM is used, the more confident and competent the staff will become in its application This will translate into more useful and timely results for the decision-makers In negotiations with developers, EDC should try to reach agreement in principle on a basis for sharing any excess profits, perhaps along the lines suggested in Section 9 2) It is likely that NEA staff would also find NEPSIM helpful in evaluating IPP proposals aimed strictly at the market in Nepal

If a power project supplies electricity to NEA as well as to export markets, it should be eligible for financial support from the Power Development Fund Considering the importance of project finance, PDF financing of part of the project cost could make the difference between whether or not the export project proceeds This might be a strong reason for HMGN to take some power and sell it to NEA, rather than to take a corresponding share of export revenues Efforts should be made as soon as possible to secure PDF funding assistance for any eligible power export projects IPPs should be notified immediately when such financial support will be available

Some of the main potential bottlenecks to power export projects are SEB transmission and distribution infrastructure financing and associated debt service guarantees, importer power payment guarantees, and the IPP ability to convert Indian Rupees to foreign exchange These problems will have to be resolved if the potential of power exports from Nepal to India is to be fully exploited HMGN should closely monitor developments, and seek donor assistance in finding practical solutions

A study is required of the likely macro-economic impacts of a typical IPP-developed power export project This study of the overall project economics should serve as a guideline for similar studies on subsequent projects

Elements should include

- Classification and quantification of all direct costs and benefits
- Explanation and quantification of appropriate shadow pricing and multipliers
- Analysis of the split between local and foreign currencies in capital and O&M expenditures and revenues
- Project impact on the national supply and demand for local and foreign currency
- Direct and indirect employment and spending
- Demand and supply of key commodities
- Impact on the balance of payments and the trade deficit
- Possible steps to maximize Nepal content, and recommendations on whether and when such steps should be implemented, considering the implications for financial viability
- Long-term planning forecasts of inflation rates in Nepal, India and the USA, relevant exchange rates, and the BOP deficit
- Guidelines on appropriate economic viability criteria and discount rates

The Mahakali Treaty may provide some precedent on downstream benefit sharing between Nepal and India However, for other rivers, a considerable amount of joint study will be required to quantify potential benefits and costs even prior to any negotiations on their sharing The NEPSIM model can be used to estimate benefits if appropriate input data can be obtained

The principle for net benefit sharing must be agreed with India in advance, as it will be very difficult to agree on a fair split once the decision to proceed has been made by HMGN Therefore, for any major project, negotiations should be initiated with GOI at the earliest practical date on the quantification and sharing of potential downstream benefits and costs Aid funding should be sought for this potentially profitable exercise in international cooperation

An economic analysis is required to help HMGN to choose between taking a share of power export revenues or a share of the power generated. This will require system planning inputs from NEA More study is also required to determine the best use of each project with respect to potential power and downstream benefits Again, NEA must be involved in the planning process to determine the optimal mode of operation

An attempt has been made in Figure 3 to summarize the main steps that HMGN and the developer must follow towards project implementation This process should be clarified and standardized as much as possible

Consideration should be given to a re-design of the electricity royalty structure, so that capacity royalties account for a more significant share Also the advisability of differential royalties for domestic power and for export should be considered

The need for a one-window approach to private power development led to the establishment of the EDC For this to be effective, the EDC needs appropriate authority as well as responsibility Steps are required to ensure that power export policy commitments made by one branch of government, e g on taxation, are supported by other ministries

A number of legislative conflicts and inconsistencies remain with respect to power export Steps should be taken to identify and resolve such conflicts Similarly, policy clarification is required in a number of areas, including

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import duty policy, particularly as it relates to goods which are available in Nepal but which may be of inferior quality or insufficient quantity, the policy on corporate income tax, particularly with respect to the definition of the percent reduction available to IPPs, and whether or when Parliamentary Approval is required for power export projects

An EDC library and computer database should be established

A summary, by project, of likely siltation and its implications would be helpful to potential developers

Appendices

Appendix A

Acronyms

BOOT	Build-Own-Operate-Transfer
CPI	Consumer Price Index (an index of inflation)
d/s	Downstream
EAP	Environmental Action Plan
EDC	Electricity Development Center
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product (a measure of the size of the economy)
GOI	Government of India
GWh	Gigawatt-hour (or 10^9 Watt-hours)
HMGN	His Majesty's Government of Nepal
IDA	International Development Association
IDC	Interest During Construction
PP	Independent Power Producer
Irs	Indian Rupees
k	kilo (or 10^3)
kW	kilowatt
kWh	kilowatt-hour
LOI	Letter of Intent, or Project Agreement, issued by HMGN
MOWR	Ministry of Water Resources of HMGN
MW	Megawatt (or 10^6 watts)
NEA	Nepal Electricity Authority (the National electricity utility)
NEPSIM	Nepal Export of Power Simulation Model
NPV	Net Present Value (or discounted present worth)
Nrs	Nepal Rupees
O&M	Operation and Maintenance
PA	Project Agreement issue by HMGN
PDF	Power Development Fund
PEP	Private Electricity Project
PPA	Power Purchase Agreement between Developer and Purchaser
RFP	Request for Proposals
ROI	Return on Investment
SEB	State Electricity Boards (the primary public utilities in India)
TOR	Terms of Reference
VAT	Value-added Tax (a possible replacement of the current sales tax)
WECS	Water and Energy Commission Secretariat of MOWR

APPENDIX B

CONFIDENTIAL

NEPAL EXPORT OF POWER SIMULATION MODEL

NEPSIM

USER'S MANUAL AND MODEL DOCUMENTATION

Technical Assistance
to the Electricity Development Centre
HMG/Nepal

provided under USAID Private Electricity Project
Contract No 367-0167-C-5117-00

by ACRES International Corporation
Amherst, New York

Prepared by

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June 1997, Kathmandu, Nepal

USER'S MANUAL AND MODEL DOCUMENTATION

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NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)

USER'S MANUAL AND MODEL DOCUMENTATION

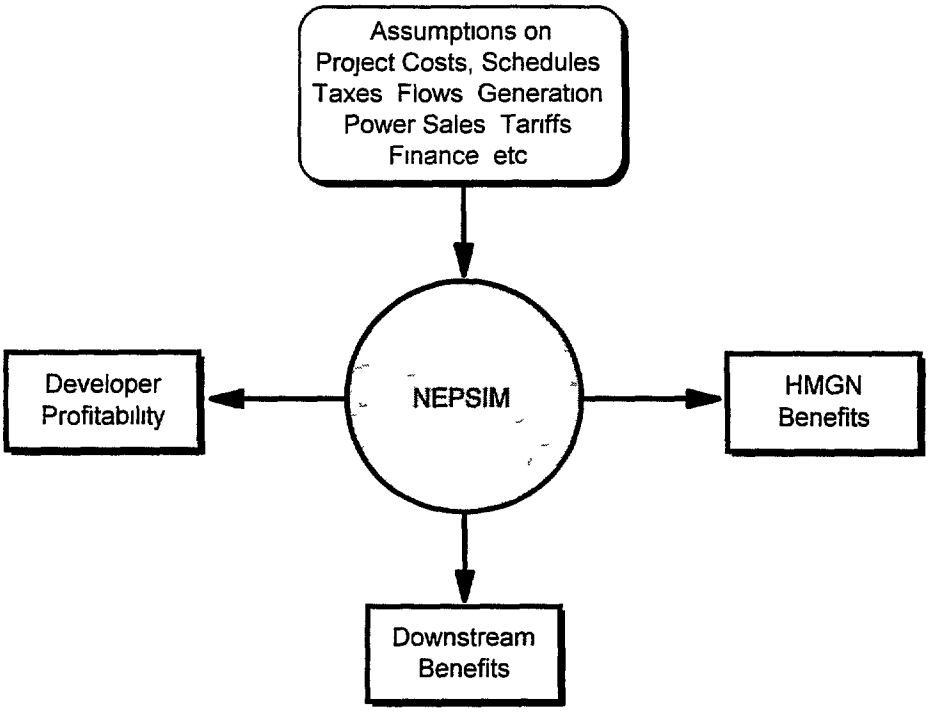
1 MODEL OBJECTIVES AND OVERVIEW

The NEPSIM model has been custom-developed as a tool for His Majesty's Government of Nepal (HMGN) as part of the effort to encourage private sector development of hydropower projects, in order to exploit opportunities for power export Specifically it has been designed to assist the Electricity Development Center (EDC) to

- ⇒ evaluate power export policy alternatives and formulate recommendations
- ⇒ assess and compare developer's proposals
- ⇒ quantify the net benefits to Nepal, including downstream benefits
- ⇒ assist in negotiations with potential developers and downstream beneficiaries
- ⇒ understand the linkages between HMGN policy, power production, export prices, project economics, project finance, and developer viability

Figure 1

INPUTS AND OUTPUTS IN THE NEPSIM MODEL



As shown in Figure 1, NEPSIM requires a number of inputs, based upon which it then calculates the resulting Developer profitability, downstream benefits, and HMGN benefits The level of detail of the inputs can be very detailed or quite general, depending upon the

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available information NEPSIM has been designed to have the flexibility to handle a wide range of project types and input assumptions Care has been taken to make it as automatic and user-friendly as possible Table 1 summarises the main categories of inputs and model outputs

Table 1

NEPSIM INPUTS AND OUTPUTS

Inputs	Outputs
Project Implementation Project and Developer Scenario description Development schedule Ownership and transfer **Project Costs** Capital cost and equity Operation and maintenance costs **Power Production and Sales** Power tariffs and wheeling charges Power production Power sales Transmission losses **Economics and Finance** Inflation and exchange rates Discount rate Debt financing and terms **HMGN Benefits** Taxes, Royalties and fees HMGN costs and other benefits **Downstream Benefits** Irrigation potential Flood damages and alleviation Benefit sharing	**Project Economics** Project real economic Rate of Return Present Worth of HMGN Net Benefits HMGN, Developer & India share of benefits **Developer Viability** Loan amortisation Developer's cash flow Developer ROR on equity Debt Service ratios Years of operation until payback **Downstream Benefits** Benefits within Nepal Benefits within India Nepal's share of India benefits **Analyses** Sensitivity studies Impact studies Royalty growth pattern HMGN total revenue growth pattern HMGN benefit share by source HMGN benefits relative to Trade Deficit Project delay economics

NEPSIM has been developed in Lotus 123 Spreadsheet format at the request of EDC because Lotus is the software package with which EDC staff are most familiar

While NEPSIM has been designed primarily for the analysis of power export projects, it has the flexibility to provide useful insights on projects fully dedicated to serving power consumers in Nepal, and could therefore also be a useful tool for NEA and of course WECS

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2 SOFTWARE / HARDWARE REQUIREMENTS

The NEPSIM model has been developed using the LOTUS 123 Release 5 for Windows spreadsheet LOTUS 123 is a Windows program that must be executed from Windows version 3 or later, Windows95 or WindowsNT operating systems Hardware requirements are the same for any machine running the Windows operating system Minimum recommended requirements are 486-33Mhz processor with 16MB of memory There will be significantly enhanced performance of model recalculation times if a Pentium processor with additional memory is utilized for model application Hard disk space requirements for the basic NEPSIM model and associated files is approximately 2MB Hard disk space of 20 to 50MB should be sufficient for most project applications

The model will work with any printer that is Windows compatible It is recommended that a 600 dpi quality printer be used to provide sufficient resolution of the NEPSIM model reports and graphs

3 INPUTS

The NEPSIM inputs are entered primarily in the INPUT model sheet The next few pages are a reproduction of the INPUT sheet, with numbers identifying each of the individual inputs or input sections This is followed by descriptions of each numbered item, corresponding to the numbers on the INPUT sheet

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NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)
MODEL INPUTS

Project	1
Scenario Description	2
Proposal Number	3
Scenario Number	4
Developer	5
Purchaser	6
First year of construction	7
Last year of construction	8
First full capacity commercial power production date	9
Total Developer capital cost in 1997 million US$	10
Developer's equity % of total capital cost	11
Project Life for this Analysis	12
Years of Full Developer operation before ownership transfer to HMGN	13
Developer proposed HMGN ownership % after transfer	14

* Including all taxes fees and socio-economic and environmental costs

Operation and Maintenance

Percentage of Capital Cost %/year (during private operation)	15
Percentage of Capital Cost %/year (after handover to HMGN)	16

Tariffs

	Year 1 Price 1997 US$	Escalation Real US $ %/year
Nepal capacity $/kW/mo	17	18
Nepal firm energy c/kWh	19	20
Nepal secondary energy c/kWh	21	22
Export capacity $/kW/mo	23	24
Export firm energy c/kWh	25	26
Export secondary energy c/kWh	27	28
Export capacity IRs/kW/mo	29	30
Export firm energy IRs/kWh	32	33
Export secondary energy IRs/kWh	35	36
Wheeling charge in Nepal $/MWh	38	39
Wheeling charge to border $/MWh	40	41
Wheeling charge in India $/MWh	42	43

Developer sells direct to NEA? 44 (No or Yes)

Developer gives power to HMGN which HMGN sells to NEA? 45 (No or Yes)

% Paid in IRs: 31, 34, 37

Average tariffs based on time-of-day operation to maximize revenues

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MODEL INPUTS

Input of Yearly Tariffs

Calendar Year	Nepal Capacity $/kW/mo	Nepal Firm Energy c/kWh	Nepal Secondary E c/kWh	Export Capacity Tariff in $ $/kW/mo	Export Firm Tariff in $ c/kWh	Export Sec Tariff in $ c/kWh	Export Capacity Tariff in IRs IRs/kW/mo	Export Firm Tariff in IRs IRs/kWh	Export Sec Tariff in IRs IRs/kWh
1999									
2000	46	47	48	49	50	51	52	53	54
2001									
2002									
2003									
2004									
2005									
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2007									
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2053									
2054									

Note If these annual tariffs are not specified the tariffs will be calculated from the inputs on the previous page

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MODEL INPUTS

Power Production Assumptions

	Net Power Output	Delivery to Nepal	Delivery to India
Capacity MW	55	56	
Firm Energy GWh/year	57	58	
Secondary Energy GWh/year	59	60	
Average Energy GWh/year			

Phase In of Power Production

Operating Year	Calendar Year	MW	GWh
1			
2	61	62	63
3			
4			
5			
6			

Transmission losses, %

to deliver to import customer 64

Inflation, Exchange Rate Depreciation and Discount Rate

US ave Inflation Rate %/year 65

Nepal ave Inflation Rate %/year 66

Depreciation Rate NRs/US$ % year 67

Depreciation Rate NRs/IRs %/year 68

Real Discount Rate %/year 69

Balance of Trade Deficit millions of US$ in first year of construction 70

Deficit Growth Rate % per Year 71

Exchange Rate Assumptions

mid Calendar Year	Inflation Indeces: US CPI	Inflation Indeces: Nepal CPI	Exchange Rates by Currency Type: (a) US $ per US $	(b) NRs per US $	(c) IRs per US $	(d) Pound per US $	(e) DM per US $	(f) Yen per US $
72	73	74				75		

Exchange Rates by Currency Type: (g) Ecu per US $	(h) Australian $ per US $	(i) per US $	(j) per US $	(k) per US $	(l) per US $	(m) per US $

MODEL INPUTS

Tax Rate Assumptions

	% of Cap cost	% of O&M cost
Personal Income Tax	76	77
Import Duties	78	79
Sales Tax or VAT	80	81
Local Taxes	82	83

Corp Tax holiday years 84

Corp Income Tax 85 of net profit

Export Tax 86 of net export revenues

Nepal Revenue Sharing 87 of net revenues

Mortgage Registration Fee 88 of debt financing

	First 15 years	Year 16 on
Capacity Royalty Rs/kW/yr	89	90
Energy Royalty % of total energy revenue	91	92

Loan Ammounts and Terms

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(thousands)

Loan Number	1	2	3	4	5
Lender					
Currency type					
Currency					
Amount thousands					
Interest Rate					
Amortization period years					
Grace Period years					
Initial US $ equivalent					

Loan Number	6	7	8	9	10
Lender					
Currency type					
Currency					
Amount thousands					
Interest Rate					
Amortization period years					
Grace Period years					
Initial US $ equivalent					

From Exchange Rate Assumptions on the previous page

Total Debt thousands of US $

Total Equity thousands of US $

Total Capital Cost, thousands of US $

MODEL INPUTS

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Assumed Distribution of Equity Spending

Construction Duration years

Period	3	4	5	6	7	8	9	10	11	12	13	14	15
1													
2													
3													
4													
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12													
13													
14													
15													
Totals	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%

MODEL INPUTS

Are HMGN pre-development costs credited as HMGN equity in the development? 95
(Type in Yes or No)

HMGN Costs and Benefits
(Thousan 1997 US$)

Calendar Year	HMGN * re-developel Investment	Direct ** Infrastructure Benefits	HMGN *** Other Costs
1997	96		
1998		97	98
1999			
2000			
2001			
2002			
2003			
2004			
2005			
2006			
2007			
2008			
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NPV			

* Studies surveys land cost of public hearings etc
** Access roads and other social infrastructure available to HMGN
*** HMGN costs other than operating and wheeling after ownership transfer

MODEL INPUTS

Irrigation Benefits

Based on Reliability Factor of 75%		
(e g available 3 of 4 Years)		
Existing Dry Weather Base Flow (cms)	99	
Project Dry Weather Base Flow (cms)		100
Annual Escalation of Irrigation Benefits (%)		101
Annual Escalation of O&M Costs (%)		102
% of India Irrigation Benefits to Nepal	103	

Flood Damages

Flood Damages Escalation %/Year

104

% of Net Flood Benefits in India Benefits to Nepal

105

Flood Damages

(Thousands 1997 US$)

Flood Return Period (years)	Without Project Development: Flood Peak Q (cms)	Flood Duration (days)	Flood Damages	Percent of ood Damage in Nepal	Project Flood Storage (mcm)	Project Flood Attenuation (cms)
50						
100	106	107	108	109	110	
200						
500						
1000						
2000						
10000						

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MODEL INPUTS

Other Downstream Benefits

Year of Operation	Other Nepal Benefits	Other India Benefits	% India Other D/S Benefits to Nepal
	1997 Thousands US$		
2002			113
2003	111	112	
2004			
2005			
2006			
2007			
2008			
2009			
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MODEL INPUTS

Nepal Irrigation Data Input

(Thousands 1997 US$)

	NEPAL								PER CROP RESULTS			
			Improvement of Existing		Development of New Irrigatio Area							
	District	Scheme	Hectares New	Hectares Improved	Water Requirement ms per Hectare	Initial Capital Improvement 1000 Hectare	Annual Additional O&M 1000 Hectare	Annual Differential Benefit 1000 Hecta	Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Benefi con
1									0 00	$0	$0	$0
2	114	115	116	117	118	119	120	121	0 00	$0	$0	$0
3									0 00	$0	$0	$0
4									0 00	$0	$0	$0
5									0 00	$0	$0	$0
6									0 00	$0	$0	$0
7									0 00	$0	$0	$0
8									0 00	$0	$0	$0
9									0 00	$0	$0	$0
10									0 00	$0	$0	$0
11									0 00	$0	$0	$0
12									0 00	$0	$0	$0
13									0 00	$0	$0	$0
14									0 00	$0	$0	$0
15									0 00	$0	$0	$0
16									0 00	$0	$0	$0
17									0 00	$0	$0	$0
18									0 00	$0	$0	$0
19									0 00	$0	$0	$0
20									0 00	$0	$0	$0
21									0 00	$0	$0	$0
22									0 00	$0	$0	$0
23									0 00	$0	$0	$0
24									0 00	$0	$0	$0
25									0 00	$0	$0	$0
26									0 00	$0	$0	$0
27									0 00	$0	$0	$0
28									0 00	$0	$0	$0
29									0 00	$0	$0	$0
30									0 00	$0	$0	$0
31									0 00	$0	$0	$0
32									0 00	$0	$0	$0
33									0 00	$0	$0	$0
34									0 00	$0	$0	$0
35									0 00	$0	$0	$0
36									0 00	$0	$0	$0
37									0 00	$0	$0	$0
38									0 00	$0	$0	$0
39									0 00	$0	$0	$0
40									0 00	$0	$0	$0
41									0 00	$0	$0	$0
42									0 00	$0	$0	$0
43									0 00	$0	$0	$0
44									0 00	$0	$0	$0
45									0 00	$0	$0	$0
46									0 00	$0	$0	$0
47									0 00	$0	$0	$0
48									0 00	$0	$0	$0
49									0 00	$0	$0	$0
50									0 00	$0	$0	$0
51									0 00	$0	$0	$0
52									0 00	$0	$0	$0
53									0 00	$0	$0	$0
54									0 00	$0	$0	$0
55									0 00	$0	$0	$0
56									0 00	$0	$0	$0
57									0 00	$0	$0	$0
58									0 00	$0	$0	$0
59									0 00	$0	$0	$0
60									0 00	$0	$0	$0
61									0 00	$0	$0	$0
62									0 00	$0	$0	$0
63									0 00	$0	$0	$0
64									0 00	$0	$0	$0
65									0 00	$0	$0	$0
66									0 00	$0	$0	$0
67									0 00	$0	$0	$0
68									0 00	$0	$0	$0
69									0 00	$0	$0	$0
70									0 00	$0	$0	$0
71									0 00	$0	$0	$0
72									0 00	$0	$0	$0
73									0 00	$0	$0	$0
74									0 00	$0	$0	$0
75									0 00	$0	$0	$0
76									0 00	$0	$0	$0
77									0 00	$0	$0	$0
78									0 00	$0	$0	$0
79									0 00	$0	$0	$0
80									0 00	$0	$0	$0
81									0 00	$0	$0	$0
82									0 00	$0	$0	$0
83									0 00	$0	$0	$0
84									0 00	$0	$0	$0
85									0 00	$0	$0	$0
86									0 00	$0	$0	$0
87									0 00	$0	$0	$0
88									0 00	$0	$0	$0
89									0 00	$0	$0	$0
90									0 00	$0	$0	$0
91									0 00	$0	$0	$0
92									0 00	$0	$0	$0
93									0 00	$0	$0	$0
94									0 00	$0	$0	$0
95									0 00	$0	$0	$0
96									0 00	$0	$0	$0
97									0 00	$0	$0	$0
98									0 00	$0	$0	$0
99									0 00	$0	$0	$0
100									0 00	$0	$0	$0
	Use individual line for each improved or new crop (e g do not include hectares of improvement and new irr									0	0	0

MODEL INPUTS

India Irrigation Data Input

(Thousands 1997 US$)

	INDIA								PER CROP RESULTS			
	Improvement of Existing or Development of New Irrigation Areas											
	District	Scheme	Hectares New	Hectares Improved	Water Requirements Per Hectare	Initial Capital Improvement 1000 Hectares	Annual Additional O&M 1000 Hectares	Annual Differential Benefit 1000 Hectares	Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Benefit
1									0.00	$0	$0	$0
2	122	123	124	125	126	127	128	129	0.00	$0	$0	$0
3									0.00	$0	$0	$0
4									0.00	$0	$0	$0
5									0.00	$0	$0	$0
6									0.00	$0	$0	$0
7									0.00	$0	$0	$0
8									0.00	$0	$0	$0
9									0.00	$0	$0	$0
10									0.00	$0	$0	$0
11									0.00	$0	$0	$0
12									0.00	$0	$0	$0
13									0.00	$0	$0	$0
14									0.00	$0	$0	$0
15									0.00	$0	$0	$0
16									0.00	$0	$0	$0
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18									0.00	$0	$0	$0
19									0.00	$0	$0	$0
20									0.00	$0	$0	$0
21									0.00	$0	$0	$0
22									0.00	$0	$0	$0
23									0.00	$0	$0	$0
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27									0.00	$0	$0	$0
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29									0.00	$0	$0	$0
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42									0.00	$0	$0	$0
43									0.00	$0	$0	$0
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48									0.00	$0	$0	$0
49									0.00	$0	$0	$0
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67									0.00	$0	$0	$0
68									0.00	$0	$0	$0
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83									0.00	$0	$0	$0
84									0.00	$0	$0	$0
85									0.00	$0	$0	$0
86									0.00	$0	$0	$0
87									0.00	$0	$0	$0
88									0.00	$0	$0	$0
89									0.00	$0	$0	$0
90									0.00	$0	$0	$0
91									0.00	$0	$0	$0
92									0.00	$0	$0	$0
93									0.00	$0	$0	$0
94									0.00	$0	$0	$0
95									0.00	$0	$0	$0
96									0.00	$0	$0	$0
97									0.00	$0	$0	$0
98									0.00	$0	$0	$0
99									0.00	$0	$0	$0
100									0.00	$0	$0	$0

Use individual line for each improved or new crop (e.g. do not include hectares of improvement and new irrigation on same line)

1 Project - Units Text

The name of the project being evaluated The project name is entered in the left most portion of the light blue field

2 Scenario Description - Units Text

Description of the specific scenario that is being evaluated The field has the automatically wraps text to take up to three lines of description The scenario description is entered in the left most portion of the light blue field

3 Proposal Number - Units Text

Field to insert any alpha-numeric identifier for the proposal

4 Scenario Number - Units Text

Field to insert any alpha-numeric identifier for the scenario

5 Developer - Units Text

Name of the proposed developer of the project The developer is entered in the left most portion of the light blue field

6 Purchaser - Units Text

Name of the proposed purchaser of the project, if applicable The purchaser is entered in the left most portion of the light blue field

7 First year of construction - Units Integer years

The first calendar year of construction The year should be entered in the four digit format, for example 1997

8 Last year of construction - Units Integer years

The last calendar year of construction prior to full capacity commercial power production The year should be entered in the four digit format, for example 1997

9 First full capacity commercial power production date - Units Integer years

The first calendar year of full capacity commercial power production This year should be one year greater than the last year of construction The year should be entered in the four digit format, for example 1997

10 Total developer capital cost - Units Million United States dollars

The present worth of the total capital cost of the project at the first year of construction Total capital cost of the project includes construction and related costs, interest during construction, insurance, environmental and socio-economic mitigation, taxes, fees, financial, legal and any other costs associated with the project

11 Developer's equity as percent of total capital cost - Units Percent

The percent of the total capital cost that will be supplied by the developer and not financed

12 Project Life for analysis - Units Integer years

This is the number of years the project economic analysis of the project will be computed after the first full capacity commercial power production The maximum project life the model will analyze is 50 years The year should be entered in the four digit format, for example 1997

13 Years of full developer operation before transfer to HMGN - Units Integer years

This is the number of years after full capacity power production that the developer will operate the project before the project ownership is turned over to HMGN The year should be entered in the four digit format, for example 1997

14 Developer proposed HMGN ownership after transfer - Units Percent

The percent of project HMGN would own at the end of the number of years of developer full operation This would normally be 100 percent

15 Operation and maintenance, developer operation - Units Percent

The annual operations and maintenance costs represented as a percent of the total capital cost during the developers operation of the plant

16 Operation and maintenance, HMGN operation - Units Percent

The annual operations and maintenance costs represented as a percent of the total capital cost after transfer of the project to HMGN

17 Nepal capacity tariff - Units US$/kW/Month

The installed capacity tariff for capacity that has been designated to Nepal The value to be entered is for the first year of construction

18 Nepal capacity tariff annual escalation - Units Percent

The annual escalation in real US$ of the Nepal capacity tariff

19 Nepal firm energy tariff - Units US cents/kWh

The firm energy tariff for energy delivered to Nepal The value to be entered is for the first year of construction

20 Nepal firm energy tariff annual escalation - Units Percent

The annual escalation in real US$ of the Nepal firm energy tariff

21 Nepal secondary energy tariff - Units US cents/kWh

The secondary energy tariff for energy delivered to Nepal The value to be entered is for the first year of construction

22 Nepal secondary energy tariff annual escalation - Units Percent

The annual escalation in real US$ of the Nepal secondary energy tariff

23 Export capacity tariff - Units US$/kW/Month

The installed capacity tariff for capacity that has been designated to Export (to be Paid in US$) The value to be entered is for the first year of construction

24 Export capacity tariff annual escalation - Units Percent

The annual escalation of the Export capacity tariff that is to paid in US$

25 Export firm energy tariff - Units US cents/kWh

The firm energy tariff for energy that has been designated to export (to be paid in US$) The value to be entered is for the first year of construction

26 Export firm energy tariff annual escalation - Units Percent

The annual escalation of the Export firm energy tariff that is to be paid in US$

55

27 Export secondary energy tariff - Units US cents/kWh

The secondary energy tariff for energy that has been designated to export (to be paid in US$) The value to be entered is for the first year of construction

28 Export secondary energy tariff annual escalation - Units Percent

The annual escalation of the Export secondary energy tariff that is to be paid in US$

29 Export capacity tariff - Units IRs/kW/Month

The installed capacity tariff for capacity that has been designated to Export (to be Paid in India Rs) The value to be entered is for the first year of construction

30 Export capacity tariff annual escalation - Units Percent

The annual escalation of the Export capacity tariff that is to paid in India Rs

31 Percent of capacity tariff paid in India Rs - Units Percent

The percent of the capacity tariff that is to paid for in India Rs

32 Export firm energy tariff - Units IRs/kWh

The firm energy tariff for energy that has been designated to export (to be paid in India Rs) The value to be entered is for the first year of construction

33 Export firm energy tariff annual escalation - Units Percent

The annual escalation of the Export firm energy tariff that is to be paid in India Rs

34 Percent of firm energy tariff paid in India Rs - Units Percent

The percent of the firm energy tariff that is to paid for in India Rs

35 Export secondary energy tariff - Units IRs/kWh

The secondary energy tariff for energy that has been designated to export (to be paid in India Rs) The value to be entered is for the first year of construction

36 Export secondary energy tariff annual escalation - Units Percent

The annual escalation of the Export firm energy tariff that is to be paid in India Rs

37 Percent of secondary energy tariff paid in India Rs - Units Percent

The percent of the secondary energy tariff that is to paid for in India Rs

38 Nepal wheeling tariff - Units $/MWh

The tariff for wheeling the power inside Nepal The value to be entered is for the first year of construction

39 Nepal wheeling tariff annual escalation - Units Percent

The annual escalation of the Nepal wheeling tariff in percent

40 Export wheeling tariff within Nepal - Units $/MWh

The tariff for wheeling export power inside Nepal The value to be entered is for the first year of construction

41 Export wheeling tariff within Nepal annual escalation - Units Percent

The annual escalation of the export energy wheeling tariff within Nepal in percent

42 Export wheeling tariff within India - Units $/MWh

The tariff for wheeling export power inside India The value to be entered is for the first year of construction

43 Export wheeling tariff within India annual escalation - Units Percent

The annual escalation of the export energy wheeling tariff within India in percent

44 Logical variable for sale of power to NEA - Units yes or no

Logical variable to set yes or no that is used to indicate if the Nepal portion of capacity firm and secondary energy are sold directly to NEA Yes or no should be entered in all small letters Both variables 44 and 45 can be specified no but only one of variables 45 and 46 can be set yes

45 Logical variable for power given to HMGN - Units yes or no

Logical variable to set yes or no that is used to indicate if the Nepal portion of capacity, firm and secondary energy are given directly to HMGN and then sold by HMGN to NEA Both variables 45 and 46 can be specified no but only one of variables 44 and 45 can be set yes

46-54 General Note

Annual tariffs can be set in the model using a base year and annual escalation as specified in fields 17 through 43 above Specific annual tariffs can also be specified using fields 46 through 54 described below The model utilizes either method but not a combination of both for each individual variable Care should be taken to fill in all years of the project for the full project life if the specific yearly input method is specified To facilitate switching back and forth between methods the top field in each of the specific yearly input columns is used as the key decision field If the top field in any specific yearly column is blank then base year with annual escalation method is used in the analysis Keeping the rest of the column full (from the second year to the end of the project life) will not affect the program results

46 Nepal capacity tariff - Units US$/kW/Month

The installed capacity tariff for capacity that has been designated to Nepal The tariff for each individual year should be entered for the years displayed

47 Nepal firm energy tariff - Units US cents/kWh

The firm energy tariff for energy delivered to Nepal The tariff for each individual year should be entered for the years displayed

48 Nepal secondary energy tariff - Units US cents/kWh

The secondary energy tariff for energy delivered to Nepal The tariff for each individual year should be entered for the years displayed

49 Export capacity tariff - Units US$/kW/Month

The installed capacity tariff for capacity that has been designated to Export (to be Paid in US$) The tariff for each individual year should be entered for the years displayed

50 Export firm energy tariff - Units US cents/kWh

The firm energy tariff for energy that has been designated to export (to be paid in US$) The tariff for each individual year should be entered for the years displayed

51 Export secondary energy tariff - Units US cents/kWh

59

The secondary energy tariff for energy that has been designated to export (to be paid in US$) The tariff for each individual year should be entered for the years displayed

52 Export capacity tariff - Units IRs/kW/Month

The installed capacity tariff for capacity that has been designated to Export (to be Paid in India Rs) The tariff for each individual year should be entered for the years displayed

53 Export firm energy tariff - Units IRs/kWh

The firm energy tariff for energy that has been designated to export (to be paid in India Rs) The tariff for each individual year should be entered for the years displayed

54 Export secondary energy tariff - Units IRs/kWh

The secondary energy tariff for energy that has been designated to export (to be paid in India Rs) The tariff for each individual year should be entered for the years displayed

55 Net power capacity of project - Units MW

The net total power capacity of the project in MW

56 Net power capacity assigned to Nepal - Units MW

The portion of net power capacity that has been assigned to Nepal The difference (including transmission losses, item 64) between net power capacity of the project (Item 55) and the net power capacity assigned to Nepal is the program computed value of net capacity assigned for delivery to India (export)

57 Net firm energy production of the project - Units GWh/year

The net annual total firm power production for the project The value used should include adjustments for station usage, scheduled and unscheduled losses and other appropriate energy reductions

58 Net firm energy production assigned to Nepal - Units GWh/year

The portion of net firm power production that has been assigned to Nepal The difference (including transmission losses, item 64) between net power capacity of the project (Item 57) and the net power capacity assigned to Nepal is the program computed value of net firm power production assigned for delivery to India (export)

59 Net secondary energy production of the project - Units GWh/year

The net annual total secondary power production for the project The value used should include adjustments for station usage, scheduled and unscheduled losses and other appropriate energy reductions

60 Net secondary energy production assigned to Nepal - Units GWh/year

The portion of net secondary power production that has been assigned to Nepal The difference (including transmission losses, item 64) between net power capacity of the project (Item 57) and the net power capacity assigned to Nepal is the program computed value of net firm power production assigned for delivery to India (export)

61 Phase-In power production calendar year - Units Integer year

The program allows the input of up to six years of partial power production during the construction period prior to the first year of full power production specified in field 13 The year should be entered in the four digit format, for example 1997

62 Phase-In power production net capacity - Units MW

58

The total net power capacity of the project corresponding to the year entered in the adjacent calendar year item 61 Based on the percentage of capacity assigned to Nepal and for export input in items 55 and 56, the corresponding ratio of Nepal and export capacity are automatically assigned by the program

63 Phase-In power net firm energy production - Units GWh

The total net firm energy production of the project corresponding to the year entered in the adjacent calendar year, item 61 All the phase-in energy is assumed to be firm energy Based on the percentage of firm energy assigned to Nepal and for export input in items 55 and 56 the corresponding ratio of Nepal and export firm energy are automatically assigned by the program

64 Export transmission losses - Units Percent

The percent of the net export capacity and firm and secondary energy production that is lost between the project and the ultimate export customer The capacity or firm and secondary energy remaining after this adjustment is the amount of capacity or firm and secondary energy actually sold to the export market

65 US average annual inflation rate - Units Percent/year

The estimated average annual US inflation rate that is expected over the life of the project

66 Nepal average annual inflation rate - Units Percent/year

The estimated average annual Nepal inflation rate that is expected over the life of the project

67 Nepal Rs to US$ annual depreciation rate - Units Percent/year

The estimated annual average depreciation rate between the Nepal Rs and US$ over the life of the project

68 Nepal Rs to India Rs annual depreciation rate - Units Percent/year

The estimated annual average depreciation rate between the Nepal Rs and India Rs over the life of the project

69 HMGN real discount rate - Units Percent/year

HMGN opportunity cost of money assigned to compute the present worth of government project benefits over the life of the project

70 HMGN balance of trade deficit - Units Millions of US$

The balance of trade deficit for HMGN in million of US$ for the first year of construction, item 7

71 HMGN balance of trade deficit annual escalation - Units Percent/year

The estimated annual average percent escalation of HMGN trade deficit over the life of the project

72 Exchange rate assumptions base year - Units Integer year

The reference calendar year for the exchange rate assumptions The year can be any year not later than the first year of construction, item 13 The year should be entered in the four digit format, for example 1997

73 US Consumer price index - Units Integer

59

The US consumer price index (CPI) for the specified exchange rate assumptions base year item 72

74 Nepal Consumer price index - Units Integer

The Nepal consumer price index (CPI) for the specified exchange rate assumptions base year, item 72

75 Exchange rate assumptions - Base Unit US$

A total of 13 different currency exchange rates can be specified in the model Seven currencies have been specified and an additional 6 can vary with the project The exchange rate entered is the conversion factor to convert the specified currency into US$ The letter code that is provided for each currency conversion (a to m) is used in the loan amounts and terms section of the input (item 93) to specify the appropriate currency exchange rate

76 Capital cost personal income tax - Units Percent

The personal income taxes representative of construction activities The personal income taxes paid are estimated as a percent of the total construction cost for that corresponding year

77 Operations and maintenance cost personal income tax - Units Percent

The personal income taxes representative of operations and maintenance activities The personal income taxes paid are estimated as a percent of the operations and maintenance cost for that corresponding year

78 Capital cost import duties - Units Percent

The import duties representative of construction activities The import duties paid are estimated as a percent of the total construction cost for that corresponding year

79 Operations and maintenance cost import duties - Units Percent

The import duties representative of operations and maintenance activities The import duties paid are estimated as a percent of the operations and maintenance cost for that corresponding year

80 Capital cost sales tax/VAT - Units Percent

The sales tax/VAT representative of construction activities The sales tax/VAT paid are estimated as a percent of the total construction cost for that corresponding year

81 Operations and maintenance cost sales tax/VAT - Units Percent

The sales tax/VAT representative of operations and maintenance activities The sales tax/VAT paid are estimated as a percent of the operations and maintenance cost for that corresponding year

82 Capital cost local taxes - Units Percent

The local taxes representative of construction activities The local taxes paid are estimated as a percent of the total construction cost for that corresponding year

83 Operations and maintenance cost local taxes - Units Percent

The local taxes representative of operations and maintenance activities The local taxes paid are estimated as a percent of the operations and maintenance cost for that corresponding year

84 Corporate taxes tax holiday - Units Integer years

The number of years, starting from the year of first commercial generation in which the developer is not required to pay corporate income taxes on profits from the project

85 Corporate income tax rate - Units Percent

The percent of annual corporate profits that must be paid to HMGN as corporate income tax

86 Energy export tax - Units Percent

The percent of net annual export energy revenues that must be paid to HMGN as energy export tax

87 Nepal revenue sharing - Units Percent

The percent of net annual developer revenues that must be paid to HMGN as revenue sharing

88 Mortgage registration fee -Units Percent

The percent of the total debt financed for the project that must be paid to HMGN as mortgage registration fee

89 First 15 years capacity royalty - Units Nepal Rs/kW/year

The capacity royalty fee paid to HMGN for each kW of project capacity during the first 15 years of commercial generation

90 After 15 years capacity royalty - Units Nepal Rs/kW/year

The capacity royalty fee paid to HMGN for each kW of project capacity after the first 15 years of commercial generation

91 First 15 years energy royalty - Units Percent

The percentage of developer net revenues from firm and secondary energy production paid to HMGN during the first 15 years of commercial generation

92 After 15 years energy royalty - Units Percent

The percentage of developer net revenues from firm and secondary energy production paid to HMGN after the first 15 years of commercial generation

93 Loan amounts and terms - Base Unit US$

The model allows for up to 10 individual project construction loans For each loan the user inputs the lender name, currency type code as explained in item 75, amount of loan in applicable currency, interest rate of the loan, amortization period in years and grace period, number of years starting from the first year of construction before payment of the loan must commence (normally the construction period) The model will compute the equivalent loan amount in US$ using the conversion factor input in item 75 At the bottom of this section the total project debt, developer equity and total capital construction cost are summarized The total capital construction cost should be consistent with the input total capital construction cost in item 10 The program uses item 10 in preference to this item in model calculations

94 Distribution of equity spending - Units Percent/Year

The model allows for construction duration of from 3 to 15 years The percent of total capital construction cost that is spent each year of the construction period is specified in the appropriate column The sum of the yearly percentages for each construction duration are

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added along the bottom of the table as a check to ensure that the yearly percentages add to 100 percent Only the year that corresponds to the length of construction period for the project under consideration is required to be completed

95 HMGN pre-development costs credited as equity logical - Units yes or no

The model allows the investment HMGN had put into the project prior to the private development to be credited to HMGN as equity in the project The user should type in either yes or no using all small letters, as appropriate The actual equity value is input in item 96

96 HMGN pre-development investment - Units US$

The present worth of HMGN pre-development investment in the project adjusted to the first year of construction US$

97 Direct infrastructure benefits - Units US$

The infrastructure benefits to HMGN resulting from the construction of the project The years that appear along the left of the table will automatically start from the first year of construction and end at the last year of the project life being evaluated Infrastructure benefits should be entered into the appropriate years row when they are expected to occur

98 HMGN other costs - Units US$

Any other expected cost to HMGN that are not included in any of the other inputs The years that appear along the left of the table will automatically start from the first year of construction and end at the last year of the project life being evaluated Other HMGN costs should be entered into the appropriate years row when they are expected to occur

99 Existing dry weather base flow - Units cms

The pre-project dry weather base flow with a reliability factor of 75% (available, on average, 3 out of 4 years) This reliability factor is general guidance and can be modified appropriately for each project as long as consistent methodology is utilized for both pre-project and post project base flows

100 Project dry weather base flow - Units cms

The post-project dry weather base flow with a reliability factor of 75% (available, on average, 3 out of 4 years) This reliability factor is general guidance and can be modified appropriately for each project as long as consistent methodology is utilized for both pre-project and post project base flows

101 Annual escalation of irrigation benefits - Units Percent

The annual average estimated percent in escalation of irrigation benefits in both India and Nepal during the life of the project

102 Annual escalation of irrigation O&M costs - Units Percent

The annual average estimated percent in escalation of irrigation operations and maintenance costs in both India and Nepal during the life of the project

103 Percent of India irrigation benefits to Nepal - Units Percent

Project developments in Nepal will have direct downstream irrigation benefits to India Some inter-governmental arrangement may be developed that will provide some portion of the benefits provided to India be recovered by Nepal The value input to this field is the percent of the India irrigation benefits that Nepal is expected to receive

104 Annual escalation of flood damages - Units Percent

Due to expected continual watershed development and investment over the life of the project the estimated flood damages at a particular probability of occurrence mav potentially increase The annual average estimated percent of escalation of flood damages downstream of the project, to include India and Nepal over the like of the project in input in this field

105 Percent of India flood benefits to Nepal - Units. Percent

Project developments in Nepal will have direct downstream flood benefits to India Some inter-governmental arrangement may be developed that will provide some portion of the benefits provided to India be recovered by Nepal The value input to this field is the percent of the India flood benefits that Nepal is expected to receive

106 Existing flood peak discharges - Units cms

The pre-project computed peak flood discharges corresponding to the flood return periods along the left of the table For example the 50 year return period is the flood that is expected to occur, on average once every 50 years or a yearly probability of occurrence of 2 0 percent

107 Existing flood duration - Units days

While the peak flood is input in the previous field a duration is required to compute the approximate volume of each return period event Input an appropriate flood duration that provides in conjunction with the peak discharge a reasonable estimate of the flood volume

108 Existing total flood damages - Units US$

For each return period event the estimate of combined flood damages in both India and Nepal resulting from that level of flood

109 Percent of total flood damages in Nepal - Units Percent

Total flood damages input in item 108 include the flood damages in both India and Nepal The value input here represents the percent of total flood damages that occurs in Nepal

110 Project flood storage - Units Thousand cubic meters

The project storage expected to be available for flood storage This will likely be the same value for each of the flood return periods but may be varied if modifications to reservoir operations policies occur under different storm events

111 Other Nepal downstream benefits - Units US$

Any other expected downstream benefits to HMGN that are not included in any of the other inputs The years that appear along the left of the table will automatically start from the first year of commercial operation and end at the last year of the project life being evaluated Other HMGN downstream benefits should be entered into the appropriate years row when they are expected to occur

112 Other India downstream benefits - Units US$

Any other expected downstream benefits to India that are not included in any of the other inputs The years that appear along the left of the table will automatically start from the first year of commercial operation and end at the last year of the project life being evaluated Other India downstream benefits should be entered into the appropriate years row when they are expected to occur

113 Percent of India other benefits to Nepal - Units Percent

Project developments in Nepal will have other direct downstream benefits to India Some inter-governmental arrangement may be developed that will provide some portion of the benefits provided to India be recovered by Nepal The value input to this field is the percent of the other India benefits that Nepal is expected to receive

114 Nepal irrigation district - Units Text

Alpha numeric field to identify a particular Nepal irrigation district

115 Nepal irrigation scheme - Units Text

Alpha numeric field to identify a particular Nepal irrigation scheme

116 Number of new Nepal irrigation hectares - Units Hectares

The number of new hectares of irrigation for this irrigation scheme One scheme can have either new or improved hectares of irrigation but not both

117 Number of improved Nepal irrigation hectares - Units Hectares

The number of improved hectares of irrigation for this irrigation scheme One scheme can have either new or improved hectares of irrigation but not both

118 Nepal irrigation water requirement per hectare - Units cms/hectare

The Nepal irrigation water requirement per hectare for this irrigation scheme

119 Nepal irrigation initial capital improvement cost - Units US$/1000 hectares

The Nepal capital improvement costs associated with construction and implementation of this irrigation scheme per 1000 hectares

120 Nepal irrigation annual O&M costs - Units US$/1000 hectares/year

The Nepal annual additional operations and maintenance costs associated with this irrigation scheme per 1000 hectares

121 Nepal annual irrigation differential benefits - Units US$/1000 hectares/year

The Nepal average annual expected differential benefits resulting from this irrigation scheme per 1000 hectares

122 India irrigation district - Units Text

Alpha numeric field to identify a particular India irrigation district

123 India irrigation scheme - Units Text

Alpha numeric field to identify a particular India irrigation scheme

124 Number of new India irrigation hectares - Units Hectares

The number of new hectares of irrigation for this irrigation scheme One scheme can have either new or improved hectares of irrigation but not both

125 Number of improved India irrigation hectares - Units Hectares

The number of improved hectares of irrigation for this irrigation scheme One scheme can have either new or improved hectares of irrigation but not both

126 India irrigation water requirement per hectare - Units cms/hectare

The India irrigation water requirement per hectare for this irrigation scheme

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127 India irrigation initial capital improvement cost - Units US$/1000 hectares

The India capital improvement costs associated with construction and implementation of this irrigation scheme per 1000 hectares

128 India irrigation annual O&M costs - Units US$/1000 hectares/year

The India annual additional operations and maintenance costs associated with this irrigation scheme per 1000 hectares

129 India annual irrigation differential benefits - Units US$/1000 hectares/year

The India average annual expected differential benefits resulting from this irrigation scheme per 1000 hectares

4 CALCULATIONS AND OUTPUTS

The first sheet of the NEPSIM model is the Table of Contents (TOC) worksheet, which with its menu of destination buttons and print option buttons is one of the primary mechanisms for navigating around the model and for print control That is followed by the Summary Results page, which provides an executive summary of the main results of the simulation, organised in terms of the key indicators for HMGN, for the Developer, and for the overall project Next is the Inputs worksheet, already described in Section 3, where the project and scenario specific data is entered Then comes a series of worksheets where the bulk of the calculations are automatically performed, based on the inputs Finally, there is the detailed outputs section, which consists of a summary worksheet of the sensitivity and impact analyses, followed by six graphical presentations of results

5 USING NEPSIM

a) General Model Layout

The NEPSIM model contains a total of 17 LOTUS 123 worksheets The first worksheet is the Table of Contents which provides the name and description of the other worksheets The default colour for all worksheets in the model is light yellow As stated previously input fields have all been coloured light blue Results of calculations have been coloured white Additionally, areas that have been coloured light grey contain command buttons which activate macro command to move between sheets, complete calculations and do automated printing Command buttons have been generally placed in the top left corner of each sheet The user can quickly get to each sheets command button by pressing the "Home" key on the keyboard Pressing the Home key will make the active cell A1 or the top left most cell of the worksheet In addition to the command buttons a block of text will also be visible which describes the project and scenario being completed

Moving between worksheets can be accomplished by using a command button that takes you from the Table of Contents (TOC) to any worksheet and from any worksheet back to the TOC Movement between worksheets can also be accomplished by selecting the appropriate worksheet tab The worksheet tabs have been named based on the contents of the sheet generally using the initials of the name of the worksheet (an example, PPP for the worksheet named Power, Production, Pricing & Annual Revenues) The worksheet tabs have short abbreviations so that all worksheet tabs can be displayed across the top of the window at one

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time This allows quick movement between sheets after the user becomes experienced with the model

b) Model Calculation/Recalculation Procedures

The user set-up command for recalculation of the model has been set to automatic This means that generally in the model, when input is changed, all subsequent calculations are updated automatically The right end of the LOTUS 123 status bar displays the status of recalculation If the word "READY' is displayed all recalculation has been completed If the word "WAIT" is displayed then recalculation is still taking place and all values may not be updated until the ready message is displayed

While most values are automatically updated when input is changed this is not the case when calculation and update are accomplished in the model by the use of LOTUS 123 macros To activate a macro requires the user to activate the macro by some action (pressing a command button) In addition, one macro can call another macro but the original macro would still require activation by the user To activate the downstream irrigation benefits calculation, downstream flood benefits calculation, sensitivity analysis calculation, and to update the appropriate range on model graphs requires manual activation by the user This means that if the user has made changes in the inputs to update the sensitivity results worksheet results would require the user to press the "Compute Sensitivity Analysis" command button at the top of the SA worksheet When any input has been changed and the user wants to review model results the appropriate compute buttons for irrigation benefits, flood benefits, sensitivity analysis and graphs should be activated

The model has been programmed so that no printing of results can be accomplished without the computation macros updating of the model The user will notice when printing the complete model input and results, or specific pages that require updating, that there is a delay prior to printing while the updating macros are completed Some macros, such as the sensitivity analysis computation macro, involves numerous commands and takes a noticeable time to compute all the results The user can determine if a macro is still running by observing the message on the right side of the status bar The message "Cmd" means that a command is being completed and that the macro is still running A combination of "Cmd" and "Wait" commands will be displayed when a macro is being completed The user can determine when the macro and recalculation is complete when the "Ready" message appears in the status bar

6 MODEL MAINTENANCE

a) Model Manager

A model manger should be appointed for NEPSIM who has overall responsibility for the model maintenance, updates and modifications of the program and documentation and is the point of contact for obtaining the model and documentation He should also keep a list of users to whom the model has been provided so that all users can receive timely updates of NEPSIM model or documentation modifications and updates <u>The model manger must not only have excellent LOTUS 123 skills and experience, but must also have a sufficient knowledge of the economic concepts and procedures used in the model to understand the potential consequences of contemplated changes to the model</u>

The NEPSIM model results are potentially sensitive and it may be advisable to control the distribution of the model and to ensure that its results are treated as confidential This will apply particularly in the case of negotiations with developers, importing states or enterprises and downstream beneficiaries in India

The model manager will be the custodian of the master copy and backup copy of the model and will the person who knows the password that is required to remove the general protection - a step that is required before the internal structure and logic of the model can be modified The model manager can also keep extra copies of the user's manual and model documentation and can be responsible for the distribution of copies of the model

b) Master Copy

The most current version of the NEPSIM model (master copy) should be kept by the model manager on both hard disk and floppy disk at all times It is recommended that the most current version of the NEPSIM files be kept in a zipped file named with the date of the latest update For example the file N290597 ZIP would be the version updated on 29 May 1997 This is the file that would be given to users so they would only have to check to see the name of the latest ZIP file in their directory to know if they have the most current version of the NEPSIM

c) Protection, Modification and Update

The NEPSIM model has been sealed using the LOTUS 123 file-protect command This effectively allows no modification to cells within the spreadsheet that have not been specifically set to be unprotected All cells that are light blue in colour are data input cells in NEPSIM and have been set unprotected No other cells in the NEPSIM model can be modified by the user An error message will be displayed if the user tries to change any cell that has not been specifically excluded before the file was sealed A message code appears at the right side of the status bar that lets the user know if the active cell is protected or unprotected The protected code is Pr and the unprotected code is U

Sealing the file to protect it using the LOTUS 123 file-protect command requires the use of a password The password used to seal the file is required to unseal the file and allow modifications/update to the otherwise protected cells <u>It is imperative that this password not be lost</u> LOTUS 123 provides no methodology for unsealing the file without the password If the password is lost then the file cannot be unsealed to allow further modifications or updates If this were to occur it would be necessary to contact the authors of this report, who designed NEPSIM

7 GENERAL LIMITS OF THE NEPSIM MODEL

a) General limits include
- A construction period between 3 and 15 years
- The maximum number of years of project operation is 50 years
- The maximum possible phase-in of power production is 6 years
- No more than 10 financing or grant sources
- A maximum of 13 currencies and corresponding exchange rates
- The maximum period to cover loan grace period and amortization is 21 years
- A maximum of 100 irrigation districts in India and 100 in Nepal

b) The model assumes a constant pattern of average year power sales following the phase-in period

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c) No phased ownership transfer - simply a one time specified % handover at a specified date

d) Does not specifically allow for the physical and economic impacts of siltation

e) Does not allow for a variable pattern of O&M costs, which are input as simply a different % of capital costs during the private and public ownership phases

f) Does not specifically reflect variable seasonal or daily operation - figures are annual averages

g) The model assumes constant rates of inflation and currency depreciation Variations over the years can not be assumed

h) There is no specific allowance for peaking power sales - it is assumed that this is reflected in the average annual tariffs for capacity, firm energy and secondary energy

i) Energy for use in Nepal must be either sold by the developer direct to NEA or given to HMGN for sale to NEA, not a combination of both

j) Does not reflect expenditures in different currencies - all expenditures are expressed in US $ equivalent

k) Does not directly show the project's annual forex conversion burden on Nepal and /or India

l) Depreciation is straight line over the private ownership period No allowance is made for variable depreciation rates for various assets

m) No allowance is made for the commitment fee usually charged by financiers for non-use of funds

n) HMGN pre-development investments prior to the first year of construction have to be expressed in Present Worth terms for the first year of construction

o) The various tax rate assumptions are each expressed as a combination of percentage of capital costs and a percentage of O&M costs, and, apart from provision for a variable income tax holiday, remain constant throughout the analysis

p) The developer's Balance Sheet is not calculated, only his Cash Flow and Return on Equity

q) Irrigation initial capital costs are amortised over the project life using the selected discount rate

r) The specified annual escalation rates for flood damages, and irrigation benefits and O&M costs, must remain constant throughout the analysis

8 NEPSIM MACROS AND THEIR FUNCTIONS

The following table contains a listing of all macros used in NEPSIM The table contains the macro command, three columns in which temporary variables are stored and a column that describes what each line of the macro accomplishes

Name	Macro Commands	Counters and Base Case Input Values (Old)		Description
				FLOOD BENEFITS COMPUTATION
				Computes yearly flood damages based on input of 1 50 to 1 10 000 flood frequency flows estimated downstream damages associated with each flood level a yearly escalation of flood damages computed reduction in peak flood event discharge levels and specified period of a alysis
FldComp	{BLANK FLDRESULTS}	FldYrCnt		Clears the flood benefits yearly results table
	{IF FLDESC }{BLANK FloodAll}{RETURN}			If the flood input data is empty blank results and ext
	{FOR FldYrCnt 1 PLife 1 FloodSub}		51 00	FOR loop to call Subroutine FLOODSUB for each year of operation (FldYrCnt)
		Temp		
FloodSub	{PUT Temp 0 0 FldDam1}		0 00	Writes the value of the 50 year flood damages to variable Temp
	{PUT FldDamEsc 0 0 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam2}			Writes the value of the 100 year flood damages to variable Temp
	{PUT FldDamEsc 0 1 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam3}			Writes the value of the 200 year flood damages to variable Temp
	{PUT FldDamEsc 0 2 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam4}			Writes the value of the 500 year flood damages to variable Temp
	{PUT FldDamEsc 0 3 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam5}			Writes the value of the 1000 year flood damages to variable Temp
	{PUT FldDamEsc 0 4 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam6}			Writes the value of the 2000 year flood damages to variable Temp
	{PUT FldDamEsc 0 5 Temp (1+FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{PUT Temp 0 0 FldDam7}			Writes the value of the 10000 year flood damages to variable Temp
	{PUT FldDamEsc 0 6 Temp (1 FldEsc) (FldYrCnt)}			Computes escalation of flood damages (1 escalation) Years in Operation and replaces the value in the Fld_C calculation sheet
	{CALC}			Recalculates the spreadsheet.
	{PUT Year 0 FldYrCnt 1 FSTPOWERP FldYrCnt 1}			Places each year in yearly results table
	{PUT NDamages 0 FldYrCnt 1 NTot}			Places Fld_C sheet computed Nepal Flood Benefits in yearly results table
	{PUT IDamages 0 FldYrCnt 1 ITot}			Places Fld_C sheet computed India Flood Benefits in yearly results table
	{PUT Damages 0 FldYrCnt 1 YrTot}			Places Fld_C sheet computed Total Flood Benefits in yearly results table
	{CALC}			Recalculates the spreadsheet
	{RETURN}			Returns to calling macro if called from another macro
				IRRIGATION BENEFITS COMPUTATION
IrrCmp	{BLANK NIRRCPY}			Clears the results table for Nepal in the Irr_Sum Sheet
	{BLANK IIRRCPY}			Clears the results table for India in the Irr_Sum Sheet
	{BLANK IFINIRRYR}			Clears the resulkts field for the India capital cost of irrigation
	{IF EXDRYQ ""}{RETURN}			If irrigation data is blank exit and don't compute
	{LET CntNLns 0}			Resets the counter for the number of lines of Nepal Irrigation schemes to zero
	{LET CntILns 0}			Resets the counter for the number of lines of Indian irrigation schemes to zero
	{FOR NIrrCnt 1 100 1 NIrrSub}	NIrrCnt		FOR routine to write up to 100 schemes of Nepal of data to Irr_Sum
	{IF OVER<0}{FOR IIrrCnt;1 100 1 IIrrSub}		3 00	FOR routine to write up to 100 schemes of India of data to Irr_Sum
	{HOME}			Go to top of summary sheet
	{CALC}			Recalculates the spreadsheet.
	{RETURN}	IIrrCnt		Returns to calling macro if called from another macro
			3 00	
NIrrSub	{EDIT-GOTO NStartIn}	Over		Goes to the start of the Nepal Irrigation input area on sheet N_Irr
	{D NIrrCnt}		0 00	Based on NIrrCnt goes down to the appropriate input line
	{SELECT RIGHT 7}			Selects the 7 input fields to be copied
	{EDIT-COPY}			Copies the selected range to the clipboard
	{IF @CELLPOINTER("type") "b #AND#Over 0}{FORBREAK}			Checks to see if input line is blank If it is and Over (the amount of irrigation water left) is less than 0 water is left so break this FOR l op a d g t l d FOR loop
	{IF @CELLPOINTER("type") "b"#AND#Over>0} {BRANCH NInterpo2}			Checks to see if input line is blank If it is and Over (the amount of irrigation water left) is greater than 0 more water is being used than is available and must interpolate the last Nepal input
	{EDIT-GOTO NStartSum}			Goes to the start of the Nep l Irrigation Summary output area in sheet Irr_Sum
	{DOWN NIrrCnt}	CntNLns		Based on NIrrCnt goes down to the appropriate input line
	{EDIT-PASTE-SPECIAL cell-contents"}		2 00	Pastes the cell contents from the Nepal Input area to Nepal Summary area
	{LET CntNLns CntNLns 1}	CntILns		Increments the Nepal scheme counter for new scheme written to summary page
	{EDIT-GOTO NStartIn}		2 00	Goes to the start of the Nepal Irrigation input area on sheet N_Irr

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{IF Over>0} {BRANCH NInterpo}		IF Over (the amount of irrigation water left) is greater than 0 more water is being used than is available and must interpolate the last Nepal input (the difference between NInterpo and NInterpo2 is for NInterpo2 the counter NIrrCnt has been incremented already for NInterpo it has not)
IrrSub	{EDIT GOTO IStartI }		Goes to the start of the India Irrigation input area on sheet I_Irr
	{D IIrrCnt}		Based on IIrrC t goes down to the appropriate input line
	{SELECT RIGHT 7}		Selects the 7 input fields to be copied
	{EDIT COPY}		Copies the selected range to the clipboard
	{IF @CELLPOINTER("type") b"#AND#Over 0}{FORBREAK}		Checks to see if input line is blank If it is and Over (the amount of irrigation water left) is less than 0 water is left so break this FOR loop anyway no other irrigation areas are available to use
	{IF @CELLPOINTER("type") b"#AND#Over>0}{BRANCH IInterpo2}		Checks to see if input line is blank If it is and Over (the amount of irrigation water left) is greater than 0 more water is being used than is available and must interpolate the last India input
	{EDIT-GOTO IStartSum}		Goes to the start of the India Irrigation Summary output area in sheet Irr_Sum
	{DOWN IIrrCnt}		Based on IIrrCnt goes down to the appropriate input line
	{EDIT-PASTE-SPECIAL cell-contents"}		Pastes the cell contents from the India Input area to India Summary area
	{LET CntlLns CntlLns 1}		Increments the India scheme counter for new scheme written to summary page
	{EDIT GOTO IStartIn}		Goes to the start of the India Irrigation input area on sheet I_Irr
	{IF Over 0} {BRANCH IInterpo}		IF Over (the amount of irrigation water left) is greater than 0 more water is being used than is available and must interpolate the last India input (the difference between IInterpo and IInterpo2 is for IInterpo2 the counter IIrrCnt has been incremented already for IInterpo it has not)
NInterpo	{EDIT-GOTO NStartIn}		Goes to the start of the Nepal Irrigation input area on sheet N_Irr
	{DOWN NIrrCnt}		Based on NIrrCnt goes down to the appropriate input line
	{SELECT-RIGHT 7}		Selects the 7 input fields to be copied
	{EDIT-COPY}		Copies the selected range to the clipboard
	{EDIT GOTO IrrCalc}		Goes to the interim irrigation calculation section of the sheet FldIrr_C
	{EDIT PASTE-SPECIAL cell-contents"}		Pastes the cell contents from the Nepal Input area to Interim Calculation area
	{DOWN 1}		Moves down 1 row to the results of the appropriately ratioed input that now reflects the incremental amount to reach the exact amount of available irrigation water
	{SELECT-RIGHT 7}		Selects the 7 results fields to be copied
	{EDIT-COPY}		Copies the appropriately computed results
	{EDIT-GOTO NStartSum}		Goes back to the Nepal summary output area in the Irr_Sum sheet
	{DOWN NIrrCnt}		Move down to the same line that was last copied to this area
	{EDIT PASTE-SPECIAL cell-contents"}		Pastes the computed values from sheet FldIrr_C over the same unratioed line as pasted previously
	{HOME}		Moves to home so final results are displayed
	{FORBREAK}		Computed irrigation water used now equals irrigation water available end calculation
IInterpo	{EDIT-GOTO IStartIn}		Goes to the start of the India Irrigation input area on sheet I_Irr
	{DOWN IIrrCnt}		Based on IIrrCnt goes down to the appropriate input line
	{SELECT-RIGHT 7}		Selects the 7 input fields to be copied
	{EDIT COPY}		Copies the selected range to the clipboard
	{EDIT GOTO IrrCalc}		Goes to the interim irrigation calculation section of the sheet FldIrr_C
	{EDIT PASTE-SPECIAL cell-contents"}		Pastes the cell contents from the India Input area to Interim Calculation area
	{DOWN 1}		Moves down 1 row to the results of the appropriately ratioed input that now reflects the incremental amount to reach the exact amount of available irrigation water
	{SELECT-RIGHT 7}		Selects the 7 results fields to be copied
	{EDIT-COPY}		Copies the appropriately computed results
	{EDIT GOTO IStartSum}		Goes back to the India summary output area in the Irr_Sum sheet
	{DOWN IIrrCnt}		Move down to the same line that was last copied to this area
	{EDIT-PASTE-SPECIAL cell-contents"}		Pastes the computed values from sheet FldIrr_C over the same unratioed line as p sted previously
	{HOME}		Moves to home so final results are displayed
	{FORBREAK}		Computed irrigation water used now equals irrigation water available end calculation
NInterpo2	{EDIT-GOTO NStartIn}		Goes to the start of the Nepal Irrigation input area on sheet N_Irr
	{DOWN NIrrCnt 1}		Based on NIrrCnt goes down to the appropriate input line
	{SELECT-RIGHT 7}		Selects the 7 input fields to be copied
	{EDIT-COPY}		Copies the selected range to the clipboard
	{EDIT-GOTO IrrCalc}		Goes to the interim irrigation calculation section of the sheet Fldl r_C
	{EDIT-PASTE-SPECIAL cell-contents"}		Pastes the cell contents from the Nepal Input area to Interim Calculation area
	{DOWN 1}		Moves down 1 row to the results of the appropriately ratioed input that now reflects the incremental amou t to rea h the e act mou t of lable irrigati water
	{SELECT-RIGHT 7}		Selects the 7 results fields to be copied

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{EDIT COPY}		Copies the appropriately computed results
	{EDIT GOTO NStartSum}		Goes ba k t the Nepal summary output area in the Irr_Sum sheet
	{DOWN NIrrCnt 1}		M e down to the same line that was last copied to this area
	{EDIT PASTE-SPECIAL cell contents"}		Pastes the computed values from sheet FldIrr_C over the same unratioed line as pasted previously
	{HOME}		Moves to home so final results are displayed
	{FORBREAK}		Computed irrigation water used now equals irrigation water available end calculation
Interno2	{EDIT GOTO IStartIn}		Goes to the start of the India Irrigation input area on sheet I_Irr
	{DOWN IIrrCnt 1}		Based on IIrrCnt goes down to the appropriate input line
	{SELECT RIGHT 7}		Selects the 7 input fields to be copied
	{EDIT-COPY}		Copies the selected range to the clipboard
	{EDIT GOTO IrrCalc}		Goes to the interim irrigation calculation section of the sheet FldIrr_C
	{EDIT PASTE SPECIAL cell contents"}		Pastes the cell contents from the India input area to Interim Calculation area
	{DOWN 1}		Moves down 1 row to the results of the appropriately ratioed input that now reflects the incremental amount to reach the exact amount of available irrigation water
	{SELECT RIGHT 7}		Selects the 7 results fields to be copied
	{EDIT-COPY}		Copies the appropriately computed results
	{EDIT GOTO IStartSum}		Goes back to the India summary output area in the Irr_Sum sheet
	{DOWN IIrrCnt 1}		Move down to the same line that was last copied to this area
	{EDIT PASTE SPECIAL cell-contents"}		Pastes the computed values from sheet FldIrr_C over the same unratioed line as pasted previously
	{HOME}		Moves to home so final results are displayed
	{FORBREAK}		Computed irrigation water used now equals irrigation water available end calculation
			STRIPE THIS SHEET WHITE LIGHT BLUE TO HELP READABILITY
Stripe	{HOME}	StrCnt	Goes to the top of the macro sheet
	{DOWN 17}	1 00	Moves down 12 lines to get to the start of the macros
	{FOR STRCNT 1 700 1 DarkLn}		Sets up FOR loop that runs macro DarkLn for 500 times
	{HOME}		Goes back to top of macro sheet when completed
DarkLn	{IF @CELLPOINTER("backgroundcolor") 168}{BRANCH DwnOne}		If the cell the cursor is at has a background of dark blue (sperater between macros) then goes to macro DwnOnw which moves the cursor down one row
	{SELECT RANGE RELATIVE 8 0 0 0 0 0}		Selects a range of 20 columes for the row the cursor is in
	{STYLE INTERIOR 22}		Sets the bacground color to a light blue
	{DOWN 1}		Moves the cursor down one row
	{IF @CELLPOINTER("backgroundcolor") 188}{BRANCH DwnOne}		If the cell the cursor is at has a background of dark blue (sperater between macros) then goes to macro DwnOnw which moves the cursor down one row
	{SELECT RANGE RELATIVE 8 0 0 0 0 0}		Selects a range of 20 columes for the row the cursor is in
	{STYLE INTERIOR 0}		Sets the bacground color to white
	{DOWN 1}		Moves the cursor down one row
DwnOne	{DOWN 1}		Moves the cursor down one row
			PRINT THIS SHEET CONTAING ALL MACROS USED IN NEPSIM
PrintMacros	{PRINT NAME USE macros"}		Slect the page setup file Macros.AL3
	{HOME}		Got to top of the macro sheet
	{DOWN 16}		Move down 16 rows to start of macros
	{SELECT RANGE-RELATIVE 8 1364 0}		Select all active cells used in the sheet.
	{PRINT? selection"}		Print with preview the all active cells selection
	{PRINT-RESET}		Resets the page setup to the default settings
			SET PREVIEW TO OFF
SetPrintNP	{PUT PreviewYorN 0 0 no"}	PreviewYorN	Sets a variable (PreviewYorN) to no This logical causes prints to be do e without preview
	{RETURN}	no	Returns to calling macro If called from another macro

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Name	Macro Commands	Count rs and Base Case Input Values (Old)	Description
			SET PREVIEW TO ON
SetPrintWP	{PUT PreviewYorN 0 0 yes"}		Sets a variable (PreviewYorN) to yes This logical causes pnnts to be done with preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINTS ALL SHEETS OF NEPSIM WITHOUT PREVIEW
PrintAllSheets	{SetPrntNP}		Runs macro SetPrntNP which turns logical PreviewYorN to no so printing is without p eview
	{IRRCMP}		Calls macro IRRCMP which updates the downstream Irrigation benefit results prior to printing
	{FLDCOMP}		Calls macro FLDCOMP which updates the downstream flood benefit results prior to printing
	{SENSITIVITY}		Calls macro SENSITIVITY which updates the sensitivity anlysis results prior to printing
	{UpdateGraphs}		Calls the macro UpdateGraphs which updates the graph ranges and graphs prior to printing
	{EDIT GOTO ModelName}		Go to sheet TOC to start print.
	{PrintTOC}		Calls the macro PrintTOC which prints the TOC sheet
	{WAIT @NOW+@TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintSUM}		Calls the macro PrintSum which prints the Sum sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrntINPUT}		Calls the macro PrntINPUT which prints the INPUT sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintPPP}		Calls the macro PrintPPP which prints the PPP sheet.
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet. This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintEFT}		Calls the macro PrintEFT which prints the EFT sheet.
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintDCF}		Calls the macro PrintDCF which prints the DCF sheet
	{WAIT @NOW+@TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintLA}		Calls the macro PrintLA which pnnts the LA sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintHMGN}		Calls the macro PrintHMGN which prints the HMGN sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintIrrB}		Calls the macro PrintIRRB which prints the IRRS sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet. This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintFLD}		Calls the macro PrintFLD which prints the FLD sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet. This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintSA}		Calls the macro PrintSA which prints the SA sheet
	{WAIT @NOW+@TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet. This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrintGPH1}		Calls the macro PrintGPH1 which prints the GPH1 sheet
	{WAIT @NOW+@TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet. This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrntGPH2}		Calls the macro PrintGPH2 which prints the GPH2 sheet
	{WAIT @NOW @TIME(0 0 TimeDelay)}		Waits the length of variable TimeDelay seconds before printing another sheet This has been done so as not to overload the printer memory At the bottom right of sheet TOC this variable can be reset depending on the avialble memeory of your printer
	{PrntGPH3}		Calls the macro PrintGPH3 which prints the GPH3 sheet
			MACRO TO GENERATE THE LIST OF NAMED RANGES ON SHEET RANGES
rngtbl	{RANGE-NAME TABLE rngtblname}		Macro that prints the name of all named ranges to the Ranges sheet starting at named range rngtblname
			PRINT ALL SHEETS IN NEPSIM WITH PREVIEW
PrintAllPreview	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{IRRCMP}		Calls macro IRRCMP which updates the downstream Irrigation benefit results prior to printing
	{FLDCOMP}		Calls macro FLDCOMP which updates the downstream flood benefit esults prio to pnnting

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Name	Macro Commands	Counters and Base Cas Input Values (Old)	Description
	{SENSITIVITY}		Calls macro SENSITIVITY which updates the sensitivity anlysis results prior to printing
	{UpdateGraphs}		Calls the macro UpdateGraphs which updates the graph ranges and graphs p or to printing
	{EDIT GOTO ModelName}		Go to sheet TOC to start print
	{PrintTOC}		Calls the macro PrintTOC which prints the TOC sheet
	{PrintSUM}		Calls the macro PrintSum which prints the Sum sheet
	{PrintINPUT}		Calls the macro PrintINPUT which prints the INPUT sheet
	{PrintPPP}		Calls the macro PrintPPP which prints the PPP sheet
	{PrintEFT}		Calls the mac o PrintEFT which prints the EFT sheet
	{PrintDCF}		Calls the macro PrintDCF which prints the DCF sheet
	{PrintLA}		Calls the macro PrintLA which prints the LA sheet
	{PrintHMGN}		Calls the macro PrintHMGN which prints the HMGN sheet
	{PrintIrrB}		Calls the macro PrintIRRB which prints the IRRS sheet
	{PrintFLD}		Calls the macro PrintFLD which prints the FLD sheet
	{PrintSA}		Calls the macro PrintSA which prints the SA sheet
	{PrintGPH1}		Calls the macro PrintGPH1 which prints the GPH1 sheet
	{PrintGPH2}		Calls the macro PrintGPH2 which prints the GPH2 sheet
	{PrintGPH3}		Calls the macro PrintGPH3 which prints the GPH3 sheet.
			PRINTS SHEET TOC WITH PREVIEW
PrintTOC1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintTOC}		Calls the macro PrintTOC which prints the TOC sheet.
			PRINTS SHEET TOC WITHOUT PREVIEW
PrintTOC2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintTOC}		Calls the macro PrintTOC which prints the TOC sheet
			MACRO TO PRINT SHEET TOC
PrintTOC	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{HOME}		Goes to the top of the TOC sheet
	{SELECT RANGE RELATIVE 10 35 0}		Selects a range over 9 columns and down 34 rows
	{IF PreviewYorN "yes"}{PRINT? selection 1 9999 1 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT selection 1 9999 1 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET SUM WITH PREVIEW
PrintSUM1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintSUM}		Calls the macro PrintSUM which prints the SUM sheet
			PRINT SHEET SUM WITHOUT PREVIEW
PrintSUM2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintSUM}		Calls the macro PrintSUM which prints the SUM sheet
			MACRO TO PRINT SHEET SUM
PrintSUM	{EDIT-GOTO SumStart}		Goes to the named range SumStart which is the starting point for selecting the range of sheet Sum to print
	{SELECT-RANGE-RELATIVE 10 44 0}		Selects a range over 10 columns and down 44 rows
	{PRINT-NAME-USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? "Selection 1 9999,2 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999,2 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
			PRINT SHEET INPUT WITH PREVIEW
PrintINPUT1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with p eview
	{PrintINPUT}		Calls the macro PrintINPUT which prints the INPUT sheet
			PRINT SHEET INPUT WITHOUT PREVIEW
PrintINPUT2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintINPUT}		Calls the macro PrintINPUT which prints the INPUT sheet
			MACRO TO PRINT SHEET INPUT
PrintINPUT	{EDIT-GOTO InputStart}		Goes to the named range InputStart which is the starting point for selecting the range of sheet input to print
	{SELECT-RANGE RELATIVE 8 64 0}		Selects a range over 8 columns and down 64 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 3 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 3 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT GOTO InputStart1}		Goes to the named range InputStart1 which is the starting point for selecting the range for the 2nd page of input
	{SELECT RANGE RELATIVE 9 65 0}		Selects a range over 9 columns and down 65 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 4 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 4 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO InputStart11}		Goes to the named range InputStart11 which is the starting point for selecting the range for the 3rd & 4th pages of input
	{SELECT-RANGE RELATIVE 8 139 0}		Selects a range over 8 columns and down 139 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 5 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 5 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO InputStart2}		Goes to the named range InputStart2 which is the starting point for selecting the 5th page of input.
	{PRINT NAME USE LANDS2"}		Slect the page setup file LANDS2.AL3
	{SELECT RANGE-RELATIVE 13,23 0}		Selects a range over 13 columns and down 23 rows
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 7 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN= no"}{PRINT Selection 1 9999 7 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO InputStart22}		Goes to the named range InputStart22 which is the starting point for selecting the 6th and 7th pages of input
	{PRINT NAME-USE "TOC"}		Slect the page setup file TOC.AL3
	{SELECT RANGE RELATIVE 8 132 0}		Selects a range over 8 columns and down 132 rows
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 8 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 8 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO InputStart3}		Goes to the named range InputStart3 which is the starting point for selecting the 8th page of input.
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{SELECT RANGE RELATIVE 7 58 0}		Selects a range over 7 columns and down 58 rows
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 10 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN= no"}{PRINT Selection 1 9999 10 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO InputStart4}		Goes to the named range InputStart4 which is the starting point for selecting the 9th and 10th page of input
	{PRINT-NAME-USE "TOC"}		Slect the page setup file TOC.AL3
	{SELECT-RANGE-RELATIVE 12,222 0}		Selects a range over 12 columns and down 222 rows
	{IF PreviewYorN "yes"}{PRINT? "Selection 1 9999 11 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 11 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET PPP WITH PREVIEW
PrintPPP1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintPPP}		Calls the macro PrintPPP which prints the PPP sheet

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
			PRINT SHEET PPP WITHOUT PREVIEW
PrintPPP2	{SetPrntNP}		Runs macro SetPrntNP which turns logical PreviewYorN t no so printing is without preview
	{PrintPPP}		Calls the macro PrintPPP which prints the PPP sheet
			MACRO TO PRINT SHEET PPP
PrintPPP	{EDIT GOTO PPPStart}		Goes to the named range PPPStart which is the starting point for selecting the range of sheet PPP to pnnt
	{DOWN 27 (L F)}		Moves the cursor down 27 rows minus the number of years of construction less than 15 L last year of contrruction -F first year of construction This gets rid of the blank l ne in the print output
	{SELECT RANGE RELATIVE 31 (L F) PLIFE 0}		Selects a range over 27 columns and down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE-UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME CREATE PPPp2"}		Names the above selected range range name PPPp2
	{FILE-SEAL password}		Seals file
	{SELECT PPPp1}		Slects the amed range PPPp1 (the top part of the page)
	{SELECT APPEND PPPp2}		Appends the named range PPPp2 (the middle part of the page)
	{SELECT APPEND PPPp3}		Appends the named range PPPp3 (the bottom part of the page)
	{PRINT-NAME USE LANDS2"}		Slect the page setup file LANDS2.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 13 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1:9999 13 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET EFT WITH PREVIEW
PrintEFT1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to "yes so printing is with preview
	{PrntEFT}		Calls the macro PrintEFT which prints the EFT sheet
			PRINT SHEET EFT WITHOUT PREVIEW
PrintEFT2	{SetPrntNP}		Runs macro SetPrntNP which turns logical PreviewYorN to no so printing is without preview
	{PrintEFT}		Calls the macro PrintEFT which prints the EFT sheet
			MACRO TO PRINT SHEET EFT
PrintEFT	{EDIT-GOTO EFTStart}		Goes to the named range EFTStart which is the starting point for selecting the range of sheet EFT to print
	{DOWN 27-(L F)}		Moves the cursor down 27 rows minus the number of years of construction less than 15 L last year of contrruction -F first year of construction This gets rid of the blank line in the print output
	{SELECT RANGE RELATIVE 28 (L F) PLIFE 0}		Selects a range over 28 columns and down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This removes the bla k rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE-UNSEAL password}		Unseals protection on file so can save named range
	{RANGE-NAME-CREATE EFTp2"}		Names the above selected range range name EFTp2
	{FILE-SEAL password}		Seals file
	{SELECT EFTp1}		Slects the named range EFTp1 (the top part of the page)
	{SELECT APPEND EFTp2}		Appends the named range EFTp2 (the middle part of the page)
	{SELECT APPEND EFTp3}		Appends the named range EFTp3 (the bottom part of the page)
	{PRINT-NAME-USE "LANDS2"}		Slect the page setup file LANDS2.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 14 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT "Selection 1:9999 14 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT-GOTO EFTStart2}		Goes to the named range EFTStart2 which is the starting point for selecting the 2nd range of sheet EFT to print
	{DOWN 27-(L-F)}		Moves the cursor down 27 rows minus the number of years of construction less than 15 L last year of contrruction F first year of construction This gets rid of the blank line in the print output
	{SELECT-RANGE RELATIVE 6 (L-F) PLIFE 0}		Selects a range over 6 columns and down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This em es the bla k ows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE-UNSEAL password}		Unseals protection on file so can save named range
	{RANGE-NAME-CREATE EFTp5"}		Names the above selected range range name EFTp5
	{FILE-SEAL password}		Seals file
	{SELECT EFTp4}		Slects the named range EFTp4 (the top part of the second page)

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{SELECT APPEND EFTp5}		Appends the named range EFTp5 (the middle part of the second page)
	{SELECT APPEND EFTp6}		Appe ds the named range EFTp6 (the bottom part of the second page)
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 15 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 15 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET DCF WITH PREVIEW
PrintDCF1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintDCF}		Calls the macro PrintDCF which prints the DCF sheet
			PRINT SHEET DCF WITHOUT PREVIEW
PrintDCF2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintDCF}		Calls the macro PrintDCF which prints the DCF sheet.
			MACRO TO PRINT SHEET DCF
PrintDCF	{EDIT GOTO DCFStart}		Goes to the named range DCFStart which is the starting point for selecting the range of sheet DCF to print
	{DOWN 28-(L F)}		Moves the cursor down 28 rows minus the number of years of construction less than 15 L last year of contruction F first year of construction This gets rid of the blank line in the print output
	{SELECT RANGE RELATIVE 21 (L F) PLIFE 0}		Selects a range over 6 columns and down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME CREATE DCFp2"}		Names the above selected range range name DCFp2
	{FILE-SEAL password}		Seals file
	{SELECT DCFp1}		Slects the named range DCFp1 (the top part of the page)
	{SELECT-APPEND DCFp2}		Appends the named range DCFp2 (the middle part of the page)
	{SELECT APPEND DCFp3}		Appends the named range DCFp3 (the bottom part of the page)
	{PRINT NAME USE LANDS2"}		Slect the page setup file LANDS2.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 16 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 16 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET LA WITH MACRO
PrintLA1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintLA}		Calls the macro PrintLA which prints the LA sheet
			PRINT SHEET LA WITHOUT MACRO
PrintLA2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintLA}		Calls the macro PrintLA which prints the LA sheet
			MACRO TO PRINT SHEET LA
PrintLA	{EDIT GOTO LAStart}		Goes to the named range LAStart which is the starting point for selecting the range of sheet LA to print
	{SELECT-RANGE-RELATIVE 22 43 0}		Selects a range over 22 columns and down 43 rows
	{PRINT NAME-USE "LANDS2"}		Slect the page setup file LANDS2.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 17 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 17 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET HMGN WITH PREVIEW

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
PrintHMGN1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so p nting is with p eview
	{PrintHMGN}		Calls the mac o PrintHMGN which prints the HMGN sheet
			PRINT SHEET HMGN WITHOUT PREVIEW
PrintHMGN2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrintHMGN}		Calls the macro PrintHMGN which prints the HMGN sheet
			MACRO TO PRINT SHEET HMGN
PrintHMGN	{EDIT GOTO HMGNStart}		Goes to the named range HMGNStart which is the starting point for selecting the range of sheet HMGN to print
	{DOWN 28 (L-F)}		Moves the cursor down 28 rows minus the number of years of construction less than 15 L last year of contruction F first year of construction This gets rid of the blank line in the print output
	{SELECT RANGE RELATIVE 25 (L F) PLIFE 0}		Selects a range over 6 columns and down the number of years of construction (L-F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME CREATE HMGNp2"}		Names the above selected range range name HMGNp2
	{FILE SEAL password}		Seals file
	{SELECT HMGNp1}		Slects the named range HMGNp1 (the top part of the page)
	{SELECT APPEND HMGNp2}		Appends the named range HMGNp2 (the middle part of the page)
	{SELECT APPEND HMGNp3}		Appends the named range HMGNp3 (the bottom part of the page)
	{PRINT-NAME USE LANDS2"}		Slect the page setup file LANDS2.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 18 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 18 1}		If logical PreviewYorN is no prints the selection without preview
	{EDIT GOTO HMGNStart2}		Goes to the named range HMGNStart2 which is the starting point for selecting the 2nd range of sheet HMGN to print
	{DOWN 28 (L F)}		Moves the cursor down 28 rows minus the number of years of construction less than 15 L last year of contruction F first year of construction This gets rid of the blank line in the print output
	{SELECT RANGE RELATIVE 6 (L F) PLIFE 0}		Selects a range over 6 columns and down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME-CREATE HMGNp5"}		Names the above selected range range name HMGNp5
	{FILE SEAL password}		Seals file
	{SELECT HMGNp4}		Slects the named range HMGNp4 (the top part of the second page)
	{SELECT APPEND HMGNp5}		Appends the named range HMGNp5 (the middle part of the second page)
	{SELECT APPEND HMGNp6}		Appends the named range HMGNp6 (the bottom part of the second page)
	{PRINT-NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 19 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 19 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET IRRS WITH PREVIEW
PrintIrrB1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{IRRCMP}		Calls macro IRRCMP which updates the downstream irrigation benefit results prior to printing
	{PrintIrrB}		Calls the macro PrintIRRB which prints the IRRS sheet
			PRINT SHEET IRRS WITHOUT PREVIEW
PrintIrrB2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{IRRCMP}		Calls macro IRRCMP which updates the downstream irrigation benefit results prior to printing
	{PrintIrrB}		Calls the macro PrintIRRB which prints the IRRS sheet
			PRINT NEPAL ONLY IRRS WITH PREVIEW
PrintIrrN1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintIrrN}		Calls the macro PrintIRRN which prints the Nepal irrigation data only sheet

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
			PRINT NEPAL ONLY IRRS WITHOUT PREVIEW
PrintIrrN2	{SetP tNP}		Ru s macro SetPrntNP which turns logical PreviewYorN to s pnnting is without p eview
	{PrntIrrN}		Calls the macro PrintIRRN which prints the Nepal Irrigation data only sheet
			PRINT INDIA ONLY IRRS WITH PREVIEW
PrintIrrI1	{SetPrintWP}		Runs macro SetP ntWP which turns logical PreviewYorN to yes so printing is with preview
	{PrintIrrI}		Calls the macro PrintIRRI which prints the India Irrigation data only sheet
			PRINT INDIA ONLY IRRS WITHOUT PREVIEW
PrintIrrI2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{PrntIrrI}		Calls the macro PrntIRRI which prints the India Irrigation data only sheet
			MACRO TO PRINT SHEET IRRS
PrintIrrS	{EDIT GOTO NStartSum}		Goes to the named range NStartSum which is the start ng point for selecting the Nepal range of sheet IRRS to print
	{DOWN 1}		Go down one row to get to written area of the output.
	{LEFT 2}		Go left two to get to the edge of the sheet
	{SELECT-RANGE-RELATIVE 13 CntNLns-1 0}		Selects a range over 13 columns and down the number ofirrigation schemes included for Nepal in the irrigation analysis
	{FILE UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME-CREATE "IrrP3"}		Names the above selected range range name IrrP3
	{FILE SEAL password}		Seals file
	{EDIT GOTO IStartSum}		Goes to the named range NStartSum which is the starting point for selecting the India range of sheet IRRS to print.
	{DOWN 1}		Go down one row to get to written area of the output
	{LEFT 2}		Go left two to get to the edge of the sheet
	{SELECT RANGE RELATIVE 13 CntILns-1 0}		Selects a range over 13 columns and down the number ofirrigation schemes included for India in the irrigation analysis
	{FILE-UNSEAL password}		Unseals protection on file so can save named range
	{RANGE NAME CREATE IrrP4"}		Names the above selected range range name IrrP4
	{FILE SEAL password}		Seals file
	{IF CntNLns 0#AND#CntILns>0}{BRANCH PrintIrrAll}		If both Nepal and India irrigation schemes are used in this anlysis go to macro PrintIrrAll
	{IF CntNLns>0#AND#CntILns 0}{BRANCH PrintIrrN}		If only Nepal irrigations schemes are used in this analysis to to macro PrintIrrN
	{IF CntNLns 0#AND#CntILns>0}{BRANCH PrintIrrI}		If only India irrigations schemes are used in this analysis to to macro PrintIrrI
	{RETURN}		Returns to calling macro if called from another macro
PrintIrrAll	{PRINT NAME USE "TOC"}		Select the page setup file TOC.AL3
	{SELECT IrrP1}		Selects the named range IrrP1 (the irrigation summary page)
	{IF PreviewYorN "yes"}{PRINT? "Selection 1-9999,20 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 20 1}		If logical PreviewYorN is no prints the selection without preview
	{PRINT-NAME-USE "LANDS2"}		Slect the page setup file LANDS2.AL3
	{SELECT IrrP6}		Selects the named range IrrP6 (the top part of the second irrigation page)
	{SELECT-APPEND IrrP5}		Appends the named range IrrP5 (the top part of theNepal section of the second page)
	{SELECT APPEND IrrP3}		Appends the named range IrrP3 (the irrigation schemes or middle part of theNepal section of the second page)
	{SELECT-APPEND IRRSpb}		Appends a row with double lines at the bottom to the Nepal irrigation data
	{SELECT APPEND IrrP2}		Appends the named range IrrP3 (the top part of the India section of the second page)
	{SELECT APPEND IrrP4}		Appends the named range IrrP4 (the irrigation schemes or middle part of the India section of the second page)
	{SELECT-APPEND IRRSpb}		Appends a row with double lines at the bottom to the India irrigation data
	{IF PreviewYorN "yes"}{PRINT? "Selection 1-9999;21 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1-9999,21 1}		If logical PreviewYorN is no prints the selection without preview
	{BRANCH IrrYearly}		Calls the macro IrrYearly which prints the yearly summary of Nepal India and combined irrigation results
	{RETURN}		Returns to calling macro if called from another macro
PrintIrrN	{PRINT-NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{SELECT IrrP1}		Selects the named range IrrP1 (the irrigation summary page)

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 20 1}		If logical Previ wYo N is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 20 1}		If logical PreviewYorN is no prints the selection without preview
	{PRINT NAME USE LANDS2"}		Slect the page setup file LANDS2.AL3
	{SELECT IrrP6}		Selects the named range IrrP6 (the top part of the second irrigation page)
	{SELECT APPEND IrrP5}		Appends the named range IrrP5 (the top part of theNepal section of the second page)
	{SELECT-APPEND IrrP3}		Appends the named range IrrP3 (the irrigation schemes or middle part of theNepal section of the second page)
	{SELECT APPEND IRRSpb}		Appends a row with double lines at the bottom to the Nepal irrigation data
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 21 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 21 1}		If logical PreviewYorN is no prints the selection without preview
	{BRANCH IrrYearly}		Calls the macro IrrYearly which prints the yearly summary of Nepal India and combined irrigation results
	{RETURN}		Returns to calling macro if called from another macro
PrintIrr	{PRINT NAME USE "TOC"}		Slect the page setup file TOC AL3
	{SELECT IrrP1}		Selects the named range IrrP1 (the irrigation summary page)
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 20 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 20 1}		If logical PreviewYorN is no prints the selection without preview
	{PRINT-NAME USE "LANDS2"}		Slect the page setup file LANDS2.AL3
	{SELECT IrrP6}		Selects the named range IrrP6 (the top part of the second irrigation page)
	{SELECT APPEND IrrP2}		Appends the named range IrrP3 (the top part of the India section of the second page)
	{SELECT APPEND IrrP4}		Appends the named range IrrP4 (the irrigation schemes or middle part of the India section of the second page)
	{SELECT APPEND IRRSpb}		Appends a row with double lines at the bottom to the Nepal irrigation data
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999;21 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN= no"}{PRINT Selection 1 9999 21 1}		If logical PreviewYorN is no prints the selection without preview
	{BRANCH IrrYearly}		Calls the macro IrrYearly which prints the yearly summary of Nepal India and combined irrigation results
	{RETURN}		Returns to calling macro if called from another macro
IrrYearly	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{EDIT GOTO IrrYearlySt}		Goes to the named range IrrYearSt which is the starting point for selecting the third page of the irrigation results
	{SELECT RANGE RELATIVE 7 13 Plife 0}		Selects a range over 7 columns and down 13 plus the number of years of the project evaluation live (f LIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{SELECT-APPEND IRRSpb2}		Appends a row with double lines at the bottom of the yearly irrigation results
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 22 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999,22 1}		If logical PreviewYorN is no prints the selection without preview
	{HOME}		Goes back to top of IRRS sheet when completed
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET FLD WITH MACRO
PrintFLD1	{SetPrntWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{FLDCOMP}		Calls macro FLDCOMP which updates the downstream flood benefit results prior to printing
	{PrntFLD}		Calls the macro PrintFLD which prints the FLD sheet
			PRINT SHEET FLD WITHOUT MACRO
PrintFLD2	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{FLDCOMP}		Calls macro FLDCOMP which updates the downstream flood benefit results prior to printing
	{PrintFLD}		Calls the macro PrintFLD which prints the FLD sheet
			MACRO TO PRINT FLOOD BENEFITS RESULTS
PrintFLD	{EDIT-GOTO FLDStart}		Goes to the named range FLDStart which is the starting point for selecting the range of sheet FLD to print
	{SELECT-RANGE-RELATIVE 6,27 PLife 0}		Selects a range over 6 columns and down 27 plus the number of years of the project evaluation live (PLIFE) rows This removes the bl nk rows at the bottom if the project evaluation life is less than 50 years the maximum
	{SELECT APPEND FLDpb}		Appends a row with double lines at the bottom of the yearly flood benefits results
	{PRINT-NAME-USE "TOC"}		Select the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999,23 1}		If logical PreviewYorN is yes prints the selection with preview

Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{IF PreviewYorN no"}{PRINT Selection 1 9999 23 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to call g macro if called from another macro
			PRINT SHEET SA WITH PREVIEW
PrintSA1	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to yes so printing is with preview
	{Sensitivity}		Calls macro SENSITIVITY which updates the sensitivity analysis results prior to printing
	{PrintSA}		Calls the macro PrintSA which prints the SA sheet
			PRINT SHEET SA WITHOUT PREVIEW
PrintSA2	{SetPrintNP}		Runs macro SetPri tNP which turns logical PreviewYorN to no so printing is without preview
	{Sensitivity}		Calls macro SENSITIVITY which updates the sensitivity analysis results prior to printing
	{PrintSA}		Calls the macro PrintSA which prints the SA sheet
			MACRO TO PRINT SHEET SA
PrintSA	{EDIT-GOTO SAStart}		Goes to the named range SAStart which is the starting point for selecting the range of sheet SA to print
	{SELECT RANGE-RELATIVE 5 69 0}		Selects a range over 5 columns and down 85 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999,24 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 24 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET GPH1 WITH PREVIEW
PrintGPH11	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to "yes so printing is with preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing
	{PrintGPH1}		Calls the macro PrintGPH1 which prints the GPH1 sheet
			PRINT SHEET GPH1 WITHOUT PREVIEW
PrintGPH12	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing
	{PrintGPH1}		Calls the macro PrintGPH1 which prints the GPH1 sheet
			MACRO TO PRINT SHEET GPH1
PrintGPH1	{EDIT GOTO Gph1Start}		Goes to the named range GPH1Start which is the starting point for selecting the range of sheet GPH1 to print
	{SELECT-RANGE RELATIVE 9 67 0}		Selects a range over 9 columns and down 67 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1·9999,25 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 25 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET GHP2 WITH PREVIEW
PrintGPH21	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to "yes so printing is with preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing
	{PrintGPH2}		Calls the macro PrintGPH1 which prints the GPH2 sheet
			PRINT SHEET GHP2 WITHOUT PREVIEW
PrintGPH22	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no o printing is without preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{PrintGPH2}		Calls the macro PrintGPH2 which prints the GPH2 sheet
			MACRO TO PRINT SHEET GPH2
PrintGPH2	{EDIT GOTO Gph2Start}		Goes to the named range GPH2Start which is the start g point for selecting the range of sheet GPH2 to pri t
	{SELECT RANGE-RELATIVE 11 77 0}		Selects a range over 11 columns and down 77 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC AL3
	{IF PreviewYorN yes"}{PRINT? Selection 1 9999 26 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 26 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			PRINT SHEET GHP3 WITH PREVIEW
PrintGPH31	{SetPrintWP}		Runs macro SetPrintWP which turns logical PreviewYorN to "yes so printing is with preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing
	{PrintGPH3}		Calls the macro PrintGPH3 which prints the GPH3 sheet
			PRINT SHEET GHP3 WITHOUT PREVIEW
PrintGPH32	{SetPrintNP}		Runs macro SetPrintNP which turns logical PreviewYorN to no so printing is without preview
	{UpdateGraphs}		Calls macro UpgradeGraphs which updates the graph ranges and graphs prior to printing
	{PrintGPH3}		Calls the macro PrintGPH3 which prints the GPH3 sheet
			MACRO TO PRINT SHEET GPH3
PrintGPH3	{EDIT-GOTO Gph3Start}		Goes to the named range GPH3Start which is the starting point for selecting the range of sheet GPH3 to print
	{SELECT RANGE-RELATIVE 9 67 0}		Selects a range over 9 columns and down 67 rows
	{PRINT NAME USE "TOC"}		Slect the page setup file TOC.AL3
	{IF PreviewYorN "yes"}{PRINT? Selection 1 9999 27 1}		If logical PreviewYorN is yes prints the selection with preview
	{IF PreviewYorN no"}{PRINT Selection 1 9999 27 1}		If logical PreviewYorN is no prints the selection without preview
	{RETURN}		Returns to calling macro if called from another macro
			MACRO THAT COMPUTES THE SENSITIVIRY ANALYSIS
Sensitivity	{PUT OldNNetBenefits 0 0 NNetBenefits}	OldFirmEng	Places the named range NNetBenefits in the named range OldNNetBenefits
	{PUT OldDevROI 0 0 DevROI}	2606 20	Places the named range DevROI in the named range OldDevROI
	{PUT OldFirmEng 0 0 FirmEng}	NewFirmEng	Places the named range FirmEng in the named range OldFirmEng
	{PUT NewFirmEng 0 0 FirmEng (1 SenEngP)}	2345 58	Replaces the named range NewFirmEng with the FirmEng times 1plus SenEngP (% of plus energy sensitivity variation)
	{PUT OldFirmEngToN 0 0 FirmEngToN}	OldFirmEngToN	Places the named range FirmEngtoN in the named range OldFirmEngtoN
	{PUT NewFirmEngToN·0·0 FirmEngToN*(1+SenEngP)}	0 00	Replaces the named range NewFirmEngtoN with the FirmEngtoN times 1plus SenEngP (% of plus energy sensitivity variation)
	{PUT OldSecEng 0 0 SecEng}	NewFirmEngToN	Places the named range SecEng in the named range OldSecEng
	{PUT NewSecEng 0 0 SecEng (1+SenEngP)}	0 00	Replaces the named range NewSecEng with the SecEng times 1plus SenEngP (% of plus energy sensitivity variation)
	{PUT OldSecEngToN 0 0 SecEngToN}	OldSecEng	Places the named range SecEngtoN in the named range OldSecEngtoN
	{PUT NewSecEngToN 0 0 SecEngToN (1 SenEngP)}	596 10	Replaces the named range NewSecEngtoN with the SecEngtoN times 1plus SenEngP (% of plus energy sensitivity variation)
	{– Old and New Values at Right}	NewSecEng	Comment line
	{– Replace energies with plus values}	538 49	Comment line
	{PUT FirmEng 0 0 NewFirmEng}	OldSecEngToN	Places the named range NewFirmEng in the named range FirmEng
	{PUT FirmEngToN·0·0 NewFirmEngToN}	0 00	Places the named range NewFirmEngtoN in the named range FirmEngtoN
	{PUT SecEng 0 0 NewSecEng}		Places the named range NewSecEng in the named range SecEng
	{PUT SecEngToN·0·0 NewSecEngToN}	NewSecEngToN	Places the named range NewSecEngtoN in the named range SecEngtoN
	{Calc}	0 00	Calculates the spreadsheet (same as F9)
	{– Write sensitivity variables to sensitivity table}	OldNNetBenefits	Comment line
	{PUT Sen1Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	281276 16	Puts the % chance in NNetBenefits (Nepal net benefits) to the amed ra ge Sen1Np
	{PUT Sen1ROIp·0·0 DevROI}	OldDevROI	Puts the new computed DevROI (Developer retun on equity) to the named range Sen1ROIp
	{– Write minus data to right}	0 22	Comment line

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{PUT NewFirmEng 0 0 OldFirmEng (1 SenEngM)}		Replaces the named range NewFirmEng with the OldFirmEng times 1plus SenEngM (% of minus energy sensitivity variation)
	{PUT NewFirmEngToN 0 0 OldFirmEngToN (1 SenEngM)}		Replaces the named range NewFirmEngtoN with the OldFirmEngtoN times 1plus SenEngM (% of minus ene gy sensitivity variation)
	{PUT NewSecEng 0 0 OldSecEng (1 SenEngM)}	OldTotCapCost	Replaces the named range NewSecEngtoN with the OldSecEngtoN times 1plus SenEngM (% of minus energy sensitivity variation)
	{PUT NewSecEngToN 0 0 OldSecEngToN (1 SenEngM)}	1088 98	Replaces the named range NewSecEngtoN with the OLdSecEngtoN times 1plus SenEngM (% of minus energy sensitivity variation)
	{-- Replace energies with minus values}	NewTotCapCost	Comment line
	{PUT FirmEng 0 0 NewFirmEng}	871 18	Places the named range NewFirmEng in the named range FirmEng
	{PUT FirmEngToN 0 0 NewFirmEngToN}	OldOMPrivate	Places the named range NewFirmEngtoN in the named range FirmEngtoN
	{PUT SecEng 0 0 NewSecEng}	0 02	Places the named range NewSecEng in the named range SecEng
	{PUT SecEngToN 0 0 NewSecEngToN}	NewOMPrivate	Places the named range NewSecEngtoN in the named range SecEngtoN
	{Calc}	0 01	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	OldOMNepal	Comment line
	{PUT Sen1Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	0 03	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen1Nm
	{PUT Sen1ROIm 0 0 DevROI}	NewOMNepal	Puts the new computed DevROI (Developer return on equity) to the named range Sen1ROIm
	{-- Write back orginal values to input table}	0 02	Comment line
	{PUT FirmEng 0 0 OldFirmEng}		Places the named range FirmEng in the named range OldFirmEng
	{PUT FirmEngToN 0 0 OldFirmEngToN}		Places the named range FirmEngtoN in the named range OldFirmEngtoN
	{PUT SecEng 0 0 OldSecEng}	OYrstoTransfer	Places the named range SecEng in the named range OldSecEng
	{PUT SecEngToN 0 0 OldSecEngToN}	24 00	Places the named range SecEngtoN in the named range OldSecEngtoN
	{Calc}	NYrstoTransfer	Calculates the spreedsheet (same as F9)
** ********** **	{-- Construction and O&M Costs}		Comment line
	{PUT OldTotCapCost 0 0 TotCapCost}		Places the named range TotCapCost in the named range OldTotCapCost
	{PUT NewTotCapCost 0 0 TotCapCost (1 SenCOMp)}	OldPITCap	Replaces the named range NewTotCapCost with the TotCapCost times 1plus SenCOMp (% of plus capital and O$M sensitivity variation)
	{PUT OldOMPrivate 0 0 OMPrivate}	0 01	Places the named range OMPrivate in the named range OldOMPrivate
	{PUT NewOMPrivate 0 0 OMPrivate (1 SenCOMp)}	OldPITOp	Replaces the named range NewOMPrivate with the OMPrivate times 1plus SenCOMp (% of plus capital and O$M sensitivity variation)
	{PUT OldOMNepal 0 0 OMNepal}	0 03	Places the named range OMNepal in the named range OldOMNepal
	{PUT NewOMNepal 0 0 OMNepal (1 SenCOMp)}	OldIDCap	Replaces the named range NewOMNepal with the OMNepal times 1plus SenCOMp (% of plus capital and O$M sensitivity variation)
	{-- Old and New Values at Right}	0 01	Comment line
	{-- Replace energies with plus values}	OldIDOp	Comment line
	{PUT TotCapCost,0 0 NewTotCapCost}	0 01	Places the named range NewTotCapCost in the named range TotCapCost
	{PUT OMPrivate 0 0 NewOMPrivate}	OldSTCap	Places the named range NewOMPrivate in the named range OMPrivate
	{PUT OMNepal 0 0 NewOMNepal}	0 00	Places the named range NewOMNepal in the named range OMNepal
	{Calc}	OldSTOp	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	0 00	Comment line
	{PUT Sen2Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	OldLTCap	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen2Np
	{PUT Sen2ROIp 0 0 DevROI}	0 00	Puts the new computed DevROI (Developer return on equity) to the named range Sen2ROIp
	{-- Write minus data to right}	OldLTOp	Comment line
	{PUT NewTotCapCost,0 0 OldTotCapCost*(1 SenCOMm)}	0 00	Replaces the named range NewTotCapCost with the OldTotCapCost times 1plus SenCOMm (% of minus capital and O$M sensitivity variation)
	{PUT NewOMPrivate 0 0 OldOMPrivate (1 SenCOMm)}	OldCorpITRt	Replaces the named range NewOMPrivate with the OldOMPrivate times 1plus SenCOMm (% of minus capital and O$M sensitivity variation)
	{PUT NewOMNepal 0 0 OldOMNepal*(1+SenCOMm)}	0 18	Replaces the named range NewOMNepal with the OldOMNepal times 1plus SenCOMm (% of minus capital and O$M sensitivity variation)
	{-- Replace energies with minus values}	OldExTax	Comment line
	{PUT TotCapCost 0 0 NewTotCapCost}	0 00	Places the named range NewTotCapCost in the named range TotCapCost
	{PUT OMPrivate 0 0 NewOMPrivate}	OldMortRF	Places the named range NewOMPrivate in the named range OMPrivate
	{PUT OMNepal 0 0 NewOMNepal}	0 00	Places the named range NewOMNepal in the named range OMNepal
	{Calc}	OldCapRoyF15	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	100 00	Comment line
	{PUT Sen2Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	OldCapRoy16P	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen2Nm
	{PUT Sen2ROIm 0 0 DevROI}	1000 00	Puts the new computed DevROI (Developer return on equity) to the named range Sen2ROIm
	{-- Write back orginal values to input table}	OldEngRoyF15	Comment line
	{PUT TotCapCost,0 0 OldTotCapCost}	0 02	Places the named range OldTotCapCost in the named range TotCapCost
	{PUT OMPrivate 0 0 OldOMPrivate}	OldEngRoy16P	Places the named range OldOMPrivate in the named range OMPrivate
	{PUT OMNepal 0 0 OldOMNepal}	0 10	Places the named range OldOMNepal in the named range OMNepal
	{Calc}		Calculates the spreedsheet (same as F9)
**********	{-- Years to Transfer}	OldPlife	Comment line
	{PUT OYrsToTransfer 0 0 YrsToTransfer}	50	Places the named range YrsToTransfer in the named ra ge 0YrsToTransfer
	{PUT OldPlife 0 0 Plife}	OldNepRevS	Places the named range PLife in the named range OldPLife

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Name	Macro Commands	Counters and Base Case Input V lues (Old)	Description
	{IF PLife sen1trans}{PUT PLife 0 0 sen1trans}	0	If base case PLife (Project evalu tion l fe) is less than sen1trans set Plife to sen1trans
	{PUT YrsToTransfer 0 0 sen1trans}		Places the named range sen1trans in the named range YrsToTransfer
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen3N1 0 0 (NNetBenefits OldNNetBen fits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen3N1
	{PUT Sen3ROI1 0 0 DevROI}		Puts the new computed DevROI (Developer retun on equity) to the named range Sen3ROI1
	{IF PLife sen2trans}{PUT PLife 0 0 sen2trans}		If base case PLife (Project evaluation life) is less than sen2trans set Plife to sen2trans
	{PUT YrsToTransfer 0 0 sen2trans}		Places the named range sen2trans in the named range YrsToTransfer
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen3N2 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen3N2
	{PUT Sen3ROI2 0 0 DevROI}		Puts the new computed DevROI (Developer retun on equity) to the named range Sen3ROI2
	{IF PLife sen3trans}{PUT PLife 0 0 sen3trans}		If base case PLife (Project evaluation life) is less than sen3trans set Plife to sen3trans
	{PUT YrsToTransfer 0 0 sen3trans}		Places the named range sen3trans in the named range YrsToTransfer
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen3N3 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen3N3
	{PUT Sen3ROI3 0 0 DevROI}		Puts the new computed DevROI (Developer retun on equity) to the named range Sen3ROI3
	{IF PLife sen4trans}{PUT PLife 0 0 sen4trans}		If base case PLife (Project evaluation life) is less than sen4trans set Plife to sen4trans
	{PUT YrsToTransfer 0 0 sen4trans}		Places the named range sen4trans in the named range YrsToTransfer
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen3N4 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen3N4
	{PUT Sen3ROI4 0 0 DevROI}		Puts the new computed DevROI (Developer retun on equity) to the named range Sen3ROI4
	{-- Set variable back to orginal value}		Comment line
	{PUT YrsToTransfer 0 0 OYrsToTransfer}		Places the named range OYrsToTransfer in the named range YrsToTransfer
	{PUT PLife 0 0 OldPLife}		Places the named range OldPLife in the named range PLife
	{Calc}		Calculates the spreedsheet (same as F9)
-** *******	{-- Tax variable changes}		Comment line
	{PUT OldPITCap 0 0 PITCap}		Places the named range PITCap in the named range OldPITCap
	{PUT OldPITOp 0 0 PITOp}		Places the named range PITOp in the named range OldPITOp
	{PUT OldIDCap 0 0 IDCap}		Places the named range IDCap in the named range OldIDCap
	{PUT OldIDOp 0 0 IDOp}		Places the named range IDOp in the named range OldIDOp
	{PUT OldSTCap 0 0 STCap}		Places the named range STCap in the named range OldSTCap
	{PUT OldSTOp 0 0 STOp}		Places the named range STOp in the named range OldSTOp
	{PUT OldLTCap 0 0 LTCap}		Places the named range LTCap in the named range OldLTCap
	{PUT OldLTOp 0 0 LTOp}		Places the named range LTOp in the named range OldLTOp
	{PUT OldCorpITRt,0 0 CorpITRt}		Places the named range CorpITRt in the named range OldCorpITRt
	{PUT OldExTax 0 0 ExTax}		Places the named range ExTax in the named range OldExTax
	{PUT OldNepRevS 0 0 NepRevS}		Places the named range NepRevS in the named range OldNepRevS
	{PUT OldMortRF 0 0 MortRf}		Places the named range MortRF in the named range OldMortRF
	{PUT OldCapRoyF15 0 0 CapRoyF15}		Places the named range CapRoyF15 in the named range OldCapRoyF15
	{PUT OldCapRoy16P 0 0 CapRoy16P}		Places the named range CapRoy16P in the named range OldCapRoy16P
	{PUT OldEngRoyF15 0 0 EngRoyF15}		Places the named range EngRoyF15 in the named range OldEngRoyF15
	{PUT OldEngRoy16P 0 0 EngRoy16P}		Places the named range EngRoy16P in the named range OldEngRoy16P
	{-- Input plus variables}		Comment line
	{PUT PITCap 0 0 OldPITCap (1 sentaxp)}		Replaces the named range PitCap with the OldPitCap times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT PITOp 0 0 OldPITOp (1+sentaxp)}		Replaces the named range PitOp with the OldPitOp times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT IDCap 0 0 OldIDCap (1 sentaxp)}		Replaces the named range IDCap with the OldIDCap times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT IDOp 0 0 OldIDOp (1 sentaxp)}		Replaces the named range IDOp with the OldIDOp times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT STCap 0 0 OldSTCap (1 sentaxp)}		Replaces the named range STCap with the OldSTCap times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT STOp 0 0 OldSTOp (1+sentaxp)}		Replaces the named range STOp with the OldStOp times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT LTCap 0 0 OldLTCap (1 sentaxp)}		Replaces the named range LTCap with the OldLTCap times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT LTOp 0 0 OldLTOp (1+sentaxp)}		Replaces the named range LTOp with the OldLTOp times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT CorpITRt,0 0 OldCorpITRt*(1 sentaxp)}		Replaces the named range CorpITRt with the OldCorpITRt times 1plus SenTaxp (% of plus taxes sensitivity variation)

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Name	Macro Commands	Counters and Base Case Input Values (Old)			Description
	{PUT ExTax 0 0 OldExTax*(1 sentaxp)}				Replaces the named range ExTax with the OldExTax times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT NepRevS 0 0 OldNepRevS (1 sentaxp)}				Replaces the named range NepRe S with the OldNepRevS times 1plus SenTaxp (% of plus taxes sensitivity varati)
	{PUT MortRF 0 0 OldMortRF (1+sentaxp)}				Replaces the named range MortRF with the OldMortRF times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT CapRoyF15 0 0 OldCapRoyF15 (1 sentaxp)}				Replaces the named range CapRoyF15 with the OldCapRoyF15 times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT CapRoy16P 0 0 OldCapRoy16P (1 sentaxp)}				Replaces the named range CapRoy16P with the OldCapRoy16P times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{PUT EngRoyF15 0 0 OldEngRoyF15 (1 sentaxp)}				Replaces the named range EngRoyF15 with the OldEngRoyF15 times 1plus SenTaxp (% of plus ta es sensitivity variation)
	{PUT EngRoy16P 0 0 OldEngRoy16P (1+sentaxp)}				Replaces the named range EngRoy16P with the OldEngRoy16P times 1plus SenTaxp (% of plus taxes sensitivity variation)
	{Calc}				Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}				Comment line
	{PUT Sen4Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}				Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen4Np
	{PUT Sen4ROip 0 0 DevROI}				Puts the new computed DevROI (Developer return on equity) to the named range Sen4ROip
	{-- Input minus variables}				Comment line
	{PUT PITCap 0 0 OldPITCap (1 sentaxm)}				Replaces the named range PitCap with the OldPitCap times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT PITOp 0 0 OldPITOp (1+sentaxm)}				Replaces the named range PitOp with the OldPitOp times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT IDCap 0 0 OldIDCap (1 sentaxm)}				Replaces the named range IDCap with the OldIDCap times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT IDOp 0 0 OldIDOp (1 sentaxm)}				Replaces the named range IDOp with the OldIDOp times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT STCap 0 0 OldSTCap (1 sentaxm)}				Replaces the named range STCap with the OldSTCap times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT STOp 0 0 OldSTOp (1 sentaxm)}				Replaces the named range STOp with the OldStOp times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT LTCap 0 0 OldLTCap (1+sentaxm)}				Replaces the named range LTCap with the OldLTCap times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT LTOp 0 0 OldLTOp (1 sentaxm)}				Replaces the named range LTOp with the OldLTOp times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT CorpITRt 0 0 OldCorpITRt*(1+sentaxm)}				Replaces the named range CorpITRt with the OldCorpITRt times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT ExTax 0 0 OldExTax (1 sentaxm)}				Replaces the named range ExTax with the OldExTax times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT NepRevS 0 0 OldNepRevS (1 sentaxm)}				Replaces the named range NepRevS with the OldNepRevS times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT MortRF 0 0 OldMortRf*(1 sentaxm)}				Replaces the named range MortRF with the OldMortRF times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT CapRoyF15 0 0 OldCapRoyF15 (1 sentaxm)}				Replaces the named range CapRoyF15 with the OldCapRoyF15 times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT CapRoy16P 0 0 OldCapRoy16P (1 sentaxm)}				Replaces the named range CapRoy16P with the OldCapRoy16P times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT EngRoyF15 0 0 OldEngRoyF15 (1+sentaxm)}				Replaces the named range EngRoyF15 with the OldEngRoyF15 times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{PUT EngRoy16P 0 0 OldEngRoy16P (1 sentaxm)}				Replaces the named range EngRoy16P with the OldEngRoy16P times 1plus SenTaxm (% of minus taxes sensitivity variation)
	{Calc}				Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}				Comment line
	{PUT Sen4Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}				Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen4Nm
	{PUT Sen4ROim 0 0 DevROI}				Puts the new computed DevROI (Developer return on equity) to the named range Sen4ROim
	{-- Set variables back to orginal value}				Comment line
	{PUT PITCap 0 0 OldPITCap}				Places the named range OldPITCap in the named range PITCap
	{PUT PITOp 0 0 OldPITOp}				Places the named range OldPITOp in the named range PITOp
	{PUT IDCap 0 0 OldIDCap}				Places the named range OldIDCap in the named range IDCap
	{PUT IDOp 0 0 OldIDOp}				Places the named range OldIDOp in the named range IDOp
	{PUT STCap 0 0 OldSTCap}				Places the named range OldSTCap in the named range STCap
	{PUT STOp 0 0 OldSTOp}				Places the named range OldSTOp in the named range STOp
	{PUT LTCap 0 0 OldLTCap}				Places the named range OldLTCap in the named range LTCap
	{PUT LTOp 0 0 OldLTOp}				Places the named range OldLTOp in the named range LTOp
	{PUT CorpITRt 0 0 OldCorpITRt}				Places the named range OldCorpITRt in the named range CorpITRt
	{PUT ExTax 0 0 OldExTax}				Places the named range OldExTax in the named range ExTax
	{PUT NepRevS 0 0 OldNepRevS}				Places the named range OldNepRevS in the named range NepRevS
	{PUT MortRF 0 0 OldMortRf}				Places the named range OldMortRF in the named range MortRF
	{PUT CapRoyF15 0 0 OldCapRoyF15}				Places the named range OldCapRoyF15 in the named range CapRoyF15
	{PUT CapRoy16P 0 0 OldCapRoy16P}				Places the named range OldCapRoy16P in the named range CapRoy16P
	{PUT EngRoyF15 0 0 OldEngRoyF15}				Places the named range OldEngRoyF15 in the named range EngRoyF15
	{PUT EngRoy16P 0 0 OldEngRoy16P}				Places the named rangeOldEngRoy16P in the named range EngRoy16P
	{Calc}				Calculates the spreedsheet (same as F9)
**********	{-- Corporate tax holiday changes}		OldTaxHoliday		Comment line
	{PUT OldTaxHoliday 0 0 TaxHoliday}			15 00	Places the named range TaxHoliday in the named range OldTaxHoliday
	{PUT TaxHoliday 0 0 15}				Replaces the named range TaxHoliday with 15
	{Calc}				Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	OldNFinFldBen	OldNFinirrBen	OldNFinOthBen	Comment line

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Name	Macro Commands	Counters and Base Case Input Values (Old)			Description
	{PUT Sen5N15 0 0 (NNetBenefits OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named ra ge Sen5N15
	{PUT Sen5ROI15 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen5ROI15
	{PUT TaxHoliday 0 0 7}			0	Replaces the named range TaxHoliday with 7
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen5N7 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen5N7
	{PUT Sen5ROI7 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen5ROI7
	{PUT TaxHoliday 0 0 0}			0	Replaces the named range TaxHoliday with 0
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen5N0 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen5N0
	{PUT Sen5ROI0 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen5ROI0
	{-- Set variables back to orginal value}			0	Comment line
	{PUT TaxHoliday 0 0 OldTaxHoliday}			0	Places the named range OldTaxHoliday in the named range TaxHoliday
** **	{-- Capacity and energy royalty changes}			0	Comment line
	{PUT OldCapRoyF15 0 0 CapRoyF15}			0	Places the named range CapRoyF15 in the named range OldCapRoyF15
	{PUT OldCapRoy16P 0 0 CapRoy16P}			0	Places the named range CapRoy16P in the named range OldCapRoy16P
	{PUT OldEngRoyF15 0 0 EngRoyF15}			0	Places the named range EngRoyF15 in the named range OldEngRoyF15
	{PUT OldEngRoy16P 0 0 EngRoy16P}			0	Places the named range EngRoy16P in the named range OldEngRoy16P
	{PUT CapRoyF15 0 0 OldCapRoyF15 (1 senWrCp)}			0	Replaces the named range CapRoyF15 with the OldCapRoyF15 times 1plus SenWRCp (% of plus water royalties capacity sensitivity variation)
	{PUT CapRoy16P 0 0 OldCapRoy16P (1 senWRCp)}			0	Replaces the named range CapRoy16P with the OldCapRoy16P times 1plus SenWRCp (% of plus water royalties capacity sensitivity variation)
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen6NCp 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen6NCp
	{PUT Sen6ROICp 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen6ROICp
	{PUT CapRoyF15 0 0 OldCapRoyF15 (1 senWRCm)}			0	Replaces the named range CapRoyF15 with the OldCapRoyF15 times 1plus SenWRCm (% of minus water royalties capacity sensitivity variation)
	{PUT CapRoy16P 0 0 OldCapRoy16P (1 senWRCm)}			0	Replaces the named range CapRoy16P with the OldCapRoy16P times 1plus SenWRCm (% of minus water royalties capacity sensitivity ariation)
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen6NCm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen6NCm
	{PUT Sen6ROICm 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen6ROICm
	{PUT CapRoyF15 0 0 OldCapRoyF15}			0	Places the named range OldCapRoyF15 in the named range CapRoyF15
	{PUT CapRoy16P 0 0 OldCapRoy16P}			0	Places the named range OldCapRoy16P in the named range CapRoy16P
	{PUT EngRoyF15 0 0 OldEngRoyF15 (1 senWREp)}			0	Replaces the named range EngRoyF15 with the OldEngRoyF15 times 1plus SenWREp (% of plus water royalties energy sensitivity variation)
	{PUT EngRoy16P 0 0 OldEngRoy16P (1 senWREp)}			0	Replaces the named range EmgRoy16P with the OldEngRoy16P times 1plus SenWRep (% of plus water royalties energy sensitivity variation)
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen6NEp 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen6NEp
	{PUT Sen6ROIEp 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen6ROIEp
	{PUT EngRoyF15 0 0 OldEngRoyF15 (1 senWREm)}			0	Replaces the named range EngRoyF15 with the OldEngRoyF15 times 1plus SenWREm (% of minus water royalties energy sensitivity variation)
	{PUT EngRoy16P 0 0 OldEngRoy16P (1 senWREm)}			0	Replaces the named range EmgRoy16P with the OldEngRoy16P times 1plus SenWREm (% of minus water royalties energy sensitivity variation)
	{Calc}			0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			0	Comment line
	{PUT Sen6NEm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen6NEm
	{PUT Sen6ROIEm 0 0 DevROI}			0	Puts the new computed DevROI (Developer return on equity) to the named range Sen6ROIEm
	{PUT EngRoyF15 0 0 OldEngRoyF15}			0	Places the named range OldEngRoyF15 in the named range EngRoyF15
	{PUT EngRoy16P 0 0 OldEngRoy16P}			0	Places the named range OldEngRoy16P in the named range EngRoy16P
	{Calc}			0	Calculates the spreedsheet (same as F9)
** ** *** ** **********	{-- Without downstream benefits}			0	Comment line
	{-- Without Nepal d/s benefits}			0	Comment line
	{EDIT-COPY NFinFldBen}			0	Copies the named range NFinFldBen (Nepal final flood benefits) to the cl pboa d
	{EDIT-PASTE-SPECIAL OldNFinFldBen cell-contents"}				Copies above to the named range OldNFinFldBen
	{SELECT NFinFldBen}				Selects the named range NFinFldBen (Nepal final flood benefits)
	{DELETE}	OldFinFldBen	OldFinIrrBen	OldFinOthBen	Deletes the above selected range
	{EDIT-COPY NFinIrrBen}			0	Copies the named range NFinIrrBen (Nepal final irrigation benefits) to the cl pboard

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{EDIT PASTE SPECIAL OldNFinIrrBen cell contents"}	0	Copies above to the named range OldNFinIrrBen
	{SELECT NFinIrrBe }	0	Selects the amed range NFinIrrBen (Nepal final irrigation benefits)
	{DELETE}	0	Deletes the above selected range
	{EDIT COPY NFinOthBen}	0	Copies the named range NFinOthBen (Nepal final other benefits) to the clipboard
	{EDIT PASTE SPI CIAL OldNFinOthBen cell contents"}	0	Copies above to the named range OldNFinOthBen
	{SELECT NFinOthBen}	0	Selects the named range NFinOthBen (Nepal final other benefits)
	{DELETE}	0	Deletes the above selected range
	{Calc}	0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	0	Comment line
	{PUT Sen7NwoN 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen7NwoN
	{PUT Sen7ROIwoN 0 0 DevROI}	0	Puts the new computed DevROI (Developer retun on equity) to the named range Sen7ROIwoN
	{-- Without both d/s benefits}	0	Comment line
	{PUT OldIfiniirYr 0 0 IFiniirYr}	0	Places the named range IFiniirYr in the named range OldIFiniirYr
	{SELECT IFiniirYr}	0	Selects the named range IFiniirYr (Year before first ower charge for irrigation capital costs)
	{DELETE}	0	Deletes the above selected range
	{EDIT-COPY IFinFldBen}	0	Copies the named range IFinFldBen (Indial final flood benefits) to the clipboard
	{EDIT-PASTE-SPECIAL OldIFinFldBen cell-contents"}	0	Copies above to the named range OldIFiniirBen
	{SELECT IFinFldBen}	0	Selects the named range IFinFldBen (India final flood benefits)
	{DELETE}	0	Deletes the above selected range
	{EDIT-COPY IFiniirBen}	0	Copies the named range IFiniirBen (India final irrigation benefits) to the clipboard
	{EDIT-PASTE SPECIAL OldIFiniirBen cell-contents"}	0	Copies above to the named range OldIFiniirBen
	{SELECT IFiniirBen}	0	Selects the named range IFiniirBen (India final irrigation benefits)
	{DELETE}	0	Deletes the above selected range
	{EDIT-COPY IFinOthBen}	0	Copies the named range IFinOthBen (India final other benefits) to the clipboard
	{EDIT PASTE-SPE CIAL OldIFinOthBen cell-contents"}	0	Copies above to the named range OldIFinOthBen
	{SELECT IFinOthBen}	0	Selects the named range IFinOthBen (India final other benefits)
	{DELETE}	0	Deletes the above selected range
	{Calc}	0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	0	Comment line
	{PUT Sen7Nwob 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen7NwoB
	{PUT Sen7ROIwob 0 0 DevROI}	0	Puts the new computed DevROI (Developer retun on equity) to the named range Sen7ROIwoB
	{-- Without India d/s benefits copy back Nepal s d/s benefits}	0	Comment line
	{EDIT-COPY OldNFinFldBen}	0	Copies the named range OldNFinFldBen (Nepal base case final flood benefits) to the clipboard
	{EDIT-PASTE SPECIAL NFinFldBen cell-contents"}	0	Copies above to the named range NFinFldBen
	{EDIT-COPY OldNFiniirBen}	0	Copies the named range OldNFiniirBen (Nepal base case final irrigation benefits) to the clipboard
	{EDIT PASTE-SPECIAL NFiniirBen cell-contents"}	0	Copies above to the named range NFiniirBen
	{EDIT-COPY OldNFinOthBen}	0	Copies the named range OldNFinOthBen (Nepal base case final other benefits) to the clipboard
	{EDIT-PASTE SPECIAL NFinOthBen cell-contents"}	0	Copies above to the named range NFinOthBen
	{Calc}	0	Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}	0	Comment line
	{PUT Sen7Nwoi 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}	0	Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen7Nwoi
	{PUT Sen7ROIwoi 0 0 DevROI}	0	Puts the new computed DevROI (Developer retun on equity) to the named range Sen7ROIwoi
	{-- Copy back Nepal s d/s benefits}	0	Comment line
	{EDIT COPY OldNFinFldBen}	0	Copies the named range OldNFinFldBen (Nepal base case final flood benefits) to the clipboard
	{EDIT-PASTE-SPECIAL NFinFldBen cell-contents"}	0	Copies above to the named range NFinFldBen
	{EDIT-COPY OldNFiniirBen}	0	Copies the named range OldNFiniirBen (Nepal base case final irrigation benefits) to the clipboard
	{EDIT-PASTE-SPECIAL NFiniirBen cell-contents"}	0	Copies above to the named range NFiniirBen
	{EDIT-COPY OldNFinOthBen}	0	Copies the named range OldNFinOthBen (Nepal base case final other benefits) to the clipboard
	{EDIT-PASTE-SPECIAL NFinOthBen cell-contents"}	0	Copies above to the named range NFinOthBen
	{Calc}	0	Calculates the spreedsheet (same as F9)
	{-- Copy back India s d/s benefits}		Comment line
	{EDIT-COPY OldIFinFldBen}		Copies the named range OldIFinFldBen (India base case final flood benefits) to the clipboard
	{EDIT-PASTE-SPECIAL IFinFldBen cell-contents"}	Free	Copies above to the named range IFinFldBen
	{EDIT-COPY OldIFiniirBen}		Copies the named range OldIFiniirBen (India base case final irrigation benefits) to the clipboard
	{EDIT-PASTE-SPECIAL IFiniirBen cell-contents"}		Copies above to the named range IFiniirBen

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Name	Macro Commands	Counters and Base Case Input Values (Old)		Description
	{EDIT COPY OldiFinOthBen}			Copies the named range OldiF OthBen (India base case final other benefits) to the clipboard
	{EDIT PASTE SPECIAL iFinOthBen cell-contents"}			Copies above to the named range iFinOthBen
	{PUT IfinIrrY 0 0 OldiF IrrYr}			Pl es the amed range OldiFinIrrYr in the named range IFinIrrYr
	{Calc}			Calculates the spreedsheet (same as F9)
****	{-- Average Cost of Debt}	OldIntRt1		Comment line
	{PUT OldIntRt1 0 0 IntRt1}		0	Places the named range IntRt1 in the named range OldIntRt1
	{PUT OldIntRt2 0 0 IntRt2}	OldIntRt2		Places the named range IntRt2 in the named range OldIntRt2
	{PUT OldIntRt3 0 0 IntRt3}		0	Places the named range IntRt3 in the named range OldIntRt3
	{PUT OldIntRt4 0 0 IntRt4}	OldIntRt3		Places the named range IntRt4 in the named range OldIntRt4
	{PUT OldIntRt5 0 0 IntRt5}		0	Places the named range IntRt5 in the named range OldIntRt5
	{PUT OldIntRt6 0 0 IntRt6}	OldIntRt4		Places the named range IntRt6 in the named range OldIntRt6
	{PUT OldIntRt7 0 0 IntRt7}		0	Places the named range IntRt7 in the named range OldIntRt7
	{PUT OldIntRt8 0 0 IntRt8}	OldIntRt5		Places the named range IntRt8 in the named range OldIntRt8
	{PUT OldIntRt9 0 0 IntRt9}		0	Places the named range IntRt9 in the named range OldIntRt9
	{PUT OldIntRt10 0 0 IntRt10}	OldIntRt6		Places the named range IntRt10 in the named range OldIntRt10
	{IF IntRt1 0}{PUT IntRt1 0 0 OldIntRt1 (1 sen8ACDp)}		0	If loan 1 is used replace the named range IntRt1 with the OldIntRt1 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt2 0}{PUT IntRt2 0 0 OldIntRt2 (1+sen8ACDp)}	OldIntRt7		If loan 2 is used replace the named range IntRt2 with the OldIntRt2 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt3 0}{PUT IntRt3 0 0 OldIntRt3 (1 sen8ACDp)}		0	If loan 3 is used replace the named range IntRt3 with the OldIntRt3 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt4 0}{PUT IntRt4 0 0 OldIntRt4 (1 sen8ACDp)}	OldIntRt8		If loan 4 is used replace the named range IntRt4 with the OldIntRt4 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt5 0}{PUT IntRt5 0 0 OldIntRt5 (1 sen8ACDp)}		0	If loan 5 is used replace the named range IntRt5 with the OldIntRt5 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt6 0}{PUT IntRt6 0 0 OldIntRt6 (1 sen8ACDp)}	OldIntRt9		If loan 6 is used replace the named range IntRt6 with the OldIntRt6 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt7 0}{PUT IntRt7 0 0 OldIntRt7 (1+sen8ACDp)}		0	If loan 7 is used replace the named range IntRt7 with the OldIntRt7 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt8 0}{PUT IntRt8 0 0 OldIntRt8 (1 sen8ACDp)}	OldIntRt10		If loan 8 is used replace the named range IntRt8 with the OldIntRt8 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt9 0}{PUT IntRt9 0 0 OldIntRt9 (1+sen8ACDp)}		0	If loan 9 is used replace the named range IntRt9 with the OldIntRt9 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{IF IntRt10 0}{PUT IntRt10 0 0 OldIntRt10 (1 sen8ACDp)}			If loan 10 is used replace the named range IntRt10 with the OldIntRt10 times 1plus Sen8ACDp (% of plus average cost of debt sensitivity variation)
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen8Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen8Np
	{PUT Sen8ROIp 0 0 DevROI}			Puts the new computed DevROI (Developer return on equity) to the named range Sen8ROIp
	{IF IntRt1 0}{PUT IntRt1 0 0 OldIntRt1 (1 sen8ACDm)}			If loan 1 is used replace the named range IntRt1 with the OldIntRt1 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt2 0}{PUT IntRt2 0 0 OldIntRt2 (1 sen8ACDm)}			If loan 2 is used replace the named range IntRt2 with the OldIntRt2 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt3>0}{PUT IntRt3 0 0 OldIntRt3 (1 sen8ACDm)}			If loan 3 is used replace the named range IntRt3 with the OldIntRt3 times 1plus Sen8ACD (% of minus average cost of debt sensitivity variation)
	{IF IntRt4 0}{PUT IntRt4 0 0 OldIntRt4 (1 sen8ACDm)}			If loan 4 is used replace the named range IntRt4 with the OldIntRt4 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt5 0}{PUT IntRt5 0 0 OldIntRt5 (1 sen8ACDm)}			If loan 5 is used replace the named range IntRt5 with the OldIntRt5 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt6 0}{PUT IntRt6 0 0 OldIntRt6 (1 sen8ACDm)}			If loan 6 is used replace the named range IntRt6 with the OldIntRt6 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt7 0}{PUT IntRt7 0 0 OldIntRt7 (1+sen8ACDm)}			If loan 7 is used replace the named range IntRt7 with the OldIntRt7 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt8 0}{PUT IntRt8 0 0 OldIntRt8 (1+sen8ACDm)}			If loan 8 is used replace the named range IntRt8 with the OldIntRt8 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt9 0}{PUT IntRt9 0 0 OldIntRt9 (1+sen8ACDm)}			If loan 9 is used replace the named range IntRt9 with the OldIntRt9 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{IF IntRt10 0}{PUT IntRt10 0 0 OldIntRt10 (1+sen8ACDm)}			If loan 10 is used replace the named range IntRt10 with the OldIntRt10 times 1plus Sen8ACDm (% of minus average cost of debt sensitivity variation)
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen8Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen8Nm
	{PUT Sen8ROIm 0 0 DevROI}			Puts the new computed DevROI (Developer return on equity) to the named range Sen8ROIm
	{-- Reset orginal variables}			Comment line
	{PUT IntRt1 0 0 OldIntRt1}			Places the named range OldIntRt1 in the named range IntRt1
	{PUT IntRt2 0 0 OldIntRt2}			Places the named range OldIntRt2 in the named range IntRt2
	{PUT IntRt3 0 0 OldIntRt3}			Places the named range OldIntRt3 in the named range IntRt3
	{PUT IntRt4 0 0 OldIntRt4}			Places the named range OldIntRt4 in the named range IntRt4
	{PUT IntRt5 0 0 OldIntRt5}			Places the named range OldIntRt5 in the named range IntRt5
	{PUT IntRt6 0 0 OldIntRt6}			Places the named range OldIntRt6 in the named range IntRt6
	{PUT IntRt7 0 0 OldIntRt7}			Places the named range OldIntRt7 in the named range IntRt7
	{PUT IntRt8 0 0 OldIntRt8}			Places the named range OldIntRt8 in the named range IntRt8
	{PUT IntRt9 0 0 OldIntRt9}			Places the named range OldIntRt9 in the named range IntRt9
	{PUT IntRt10 0 0 OldIntRt10}			Places the named range OldIntRt10 in the named range IntRt10
	{Calc}			Calculates the spreedsheet (same as F9)

Name	Macro Commands	Counters and Base Case Input Values (Old)		Description
	{ Discount Rate}	OldD		Comment line
	{PUT OldD 0 0 D}		0	Places the named range D in the named range OldD
	{PUT D 0 0 sen9DRp}			Places the named range sen9DRp in the named range D
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen9Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen9Np
	{PUT Sen9ROIp 0 0 DevROI}			Puts the new computed DevROI (Developer retun on equity) to the named range Sen9ROIp
	{PUT D 0 0 sen9DRm}			Places the named range sen9DRm in the named range D
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen9Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen9Nm
	{PUT Sen9ROIm 0 0 DevROI}			Puts the new computed DevROI (Developer retun on equity) to the named range Sen9ROIm
	{-- Reset orginal variables}			Comment line
	{PUT D 0 0 OldD}			Places the named range OldD in the named range D
	{Calc}			Calculates the spreedsheet (same as F9)
** ** **	{-- Average Power Price}	OldTNCap		Comment line
	{-- Nepal tariffs}		6 24	Comment line
	{EDIT COPY NepalRates}	OldTNFirm		Copies the named range NepalRates (Nepal base case energy tariff rates) to the clipboard
	{EDIT PASTE-SPECIAL NepalRates2 cell-contents"}		4 80	Copies above to the named range NepalRates2
	{PUT OldTNCap 0 0 TNCap}	OldTNSec		Places the named range TNCAP in the named range OldTNCap
	{PUT OldTNFirm 0 0 TNFirm}		2 40	Places the named range TNFirm in the named range OldTNFirm
	{PUT OldTNSec 0 0 TNSec}			Places the named range TNSec in the named range OldTNSec
	{EDIT-COPY NepalRates3}			Copies the named range NepalRates3 (Nepal plus sensitivity energy tariff rates) to the clipboard
	{FILE UNSEAL password}			Unseals protection on file so can paste-special
	{EDIT PASTE-SPECIAL NepalRates "values"}			Copies above to the named range NepalRates
	{FILE-SEAL password}			Seals file
	{PUT TNCap 0 0 OldTNCap (1 sen10PPp)}			Replaces the named range TNCap with the OldTNCap times 1plus Sen10PPp (% of plus average power price sensitivity variation)
	{PUT TNFirm 0 0 OldTNFirm (1 sen10PPp)}			Replaces the named range TNFirm with the OldTNFirm times 1plus Sen10PPp (% of plus average power price sensitivity variation)
	{PUT TNSec 0 0 OldTNSec (1 sen10PPp)}			Replaces the named range TNSec with the OldTNSec times 1plus Sen10PPp (% of plus average power price sensitivity variation)
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen10Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen10Np
	{PUT Sen10ROIp 0 0 DevROI}			Puts the new computed DevROI (Developer retun on equity) to the named range Sen10ROIp
	{-- Minus}			Comment line
	{EDIT-COPY NepalRates4}			Copies the named range NepalRate4 (Nepal minus sensitivity energy tariff rates) to the clipboard
	{FILE-UNSEAL password}			Unseals protection on file so can paste-special
	{EDIT-PASTE-SPECIAL NepalRates "values"}			Copies above to the named range NepalRates
	{FILE-SEAL password}			Seals file
	{PUT TNCap 0 0 OldTNCap (1+sen10PPm)}			Replaces the named range TNCap with the OldTNCap times 1plus Sen10PP (% of minus average power price sensitivity variation)
	{PUT TNFirm 0 0 OldTNFirm (1 sen10PPm)}			Replaces the named range TNFirm with the OldTNFirm times 1plus Sen10PPm (% of minus average power price sensitivity variation)
	{PUT TNSec 0 0 OldTNSec (1 sen10PPm)}			Replaces the named range TNSec with the OldTNSec times 1plus Sen10PPm (% of minus average power price sensitivity variation)
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}			Comment line
	{PUT Sen10Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}			Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen10Nm
	{PUT Sen10ROIm 0 0 DevROI}			Puts the new computed DevROI (Developer retun on equity) to the named range Sen10ROIm
	{EDIT-COPY NepalRates2}			Copies the named range NepalRate2 (Nepal base case energy tariff rates) to the clipboard
	{EDIT-PASTE SPECIAL NepalRates cell-contents"}			Copies above to the named range NepalRates
	{PUT TNCap 0 0 OldTNCap}			Places the named range OldTNCAP in the named range TNCap
	{PUT TNFirm 0 0 OldTNFirm}			Places the named range OldTNFirm in the named range TNFirm
	{PUT TNSec 0 0 OldTNSec}			Places the named range OldTNSec in the named range TNSec
	{Calc}			Calculates the spreedsheet (same as F9)
	{-- Export tariffs Paid in US$}	OldTECap		Comment line
	{EDIT-COPY ExportRates}		0 00	Copies the named range ExportRates (Export base case energy tariff rates) to the clipboard
	{EDIT-PASTE-SPECIAL ExportRates2 cell-contents"}	OldTEFirm		Copies above to the named range ExportRates2
	{PUT OldTECap 0 0 TECap}		7 07	Places the named range TECAP in the named range OldTECap

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{PUT OldTEFirm 0 0 TEFirm}	OldTESec	Places the named range TEFirm in the named range OldTEFirm
	{PUT OldTESec 0 0 TESec}	5 66	Places the named range TESec in the named range OldTESec
	{EDIT COPY ExportRates3}		Copies the named range ExportRates3 (Export plus sensitivity energy tariff rates) to the clipboard
	{FILE UNSEAL password}		Unseals protection on file so can paste-special
	{EDIT PASTE SPECIAL ExportRates "values"}		Copies above to the nam ed range ExportRates
	{FILE SEAL password}		Seals file
	{PUT TECap 0 0 OldTECap (1 sen12PPp)}		Replaces the named range TECap with the OldTECap times 1plus Sen12PPp (% of plus average power price sensitivity variation)
	{PUT TEFirm 0 0 OldTEFirm (1 sen12PPp)}		Replaces the named range TEFirm with the OldTEFirm times 1plus Sen12PPp (% of plus average power price sensitivity variation)
	{PUT TESec 0 0 OldTESec (1 sen12PPp)}		Replaces the named range TESec with the OldTESec times 1plus Sen12PPp (% of plus average power price sensitivity variation)
	{Calc}		Calculates the spreadsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen12Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen12Np
	{PUT Sen12ROIp 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen12ROIp
	{-- Minus}		Comment line
	{EDIT COPY ExportRates4}		Copies the named range ExportRate4 (Export minus sensitivity energy tariff rates) to the clipboard
	{FILE UNSEAL password}		Unseals protection on file so can paste-special
	{EDIT PASTE SPECIAL ExportRates "values"}		Copies above to the named range ExportRates
	{FILE-SEAL password}		Seals file
	{PUT TECap 0 0 OldTECap (1 sen12PPm)}		Replaces the named range TECap with the OldTECap times 1plus Sen12PP (% of minus average power price sensitivity variation)
	{PUT TEFirm 0 0 OldTEFirm (1 sen12PPm)}		Replaces the named range TEFirm with the OldTEFirm times 1plus Sen12PPm (% of minus average power price sensitivity variation)
	{PUT TESec 0 0 OldTESec (1+sen12PPm)}		Replaces the named range TESec with the OldTESec times 1plus Sen12PPm (% of minus average power price sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen12Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen12Nm
	{PUT Sen12ROIm 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen12ROIm
	{EDIT COPY ExportRates2}		Copies the named range ExportRate2 (Export base case energy tariff rates) to the clipboard
	{EDIT PASTE SPECIAL ExportRates cell-contents"}		Copies above to the named range ExportRates
	{PUT TECap 0 0 OldTECap}		Places the named range OldTECAP in the named range TECap
	{PUT TEFirm 0 0 OldTEFirm}		Places the named range OldTEFirm in the named range TEFirm
	{PUT TESec 0 0 OldTESec}		Places the named range OldTESec in the named range TESec
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Export tariffs Paid in tRs}	OldTECapIR	Comment line
	{EDIT COPY ExRatesRs}	0 00	Copies the named range ExRatesRs (Export base case energy tariff rates paid in Rs) to the clipboard
	{EDIT-PASTE-SPECIAL ExRatesRs2 cell-contents"}	OldTEFirmIR	Copies above to the named range ExRatesRs2
	{PUT OldTECapIR 0 0 TECapIR}	2 55	Places the named range TECAPIR in the named range OldTECapIR
	{PUT OldTEFirmIR 0 0 TEFirmIR}	OldTESecIR	Places the named range TEFirmIR in the named range OldTEFirmIR
	{PUT OldTESecIR 0 0 TESecIR}	2 04	Places the named range TESecIR in the named range OldTESecIR
	{EDIT-COPY ExRatesRs3}		Copies the named range ExRatesRs3 (Export plus sensitivity energy tariff rates) to the clipboard
	{FILE-UNSEAL password}		Unseals protection on file so can paste-special
	{EDIT-PASTE-SPECIAL ExRatesRs "values"}		Copies above to the named range ExRatesRs
	{FILE-SEAL password}		Seals file
	{PUT TECapIR 0 0 OldTECapIR (1 sen14PPp)}		Replaces the named range TECapIR with the OldTECapIR times 1plus Sen14PPp (% of plus average power price sensitivity variation)
	{PUT TEFirmIR 0 0 OldTEFirmIR (1 sen14PPp)}		Replaces the named range TEFirmIR with the OldTEFirmIR times 1plus Sen14PPp (% of plus average power price sensitivity variation)
	{PUT TESecIR 0 0 OldTESecIR*(1 sen14PPp)}		Replaces the named range TESecIR with the OldTESecIR times 1plus Sen14PPp (% of plus average power price sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen14Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen14Np
	{PUT Sen14ROIp 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen14ROIp
	{-- Minus}		Comment line
	{EDIT-COPY ExRatesRs4}		Copies the named range ExRateRs4 (Export minus sensitivity energy tariff rates) to the clipboard
	{FILE UNSEAL password}		Unseals protection on file so can paste special
	{EDIT-PASTE-SPECIAL ExRatesRs "values"}		Copies above to the named range ExRatesRs
	{FILE-SEAL password}		Seals file
	{PUT TECapIR 0 0 OldTECapIR*(1+sen14PPm)}		Replaces the named range TECapIR with the OldTECapI4 times 1plus Sen14PPm (% of minus average power price sensitivity vari tion)
	{PUT TEFirmIR 0 0 OldTEFirmIR (1 sen14PPm)}		Replaces the named range TEFirmIr with the OldTEFirmI times 1plus Sen14PPm (% of minus average pow r pri e s sitivity va abo)

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{PUT TESecIR 0 0 OldTESecIR (1 sen14PPm)}		Replaces the named range TESecIR with the OldTESecIr times 1plus Sen14PPm (% of minus average power price sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen14Nm 0 0 (NNetBenefits OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen14Nm
	{PUT Sen14ROIm 0 0 DevROI}		*Puts the new computed DevROI (Developer return on equity) to the named range Sen14ROIm*
	{EDIT COPY ExRatesRs2}		Copies the named range ExRateRs2 (Export base case energy tariff rates) to the clipboard
	{EDIT PASTE SPECIAL ExRatesRs cell contents"}		Copies above to the named range ExRatesRs
	{PUT TECapIR 0 0 OldTECapIR}		Places the named range OldTECAPIR in the named range TECapIR
	{PUT TEFirmIR 0 0 OldTEFirmIR}		Places the named range OldTEFirmIR in the named range TEFirmIR
	{PUT TESecIR 0 0 OldTESecIR}		Places the named range OldTESecIR in the named range TESecIR
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Average Power PriceEscalations}		Comment line
	{-- Nepal tariffs escalations}	OldTNCapEsc	Comment line
	{PUT OldTNCapEsc 0 0 TNCapEsc}	0 01	Places the named range TNCapEsc in the named range OldTNCapEsc
	{PUT OldTNFirmEsc 0 0 TNFirmEsc}	OldTNFirmEsc	Places the named range TNFirmEsc in the named range OldTNFirmEsc
	{PUT OldTNSecEsc 0 0 TNSecEsc}	0 01	Places the named range TNSecEsc in the named range OldTNSecEsc
	{PUT TNCapEsc 0 0 OldTNCapEsc+sen11TEp}	OldTNSecEsc	Replaces the named range TNCapEsc with the OldTNCapEsc times 1plus Sen11TEp (% of plus tariff escalation sensitivity variation)
	{PUT TNFirmEsc 0 0 OldTNFirmEsc sen11TEp}	0 01	Replaces the named range TNFirmEsc with the OldTNFirmEsc times 1plus Sen11TEp (% of plus tariff escalation sensitivity variation)
	{PUT TNSecEsc 0 0 OldTNSecEsc+sen11TEp}		Replaces the named range TNSecEsc with the OldTNSecEsc times 1plus Sen11TEp (% of plus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen11Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen11Np
	{PUT Sen11ROIp 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen11ROIp
	{-- Minus}		Comment line
	{PUT TNCapEsc 0 0 OldTNCapEsc+sen11TEm}		Replaces the named range TNCapEsc with the OldTNCapEsc times 1plus Sen11TEm (% of minus tariff escalation sensitivity variation)
	{PUT TNFirmEsc 0 0 OldTNFirmEsc sen11TEm}		Replaces the named range TNFirmEsc with the OldTNFirmEsc times 1plus Sen11TEm (% of minus tariff escalation sensitivity variation)
	{PUT TNSecEsc 0 0 OldTNSecEsc+sen11TEm}		Replaces the named range TNSecEsc with the OldTNSecEsc times 1plus Sen11TEm (% of minus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen11Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen11Nm
	{PUT Sen11ROIm 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen11ROIm
	{PUT TNCapEsc 0 0 OldTNCapEsc}		Places the named range OldTNCapEsc in the named range TNCapEsc
	{PUT TNFirmEsc 0 0 OldTNFirmEsc}		Places the named range OldTNFirmEsc in the named range TNFirmEsc
	{PUT TNSecEsc 0 0 OldTNSecEsc}		Places the named range OldTNSecEsc in the named range TNSecEsc
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Export tariff escalations Paid in US$}	OldTECapEsc	Comment line
	{PUT OldTECapEsc 0 0 TECapEsc}	0 02	Places the named range TECapEsc in the named range OldTECapEsc
	{PUT OldTEFirmEsc 0 0 TEFirmEsc}	OldTEFirmEsc	Places the named range TEFirmEsc in the named range OldTEFirmEsc
	{PUT OldTESecEsc 0 0 TESecEsc}	0 02	Places the named range TESecEsc in the named range OldTESecEsc
	{PUT TECapEsc 0 0 OldTECapEsc+sen13TEp}	OldTESecEsc	Replaces the named range TECapEsc with the OldTECapEsc times 1plus Sen13TEp (% of plus tariff escalation sensitivity variation)
	{PUT TEFirmEsc 0 0 OldTEFirmEsc+sen13TEp}	0 02	Replaces the named range TEFirmEsc with the OldTEFirmEsc times 1plus Sen13TEp (% of plus tariff escalation sensitivity variation)
	{PUT TESecEsc 0 0 OldTESecEsc+sen13TEp}		Replaces the named range TESecEsc with the OldTESecEsc times 1plus Sen13TEp (% of plus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen13Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen13Np
	{PUT Sen13ROIp 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen13ROIp
	{-- Minus}		Comment line
	{PUT TECapEsc 0 0 OldTECapEsc sen13TEm}		Replaces the named range TECapEsc with the OldTeCapEsc times 1plus Sen13TEm (% of minus tariff escalation sensitivity variation)
	{PUT TEFirmEsc 0 0 OldTEFirmEsc+sen13TEm}		*Replaces the named range TEFirmEsc with the OldTEFirmEsc times 1plus Sen13TEm (% of minus tariff escalation sensitivity variation)*
	{PUT TESecEsc 0 0 OldTESecEsc+sen13TEm}		Replaces the named range TESecEsc with the OldTESecEsc times 1plus Sen13TEm (% of minus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen13Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen13Nm
	{PUT Sen13ROIm 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen13ROIm
	{PUT TECapEsc 0 0 OldTECapEsc}		Places the named range OldTECapEsc in the named range TECapEsc

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{PUT TEFrmEsc 0 0 OldTEFirmEsc}		Places the named range OldTEFirmEsc in the named range TEFirmEsc
	{PUT TESecEsc 0 0 OldTESecEsc}		Places the named range OldTESecEsc in the named range TESecEsc
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Export tariff escalations Paid in IRs}	OldTECapIREsc	Comment line
	{PUT OldTECapIREsc 0 0 TECapIREsc}	0 00	Places the named range TECapIREsc in the named range OldTECapIREsc
	{PUT OldTEFirmIREsc 0 0 TEFirmIREsc}	OldTEFirmIREsc	Places the named range TEFirmIREsc in the named range OldTEFirmIREsc
	{PUT OldTESecIREsc 0 0 TESecIREsc}	0 10	Places the named range TESecIREsc in the named range OldTESecIREsc
	{PUT TECapIREsc 0 0 OldTECapIREsc+sen15TEp}	OldTESecIREsc	Replaces the named range TECapIREsc with the OldTECapIREsc times 1plus Sen15TEp (% of plus tariff escalation sensitivity variation)
	{PUT TEFirmIREsc 0 0 OldTEFirmIREsc sen15TEp}	0 10	Replaces the named range TEFirmIREsc with the OldTEFirmIREsc times 1plus Sen15TEp (% of plus tariff escalation sensitivity variation)
	{PUT TESecIREsc 0 0 OldTESecIREsc+sen15TEp}		Replaces the named range TESecIREsc with the OldTESecIREsc times 1plus Sen15TEp (% of plus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen15Np 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen15Np
	{PUT Sen15ROIp 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen15ROIp
	{-- Minus}		Comment line
	{PUT TECapIREsc 0 0 OldTECapIREsc+sen15TEm}		Replaces the named range TECapIREsc with the OldTeCapIrEsc times 1plus Sen15TEm (% of minus tariff escalation sensitivity variation)
	{PUT TEFirmIREsc 0 0 OldTEFirmIREsc sen15TEm}		Replaces the named range TEFirmIREsc with the OldTEFirmIREsc times 1plus Sen15TEm (% of minus tariff escalation sensitivity variation)
	{PUT TESecIREsc 0 0 OldTESecIREsc+sen15TEm}		Replaces the named range TESecIREsc with the OldTESecIREsc times 1plus Sen15TEm (% of minus tariff escalation sensitivity variation)
	{Calc}		Calculates the spreedsheet (same as F9)
	{-- Write sensitivity variables to sensitivity table}		Comment line
	{PUT Sen15Nm 0 0 (NNetBenefits-OldNNetBenefits)/OldNNetBenefits}		Puts the % chance in NNetBenefits (Nepal net benefits) to the named range Sen15Nm
	{PUT Sen15ROIm 0 0 DevROI}		Puts the new computed DevROI (Developer return on equity) to the named range Sen15ROIm
	{PUT TECapIREsc 0 0 OldTECapIREsc}		Places the named range OldTECapIREsc in the named range TECapIREsc
	{PUT TEFirmIREsc 0 0 OldTEFirmIREsc}		Places the named range OldTEFirmIREsc in the named range TEFirmIREsc
	{PUT TESecIREsc 0 0 OldTESecIREsc}		Places the named range OldTESecIREsc in the named range TESecIREsc
	{Calc}		Calculates the spreedsheet (same as F9)
	{EDIT GOTO SAStart}		Go back to sheet SA
	{RETURN}		Returns to calling macro if called from another macro
			MACRO THAT UPDATES THE DATA RANGES USED FOR GRAPHS
UpdateGraphs	{EDIT GOTO Gph2XStart}		Goes to the named range GPH2XStart, which is the starting point for selecting the range of graph 2 X range
	{IF PIPYR1 0}{DOWN 15-(FSTPOWERP-PIPYR1)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{IF PIPYR1 ""}{DOWN 15}		If no phased in power down 15 rows
	{IF PIPYR1 0}{SELECT RANGE RELATIVE 0 (FSTPOWERP PIPYR1) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{IF PIPYR1 ""}{SELECT RANGE-RELATIVE 0 YRSTOTRANSFER 1 0}		If no pahsed in power select range equal to number of years till transfer
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE Gph2X"}		Names the selected range Gph2X
	{FILE SEAL password}		Seals file
	{EDIT GOTO Gph2AStart}		Goes to the named range GPH2AStart which is the starting point for selecting the range of graph 2 A range
	{IF PIPYR1 0}{DOWN 15-(FSTPOWERP PIPYR1)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{IF PIPYR1= ""}{DOWN 15}		If no phased in power down 15 rows
	{IF PIPYR1 0}{SELECT-RANGE RELATIVE 0 (FSTPOWERP-PIPYR1) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{IF PIPYR1 ""}{SELECT-RANGE RELATIVE 0 YRSTOTRANSFER 1 0}		If no pahsed in power select range equal to number of years till transfer
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE-NAME-CREATE Gph2A"}		Names the selected range Gph2A
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph2BStart}		Goes to the named range GPH2BStart which is the starting point for selecting the range of graph 2 B range
	{IF PIPYR1>0}{DOWN 15-(FSTPOWERP-PIPYR1)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{IF PIPYR1 ""}{DOWN 15}		If no phased in power down 15 rows
	{IF PIPYR1>0}{SELECT-RANGE-RELATIVE 0 (FSTPOWERP-PIPYR1)+YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{IF PIPYR1 ""}{SELECT-RANGE-RELATIVE 0 YRSTOTRANSFER 1 0}		If no pahsed in power select range equal to number of years till transfer
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE-NAME-CREATE Gph2B"}		Names the selected range Gph2B

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{FILE SEAL password}		Seals file
	{-- Start of Chart 3}		Comment line
	{EDIT-GOTO Gph3AStart}		Goes to the named range GPH3AStart which is the starting point for selecting the range of graph 3 A range
	{IF PIPYR1 0}{DOWN 15-(FSTPOWERP PIPYR1)}		If phased in power (power before end of construction) move down the maximun number of years of co struction (15) minus the number of years of phased in power
	{IF PIPYR1 ""}{DOWN 15}		If no phased in power down 15 rows
	{IF PIPYR1 0}{SELECT RANGE RELATIVE 0 (FSTPOWERP PIPYR1) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{IF PIPYR1 ""}{SELECT RANGE RELATIVE 0 YRSTOTRANSFER 1 0}		If no pahsed in power select range equal to number of years till transfer
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE Gph3A"}		Names the selected range Gph3A
	{FILE SEAL password}		Seals file
	{-- Start of Chart 4}		Comment line
	{EDIT GOTO Gph4AStart}		Goes to the named range GPH4AStart which is the starting point for selecting the range of graph 4 A range
	{DOWN 15-(FSTPOWERP-F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE-RELATIVE 0 (FSTPOWERP-F)+YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to tran ifer plus number of years of phased in power
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE Gph4A"}		Names the selected range Gph4A
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4BStart}		Goes to the named range GPH4BStart which is the starting point for selecting the range of graph 4 B range
	{DOWN 15-(FSTPOWERP F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE RELATIVE 0 (FSTPOWERP F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4B"}		Names the selected range Gph4B
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4CStart}		Goes to the named range GPH4CStart which is the starting point for selecting the range of graph 4 C range
	{DOWN 15-(FSTPOWERP-F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT RANGE RELATIVE 0 (FSTPOWERP F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to trans er plus number of years of phased in power
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE Gph4C"}		Names the selected range Gph4C
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4DStart}		Goes to the named range GPH4DStart which is the starting point for selecting the range of graph 4 D range
	{DOWN 15-(FSTPOWERP F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE RELATIVE 0 (FSTPOWERP-F)+YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4D"}		Names the selected range Gph4D
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4EStart}		Goes to the named range GPH4EStart which is the starting point for selecting the range of graph 4 E range
	{DOWN 15-(FSTPOWERP F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE-RELATIVE 0 (FSTPOWERP-F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE-UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4E"}		Names the selected range Gph4E
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4FStart}		Goes to the named range GPH4FStart which is the starting point for selecting the range of graph 4 F range
	{DOWN 15-(FSTPOWERP-F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE-RELATIVE 0 (FSTPOWERP-F)+YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE-NAME-CREATE Gph4F"}		Names the selected range Gph4F
	{FILE-SEAL password}		Seals file
	{EDIT-GOTO Gph4GStart}		Goes to the named range GPH4GStart which is the starting point for selecting the range of graph 4 G range
	{DOWN 15-(FSTPOWERP-F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT-RANGE-RELATIVE 0 (FSTPOWERP-F)+YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE-UNSEAL password}		Unseals protection on file so can create named range

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Name	Macro Commands	Counters and Base Case Input Values (Old)	Description
	{RANGE NAME CREATE Gph4G"}		Names the selected range Gph4G
	{FILE SEAL password}		Se ls file
	{EDIT GOTO Gph4HStart}		Goes to the amed range GPH4GStart which is the starting point for selecting the range of graph 4 G range
	{DOWN 15 (FSTPOWERP F)}		If phased in powe (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT RANGE RELATIVE 0 (FSTPOWERP-F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4H"}		Names the selected range Gph4H
	{FILE SEAL password}		Seals file
	{EDIT GOTO Gph4IStart}		Goes to the named range GPH4IStart which is the starting point for selecting the range of graph 4 I range
	{DOWN 15-(FSTPOWERP F)}		If phased in power (power before end of construction) move down the maximun number of years of construction (15) minus the number of years of phased in power
	{SELECT RANGE RELATIVE 0 (FSTPOWERP F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4I"}		Names the selected range Gph4I
	{FILE-SEAL password}		Seals file
	{EDIT GOTO Gph4JStart}		Goes to the named range GPH4JStart which is the starting point for selecting the range of graph 4 J range
	{DOWN 15-(FSTPOWERP F)}		If phased in power (power before end of construction) move down the maximum number of years of construction (15) minus the number of years of phased in power
	{SELECT RANGE RELATIVE 0 (FSTPOWERP-F) YRSTOTRANSFER 1 0}		If phased in power select range equal to number of years to transfer plus number of years of phased in power
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME CREATE Gph4J"}		Names the selected range Gph4J
	{FILE-SEAL password}		Seals file
	{-- Start of Chart 5}		Comment line
	{EDIT-GOTO Gph5XStart}		Goes to the named range GPH5XStart which is the starting point for selecting the range of graph 5 X range
	{DOWN 14 (l f)}		Moves the cursor down the number of years of construction less than 15 L last year of contruction F first year of construction This gets rid of the blank line i the print output.
	{SELECT RANGE RELATIVE 0 (l f) Plife 0}		Selects a range down the number of years of construction (L F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE "Gph5X"}		Names the selected range Gp5X
	{FILE SEAL password}		Seals file
	{EDIT GOTO Gph5AStart}		Goes to the named range GPH5AStart, which is the starting point for selecting the range of graph 5 A range
	{DOWN 14 (l f)}		Moves the cursor down the number of years of construction less than 15 L last year of contruction F first year of construction This gets rid of the blank line in the print output
	{SELECT-RANGE-RELATIVE 0 (l-f)+Plife 0}		Selects a range down the number of years of construction (L-F) plus the project evaluation live (PLIFE) rows This removes the blank rows at the bottom if the project evaluation life is less than 50 years the maximum
	{FILE UNSEAL password}		Unseals protection on file so can create named range
	{RANGE NAME-CREATE Gph5A"}		Names the selected range Gp5A
	{FILE SEAL password}		Seals file
	{EDIT GOTO Gph1start}		Go back to the start of GPH1
	{RETURN}		Returns to calling macro if called from another macro
			MACRO THAT PRINTS SHEET RANGES
PrintRanges	{PRINT NAME USE ranges"}		Slect the page setup file Ranges.AL3
	{HOME}		Got to top of the ranges sheet
	{DOWN 7}		Move down 7 rows to start of macros
	{SELECT RANGE-RELATIVE 3 682 0}		Select all active cells used in the sheet.
	{PRINT? selection"}		Print with preview the all active cells selection
	{PRINT RESET}		Resets the page setup to the default settings

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9 NEPSIM NAMED RANGES

The following table contains a listing of all LOTUS 123 named ranges used in NEPSIM The table provides the range name, exact location within the model and a description of what each named range represents

RANGE NAME	RANGE LOCATION	DESCRIPTION
AEPEX	D AQ91 D AQ91	Average first year energy price for export power
AEPN	D AP91 D AP91	Average first year energy price for power sold to Nepal
ALLFLOOD	C B427 C H433	Copy of the entire flood input data
AMORP1	C D261 C D261	Amortization Period for Loan 1
AMORP10	C H270 C H270	Amortization Period for Loan 10
AMORP2	C E261 C E261	Amortization Period for Loan 2
AMORP3	C F261 C F261	Amortization Period for Loan 3
AMORP4	C G261 C G261	Amortization Period for Loan 4
AMORP5	C H261 C H261	Amortization Period for Loan 5
AMORP6	C D270 C D270	Amortization Period for Loan 6
AMORP7	C E270 C E270	Amortization Period for Loan 7
AMORP8	C F270 C F270	Amortization Period for Loan 8
AMORP9	C G270 C G270	Amortization Period for Loan 9
AUSTOUS	C C213 C C213	Conversion factor from Austrian $ to US$
AVGANNENG	C D154 C D154	Average Annual Energy
AVGANNENGTOI	C H154 C H154	Average Annual Energy Delivered to India
AVGANNENGTON	C F154 C F154	Average Annual Energy Delivered to Nepal
CAPROY16P	C G242 C G242	Capacity royality paid from year 16 on
CAPROYF15	C E242 C E242	Capacity royality paid the first 15 years
CNTILNS	P G65 P G65	Counter in irrigation computation macro that counts the number of schemes used in the analysis for India
CNTNLNS	P G63 P G63	Counter in irrigation computation macro that counts the number of schemes used in the analysis for Nepal
CORPITRT	C E233 C E233	Corporate income tax rate
CPIYEAR	C A208 C A208	The base year for the US CPI Index
CSCH	C A285 C N299	The assumed distribution of yearly construction spending complete input section
CURRENCY1	C D258 C D258	The loan currency type for loan 1
CURRENCY10	C H267 C H267	The loan currency type for loan 10
CURRENCY2	C E258 C E258	The loan currency type for loan 2
CURRENCY3	C F258 C F258	The loan currency type for loan 3
CURRENCY4	C G258 C G258	The loan currency type for loan 4
CURRENCY5	C H258 C H258	The loan currency type for loan 5
CURRENCY6	C D267 C D267	The loan currency type for loan 6
CURRENCY7	C E267 C E267	The loan currency type for loan 7
CURRENCY8	C F267 C F267	The loan currency type for loan 8
CURRENCY9	C G267 C G267	The loan currency type for loan 9
CURTYP1	C D257 C D257	The alpha code for the currency of loan 1
CURTYP10	C H266 C H266	The alpha code for the currency of loan 10
CURTYP2	C E257 C E257	The alpha code for the currency of loan 2
CURTYP3	C F257 C F257	The alpha code for the currency of loan 3
CURTYP4	C G257 C G257	The alpha code for the currency of loan 4
CURTYP5	C H257 C H257	The alpha code for the currency of loan 5
CURTYP6	C D266 C D266	The alpha code for the currency of loan 6
CURTYP7	C E266 C E266	The alpha code for the currency of loan 7
CURTYP8	C F266 C F266	The alpha code for the currency of loan 8
CURTYP9	C G266 C G266	The alpha code for the currency of loan 9
D	C F195 C F195	HMGN discount rate
DAMAGES	J E35 J E85	Total Nepal downstream yearly flood benefits
DARKLN	P B148 P B148	Named range for macro DarkLn
DCFP1	F A7 F V20	Sheet DCF printing range 1 (top of page)
DCFP2	F A30 F V85	Sheet DCF printing range 2 (middle of page)
DCFP3	F A86 F V87	Sheet DCF printing range 3 (bottom of page)
DCFSTART	F A7 F A7	For sheet DCF the starting location to determine print ranges
DEFNTOI	C F193 C F193	Depreciation Rate NRs/IRs % /year
DEFUSTON	C F191 C F191	Depreciation Rate NRs/US$ % year
DEVELOPER	C C18 C C18	Name of the project developer in the input data
DEVEQUITY	C I30 C I30	Developer percent of equity in the project
DEVROI	F V86 F V86	Developer return on equity
DMTOUS	C H208 C H208	Conversion rate from German DM to US
DRINFBEN	C F315 C F379	Direct infrastucture benefits in the HMGN Costs and Benefits section of the input
DWNONE	P B157 P B157	Named range for macro dwnone
ECUTOUS	C B213 C B213	Conversion rate from european currency (EU)to US
EFTP1	E A7 E AC19	Sheet EFT printing range 1 (top of page 1)
EFTP2	E A29 E AC84	Sheet EFT printing range 2 (middle of page 1)
EFTP3	E A85 E AC88	Sheet EFT printing range 3 (bottom of page 1)
EFTP4	E AE7 E AK19	Sheet EFT printing range 4 (top of page 2)
EFTP5	E AE29 E AK84	Sheet EFT printing range 5 (middle of page 2)
EFTP6	E AE85 E AK85	Sheet EFT printing range 6 (bottom of page 2)
EFTSTART	E A7 E A7	For sheet EFT the starting location to determine print ranges for page 1
EFTSTART2	E AE7 E AE7	For sheet EFT the starting location to determine print ranges for page 2
ENGROY16P	C G244 C G244	Energy royality paid from year 16 on
ENGROYF15	C E244 C E244	Energy royality paid the first 15 years
EXDRYQ	C H392 C H392	Irrigation existing dry weather base flow
EXPORTRATES	C E82 C G137	Yearly export capacity firm and secondary energy tariff rate in the Input of Yearly Tarrifs in the input
EXPORTRATES2	K F37 K H92	Copy of the above yearly tariff rates in sheet FL_C
EXPORTRATES3	K.F97 K H152	The above rates times the plus sensitivity multipler in sheet FL_C
EXPORTRATES4	K.F158 K.H213	The above rates times the minus sensitivity multipler in sheet FL_C
EXRATESRS	C H82 C J137	Yearly export capacity firm and secondary energy (in Rs) tariff rate in the Input of Yearly Tarrifs in the input
EXRATESRS2	K I37 K.K92	Copy of the above yearly tariff rates in sheet FL_C
EXRATESRS3	K I97 K.K152	The above rates times the plus sensitivity multipler in sheet FL_C
EXRATESRS4	K.I158 K K213	The above rates times the minus sensitivity multipler in sheet FL_C
EXTARCAPBY	C E82 C E137	Yearly export capacity tariffs in the Input of Yearly Tariffs in the input
EXTARCAPYR1	C E82 C E82	The first year of the above range
EXTARFRMEBY	C F82 C F137	Yearly export firm energy tariffs in the Input of Yearly Tariffs in the input
EXTARFRMEYR1	C F82 C F82	The first year of the above range
EXTARSECEBY	C G82 C G137	Yearly export secondary energy tariffs in the Input of Yearly Tariffs in the input
EXTARSECEYR1	C G82 C G82	The first year of the above range
EXTAX	C E235 C E235	Export tax
F	C I22 C I22	First year of project construction
FINFLDBEN	J E35 J E84	Yearly final computed flood benefits
FINIRRBEN	I U67 I U118	Yearly final computed irrigation benefits
FIRMENG	C D150 C D150	Annual firm energy produced by the project
FIRMENGTON	C F150 C F150	The amount of firm energy that goes to Nepal
FIRMENTTOI	C H150 C H150	The amount of firm energy that goes to India
FLDCOMP	P B15 P B15	Named range for macro FldComp (flood benefits computation)
FLDDAM1	C E427 C E427	Estimated total flood damages for 50 year return period
FLDDAM2	C E428 C E428	Estimated total flood damages for 100 year return period
FLDDAM3	C E429 C E429	Estimated total flood damages for 200 year return period

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RANGE NAME	RANGE LOCATION	DESCRIPTION
FLDDAM4	C E430 C E430	Estimated total flood damages for 500 year return period
FLDDAM5	C E431 C E431	Estimated total flood damages for 1000 year return period
FLDDAM6	C E432 C E432	Estimated total flood damages for 2000 year return period
FLDDAM7	C E433 C E433	Estimated total flood damages for 10000 year return period
FLDDAMESC	K.G11 K.G17	The range in FL_C where yearly escalated flood damages are placed for yearly flood benefits computation
FLDESC	C D410 C D410	Yearly percent of flood damages escalation
FLDPB	J A137 J G137	This is a blank line with double lines added to end of yearly flood benefits to make a complete border
FLDRESULTS	J B35 J E85	The complete yearly flood benefits computation results
FLDSTART	J A7 J A7	For sheet FLD the starting location to determine print ranges
FLDYRCNT	P G17 P G17	Counter in the flood macro for the year of operation being computed
FLOODALL	J B35 J E84	The complete flood results area on sheet IRRS
FLOODDATA	K.D11 K.H17	The complete input flood data copy in sheet FLD
FLOODSUB	P B19 P B19	Named range for macro FloodSub (subroutine in flood benefits computation)
FSTPOWERP	C I26 C I26	The first year of full power porduction by the project
GIVEPTON	C H61 C H61	Logical for if power is given to Nepal as part of project
GPH1START	M A7 M A7	For sheet GPH1 the starting location to determine print ranges
GPH2A	H BH36 H BH59	The data for graph 2 range A
GPH2ASTART	H BH21 H BH21	The starting location to select and name the data for graph 2 range A
GPH2B	H BI36 H BI59	The data for graph 2 range B
GPH2BSTART	H BI21 H BI21	The starting location to select and name the data for graph 2 range B
GPH2START	N A7 N A7	For sheet GPH2 the starting location to determine print ranges
GPH2X	H BG36 H BG59	The data for graph 2 range X
GPH2XSTART	H BG21 H BG21	The starting location to select and name the data for graph 2 range X
GPH3A	H BK36 H BK59	The data for graph 3 range A
GPH3ASTART	H BK21 H BK21	The starting location to select and name the data for graph 3 range A
GPH3START	O A7 O A7	For sheet GPH3 the starting location to determine print ranges
GPH4A	H AD36 H AD59	The data for graph 4 range A
GPH4ASTART	H AD21 H AD21	The starting location to select and name the data for graph 4 range A
GPH4B	H AG36 H AG59	The data for graph 4 range B
GPH4BSTART	H AG21 H AG21	The starting location to select and name the data for graph 4 range B
GPH4C	H AH36 H AH59	The data for graph 4 range C
GPH4CSTART	H AH21 H AH21	The starting location to select and name the data for graph 4 range C
GPH4D	H AI36 H AI59	The data for graph 4 range D
GPH4DSTART	H AI21 H AI21	The starting location to select and name the data for graph 4 range D
GPH4E	H AJ36 H AJ59	The data for graph 4 range E
GPH4ESTART	H AJ21 H AJ21	The starting location to select and name the data for graph 4 range E
GPH4F	H AK36 H AK59	The data for graph 4 range F
GPH4FSTART	H AK21 H AK21	The starting location to select and name the data for graph 4 range F
GPH4G	H AL36 H AL59	The data for graph 4 range G
GPH4GSTART	H AL21 H AL21	The starting location to select and name the data for graph 4 range G
GPH4H	H AM36 H AM59	The data for graph 4 range H
GPH4HSTART	H AM21 H AM21	The starting location to select and name the data for graph 4 range H
GPH4I	H AN36 H AN59	The data for graph 4 range I
GPH4ISTART	H AN21 H AN21	The starting location to select and name the data for graph 4 range I
GPH4J	H AO36 H AO59	The data for graph 4 range J
GPH4JSTART	H AO21 H AO21	The starting location to select and name the data for graph 4 range J
GPH5A	H BD30 H BD85	The data for graph 5 range A
GPH5ASTART	H BD21 H BD21	The starting location to select and name the data for graph 5 range A
GPH5X	H BA30 H BA85	The data for graph 5 range X
GPH5XSTART	H BA21 H BA21	The starting location to select and name the data for graph 5 range X
GPH6A	H BN22 H BN32	The data for graph 6 range A
GPH6B	H BO22 H BO32	The data for graph 6 range B
GPH6X	H BM22 H BM32	The data for graph 6 range X
GRACEP1	C D262 C D262	Years of grace period for loan 1
GRACEP10	C H271 C H271	Years of grace period for loan 10
GRACEP2	C E262 C E262	Years of grace period for loan 2
GRACEP3	C F262 C F262	Years of grace period for loan 3
GRACEP4	C G262 C G262	Years of grace period for loan 4
GRACEP5	C H262 C H262	Years of grace period for loan 5
GRACEP6	C D271 C D271	Years of grace period for loan 6
GRACEP7	C E271 C E271	Years of grace period for loan 7
GRACEP8	C F271 C F271	Years of grace period for loan 8
GRACEP9	C G271 C G271	Years of grace period for loan 9
HMGNP1	H A7 H Y20	Sheet HMGN printing range 1 (top of page 1)
HMGNP2	H A30 H Z85	Sheet HMGN printing range 2 (middle of page 1)
HMGNP3	H A86 H Y89	Sheet HMGN printing range 3 (bottom of page 1)
HMGNP4	H AS7 H AY20	Sheet HMGN printing range 4 (top of page 2)
HMGNP5	H AS30 H AY85	Sheet HMGN printing range 5 (middle of page 2)
HMGNP6	H AS86 H AY87	Sheet HMGN printing range 6 (bottom of page 2)
HMGNSTART	H A7 H A7	For sheet HMGN the starting location to determine print ranges for page 1
HMGNSTART2	H AS7 H AS7	For sheet HMGN the starting location to determine print ranges for page 2
IDAMAGES	J D35 J D85	India yearly flood benefits results
IDCAP	C E225 C E225	Import duties as percent of capital costs
IDOP	C F225 C F225	Import duties as percent of O&M costs
IFINFLDBEN	J D35 J D84	India final yearly flood benefits results
IFINIRRBEN	I T68 I T118	India final yearly irrigation benefits results
IFINIRRYR	I T67 I T67	Capital outlay for irrigation benefits for India in year before first full power
IFINOTHBEN	C E444 C E494	India final yearly other benefits results
IINTERPO	P B96 P B96	Named range for macro IInterpo (subroutine in irrigation benefits computation)
IINTERPO2	P B126 P B126	Named range for macro IInterpo2 (subroutine in irrigation benefits computation)
IIRRCNT	P G54 P G54	The counter for India irrigations schemes in the irrigation computation macro
IIRRCPY	I C177 I J276	The complete results of India irrigation schemes
IIRRSUB	P B68 P B68	Named range for macro IIrrSub (subroutine in irrigation benefits computation)
INPUTSTART	C A8 C A8	For sheet INPUT the starting location to determine print ranges for 1st section of pages
INPUTSTART1	C A73 C A73	For sheet INPUT the starting location to determine print ranges for 1st section of pages
INPUTSTART11	C A139 C A139	For sheet INPUT the starting location to determine print ranges for the second part of the 1st section of pages
INPUTSTART2	C A278 C A278	For sheet INPUT the starting location to determine print ranges for 2nd section of pages
INPUTSTART22	C A302 C A302	For sheet INPUT the starting location to determine print ranges for the second part of the 2nd section of pages
INPUTSTART3	C A436 C A436	For sheet INPUT the starting location to determine print ranges for 3rd section of pages
INPUTSTART4	C A495 C A495	For sheet INPUT the starting location to determine print ranges for 4th section of pages
INTRT1	C D260 C D260	Interest rate on loan 1
INTRT10	C H269 C H269	Interest rate on loan 10
INTRT2	C E260 C E260	Interest rate on loan 2
INTRT3	C F260 C F260	Interest rate on loan 3
INTRT4	C G260 C G260	Interest rate on loan 4
INTRT5	C H260 C H260	Interest rate on loan 5

RANGE NAME	RANGE LOCATION	DESCRIPTION
INTRT6	C D269 C D269	Interest rate on loan 6
INTRT7	C E269 C E269	Interest rate on loan 7
INTRT8	C F269 C F269	Interest rate on loan 8
INTRT9	C G269 C G269	Interest rate on loan 9
IREXTARCBY	C H82 C H137	Yearly export capacity tariffs (Paid in I Rs) in the Input of Yearly Tariffs in the input
IREXTARCYR1	C H82 C H82	The first year of the above range
IREXTARFBY	C I82 C I137	Yearly export firm energy tariffs (PAid in I Rs) in the Input of Yearly Tariffs in the input
IREXTARFYR1	C I82 C I82	The first year of the above range
IREXTARSBY	C J82 C J137	Yearly export secondary energy tariffs(Paid in I Rs) in the Input of Yearly Tariffs in the input
IREXTARSYR1	C J82 C J82	The first year of the above range
IRRCALC	K.C27 K.C27	Starting point for the irrigation interpolation calculation in sheet FI_C
IRRCMP	P B43 P B43	Named range for macro IrrCmp (irrigation benefits computation)
IRRI	C B617 C I716	The complete results of India irrigation schemes
IRRN	C B505 C I604	The complete results of Nepal irrigation schemes
IRRP1	I A7 I H59	Sheet IRRS printing range 1 (top of page 1)
IRRP2	I A168 I N176	Sheet IRRS printing range 2 (middle of page 1)
IRRP3	I A68 I N68	Sheet IRRS printing range 3 (bottom of page 1)
IRRP4	I A177 I N179	Sheet IRRS printing range 4 (top of page 2)
IRRP5	I A61 I N67	Sheet IRRS printing range 5 (middle of page 2)
IRRP6	I A7 I I14	Sheet IRRS printing range 6 (bottom of page 2)
IRRQ	I H19 I H19	Additional irrigation flow availble due to the project
IRRSPB	I A300 I N300	This is a blank line with double lines added to end of page 1 of irrigation benefits to make a complete border
IRRSPB2	I P118 I W118	This is a blank line with double lines added to end of page 2 of irrigation benefits to make a complete border
IRRYEARLY	P B568 P B568	Named range for macro IrrYearly (subroutine for irrigation yearly benefits computation)
IRRYEARLYST	I P54 I P54	For sheet IRRS the starting location to determine print ranges for the yearly results page
ISTARTIN	C B616 C B616	The staring location on the india irrigation input to locate appropriate scheme line
ISTARTSUM	I C176 I C176	The staring location on the india irrigation results to locate appropriate line to write scheme
ISUMQ	C J617 C J716	India total annual water requirements by scheme
ITOT	K.M18 K.M18	India total yearly computed flood benefits on sheet FL_C
ITOTQ	I H52 I H52	India total dry weater base flow used for new irrigation schemes
ITOUS	C F208 C F208	Conversion rate from Indian Rs to US
L	C I24 C I24	Last year of project construction
LASTART	G A7 G A7	For sheet LA the starting location to determine print range
LENDER1	C D256 C D256	Name of lender for loan 1
LENDER10	C H265 C H265	Name of lender for loan 10
LENDER2	C E256 C E256	Name of lender for loan 2
LENDER3	C F256 C F256	Name of lender for loan 3
LENDER4	C G256 C G256	Name of lender for loan 4
LENDER5	C H256 C H256	Name of lender for loan 5
LENDER6	C D265 C D265	Name of lender for loan 6
LENDER7	C E265 C E265	Name of lender for loan 7
LENDER8	C F265 C F265	Name of lender for loan 8
LENDER9	C G265 C G265	Name of lender for loan 9
LOANAMT1	C D259 C D259	Loan amount for loan 1
LOANAMT10	C H268 C H268	Loan amount for loan 10
LOANAMT2	C E259 C E259	Loan amount for loan 2
LOANAMT3	C F259 C F259	Loan amount for loan 3
LOANAMT4	C G259 C G259	Loan amount for loan 4
LOANAMT5	C H259 C H259	Loan amount for loan 5
LOANAMT6	C D268 C D268	Loan amount for loan 6
LOANAMT7	C E268 C E268	Loan amount for loan 7
LOANAMT8	C F268 C F268	Loan amount for loan 8
LOANAMT9	C G268 C G268	Loan amount for loan 9
LOANUS1	C D263 C D263	Loan amount in US $ for loan 1
LOANUS10	C H272 C H272	Loan amount in US $ for loan 10
LOANUS2	C E263 C E263	Loan amount in US $ for loan 2
LOANUS3	C F263 C F263	Loan amount in US $ for loan 3
LOANUS4	C G263 C G263	Loan amount in US $ for loan 4
LOANUS5	C H263 C H263	Loan amount in US $ for loan 5
LOANUS6	C D272 C D272	Loan amount in US $ for loan 6
LOANUS7	C E272 C E272	Loan amount in US $ for loan 7
LOANUS8	C F272 C F272	Loan amount in US $ for loan 8
LOANUS9	C G272 C G272	Loan amount in US $ for loan 9
LTCAP	C E229 C E229	Local taxes based on percent of capital cost
LTOP	C F229 C F229	Local taxes based on percent of O&M cost
MODELNAME	A B1 A.B1	The model name NEPSIM
MORTRF	C E239 C E239	Mortgage registration fee
NCPI	C C208 C C208	Nepal Consumer Price Index base year
NCSTSTOEQU	C I306 C I306	Logical for if Nepals previous costs go to equity in the project
NDAMAGES	J C35 J C85	Nepal yearly flood benefits results
NDRTCSTS	C G315 C G379	Nepal direct costs incured prior to private project development
NEPALRATES	C B82 C D137	Yearly Nepal capacity firm and secondary energy tariff rate in the Input of Yearly Tarrifs in the input
NEPALRATES2	K C37 K.E92	Copy of the above yearly tariff rates in sheet FL_C
NEPALRATES3	K C97 K.E152	The above rates times the plus sensitivity multipler in sheet FL_C
NEPALRATES4	K.C158 K.E213	The above rates times the minus sensitivity multipler in sheet FL_C
NEPREVS	C E237 C E237	Nepal percent of revenue shareing
NETCAP	C D148 C D148	Net capacity of the project
NETCAPTOI	C H148 C H148	Net capacity that goes to India
NETCAPTON	C F148 C F148	Net capacity that goes to Nepal
NEWFIRMENG	P G689 P G689	Holds new case FirmEng in Sensitivity macro
NEWFIRMENGTON	P G693 P G693	Holds new case FirmEngToN in Sensitivity macro
NEWITOUS	C D213 C D213	Holds new case ITOUS in Sensitivity macro
NEWJTOUS	C E213 C E213	Holds new case JTOUS in Sensitivity macro
NEWKTOUS	C F213 C F213	Holds new case KTOUS in Sensitivity macro
NEWLTOUS	C G213 C G213	Holds new case LTOUS in Sensitivity macro
NEWMTOUS	C H213 C H213	Holds new case MTOUS in Sensitivity macro
NEWNTOUS	C I213 C I213	Holds new case NTOUS in Sensitivity macro
NEWOMNEPAL	P G720 P G720	Holds new case OMNepal in Sensitivity macro
NEWOMPRIVATE	P G716 P G716	Holds new case OMPrivate in Sensitivity macro
NEWSECENG	P G697 P G697	Holds new case SecEng in Sensitivity macro
NEWSECENGTON	P G702 P G702	Holds new case SecEngToN in Sensitivity macro
NEWTOTCAPCOST	P G712 P G712	Holds new case TotCapCost in Sensitivity macro
NFINFLDBEN	J C35 J C84	Nepal final yearly flood benefits results
NFINIRRBEN	I S67 I S118	Nepal final yearly irrigation benefits results
NFINOTHBEN	C D444 C D494	Nepal final yearly other benefits results
NFLDBFRI	C D413 C D413	The percent of India flood benefits Nepal obtains from India

RANGE NAME	RANGE LOCATION	DESCRIPTION
NINFRT	C F189 C F189	Nepal average Inflation Rate
NINTERPO	P B81 P B81	Named range for macro NInterpo (subroutine in irrigation benefits computation)
NINTERPO2	P B111 P B111	Named range for macroNInterpo2 (subroutine in irrigation benefits computation)
NIRRBESC	C H394 C H394	Nepal yearly irrigation benefits escalation
NIRRBFMI	C H396 C H396	The percent of India irrigation benefits Nepal obtains from India
NIRRCNT	P G50 P G50	The counter for Nepal irrigations schemes in the irrigation computation macro
NIRRCPY	I C68 I J167	The complete results of Nepal irrigation schemes
NIRROMESC	C H395 C H395	Nepal irrigation yearly escalation for O&M
NIRRSUB	P B55 P B55	Named range for macro NIrrSub (subroutine in irrigation benefits computation)
NNETBENEFITS	H AU86 H AU86	Nepal present worth of total net benefits from the project
NOTHBFMI	C F443 C F443	The percent of India other benefits Nepal obtains from India
NOWNATRANS	C I36 C I36	The percent of Nepal ownership of project after transfer from developer
NPREINVEST	C E315 C E315	THe aount of Nepal preinvestment on the project prior to private development
NPV	H AE21 H.AE85	Cumulative yearly net present worth of combined energy and capacity royalities
NSTARTIN	C B504 C B504	The staring location on the Nepal irrigation input to locate appropriate scheme line
NSTARTSUM	I C67 I C67	The staring location on the Nepal irrigation results to locate appropriate line to write scheme
NSUMQ	C J505 C J604	Nepal total annual water requirements by scheme
NTARCAPBY	C B82 C B137	Yearly Nepal capacity tariffs in the Input of Yearly Tariffs in the input
NTARCAPYR1	C B82 C B82	The first year of the above range
NTARFRMEBY	C C82 C C137	Yearly Nepal firm energy tariffs in the Input of Yearly Tariffs in the input
NTARFRMEYR1	C C82 C C82	The first year of the above range
NTARSECEBY	C D82 C D137	Yearly Nepal secondary energy tariffs in the Input of Yearly Tariffs in the input
NTARSECEYR1	C D82 C D82	The first year of the above range
NTOT	K.L18 K.L18	Nepal total yearly computed flood benefits on sheet FL_C
NTOTQ	I H41 I H41	Nepal total dry weater base flow used for new irrigation schemes
NTOUS	C E208 C E208	Conversion rate from Nepal Rs to US
NYRSTOTRANSFER	P G726 P G726	Number of years of private operation before turn over to Nepal
OLDCAPROY16P	P G753 P G753	Holds base case CapRoy16P value in Sensitivity macro
OLDCAPROYF15	P G751 P G751	Holds base case CapRoyF15 value in Sensitivity macro
OLDCORPITRT	P G745 P G745	Holds base case CorpITRt value in Sensitivity macro
OLDD	P G1038 P G1038	Holds base case D value in Sensitivity macro
OLDDEVROI	P G706 P G706	Holds base case DerROI value in Sensitivity macro
OLDENGROY16P	P G757 P G757	Holds base case EngRoy16P value in Sensitivity macro
OLDENGROYF15	P G755 P G755	Holds base case EngRoyF15 value in Sensitivity macro
OLDEXTAX	P G747 P G747	Holds base case ExTax value in Sensitivity macro
OLDFIRMENG	P G687 P G687	Holds base case FirmEng value in Sensitivity macro
OLDFIRMENGTON	P G691 P G691	Holds base case FirmEngToN value in Sensitivity macro
OLDIDCAP	P G733 P G733	Holds base case IDCap value in Sensitivity macro
OLDIDOP	P G735 P G735	Holds base case IDOp value in Sensitivity macro
OLDIFINFLDBEN	P F927 P F976	Holds base case IFinFldBen value in Sensitivity macro
OLDIFINIRRBEN	P G927 P G977	Holds base case IFinIrrBen value in Sensitivity macro
OLDIFINIRRYR	P G926 P G926	Holds base case IFinIrrYr value in Sensitivity macro
OLDIFINOTHBEN	P H926 P H976	Holds base case IFinOthBen value in Sensitivity macro
OLDINTRT1	P G987 P G987	Holds base case IntRt1 value in Sensitivity macro
OLDINTRT10	P G1005 P G1005	Holds base case IntRt10 value in Sensitivity macro
OLDINTRT2	P G989 P G989	Holds base case IntRt2 value in Sensitivity macro
OLDINTRT3	P G991 P G991	Holds base case IntRt3 value in Sensitivity macro
OLDINTRT4	P G993 P G993	Holds base case IntRt4 value in Sensitivity macro
OLDINTRT5	P G995 P G995	Holds base case IntRt5 value in Sensitivity macro
OLDINTRT6	P G997 P G997	Holds base case IntRt6 value in Sensitivity macro
OLDINTRT7	P G999 P G999	Holds base case IntRt7 value in Sensitivity macro
OLDINTRT8	P G1001 P G1001	Holds base case IntRt8 value in Sensitivity macro
OLDINTRT9	P G1003 P G1003	Holds base case IntRt9 value in Sensitivity macro
OLDLTCAP	P C741 P C741	Holds base case LTCap value in Sensitivity macro
OLDLTOP	P G743 P G743	Holds base case LTOp value in Sensitivity macro
OLDMORTRF	P G749 P G749	Holds base case MortRf value in Sensitivity macro
OLDNEPREVS	P G762 P G762	Holds base case NepRevS value in Sensitivity macro
OLDNFINFLDBEN	P F873 P F922	Holds base case NFinFldBen value in Sensitivity macro
OLDNFINIRRBEN	P G872 P G923	Holds base case NFinIrrBen value in Sensitivity macro
OLDNFINOTHBEN	P H872 P H922	Holds base case NFinOthBen value in Sensitivity macro
OLDNNETBENEFITS	P G704 P G704	Holds base case NNetBenefits value in Sensitivity macro
OLDOMNEPAL	P G718 P G718	Holds base case OMNepal value in Sensitivity macro
OLDOMPRIVATE	P G714 P G714	Holds base case OMPrivate value in Sensitivity macro
OLDPITCAP	P G729 P G729	Holds base case PITCap value in Sensitivity macro
OLDPTOP	P G731 P G731	Holds base case PITOp value in Sensitivity macro
OLDPLIFE	P G760 P G760	Holds base case Plife value in Sensitivity macro
OLDSECENG	P G695 P G695	Holds base case SecEng value in Sensitivity macro
OLDSECENGTON	P G699 P G699	Holds base case SecEngToN value in Sensitivity macro
OLDSTCAP	P G737 P G737	Holds base case STCap value in Sensitivity macro
OLDSTOP	P G739 P G739	Holds base case STOp value in Sensitivity macro
OLDTAXHOLIDAY	P G868 P G868	Holds base case TaxHoliday value in Sensitivity macro
OLDTECAP	P G1085 P G1085	Holds base case TECap value in Sensitivity macro
OLDTECAPESC	P G1171 P G1171	Holds base case TECapEsc value in Sensitivity macro
OLDTECAPIR	P G1116 P G1116	Holds base case TEIRCap value in Sensitivity macro
OLDTECAPIRESC	P G1194 P G1194	Holds base case TECapIREsc value in Sensitivity macro
OLDTEFIRM	P G1087 P G1087	Holds base case TEFirm value in Sensitivity macro
OLDTEFIRMESC	P G1173 P G1173	Holds base case TEFirmEsc value in Sensitivity macro
OLDTEFIRMIR	P G1118 P G1118	Holds base case TEFirmIR value in Sensitivity macro
OLDTEFIRMIRESC	P G1196 P G1196	Holds base case TEFirmIREsc value in Sensitivity macro
OLDTESEC	P G1089 P G1089	Holds base case TESec value in Sensitivity macro
OLDTESECESC	P G1175 P G1175	Holds base case TESecEsc value in Sensitivity macro
OLDTESECIR	P G1120 P G1120	Holds base case TESecIR value in Sensitivity macro
OLDTESECIRESC	P G1198 P G1198	Holds base case TESecEscIR value in Sensitivity macro
OLDTNCAP	P G1053 P G1053	Holds base case TNCap value in Sensitivity macro
OLDTNCAPESC	P G1148 P G1148	Holds base case TNCapEsc value in Sensitivity macro
OLDTNFIRM	P G1055 P G1055	Holds base case TNFirm value in Sensitivity macro
OLDTNFIRMESC	P G1150 P G1150	Holds base case TNFirmEsc value in Sensitivity macro
OLDTNSEC	P G1057 P G1057	Holds base case TNSec value in Sensitivity macro
OLDTNSECESC	P G1152 P G1152	Holds base case TNSecEsc value in Sensitivity macro
OLDTOTCAPCOST	P G710 P G710	Holds base case TotCapCost value in Sensitivity macro
OMNEPAL	C E47 C E47	Holds base case OMNepal value in Sensitivity macro
OMPRIVATE	C E44 C E44	Holds base case OMPrivate value in Sensitivity macro
OVER	P G56 P G56	Intermediate variable in irrigation calculation to keep track of amount of total dry weater flow available
OYRSTOTRANSFER	P G724 P G724	Holds base case YrsToTransfer value in Sensitivity macro
P10V	G L49 G L49	In sheet LA the 10 year yearly payment sum
P10Y	G L18 G L18	In sheet LA the 10 year year

RANGE NAME	RANGE LOCATION	DESCRIPTION
P11V	G M49 G M49	In sheet LA the 11 year yearly payment sum
P11Y	G M18 G M18	In sheet LA the 11 year year
P12V	G N49 G N49	In sheet LA the 12 year yearly payment sum
P12Y	G N18 G N18	In sheet LA the 12 year year
P13V	G O49 G O49	In sheet LA the 13 year yearly payment sum
P13Y	G O18 G O18	In sheet LA the 13 year year
P14V	G P49 G P49	In sheet LA the 14 year yearly payment sum
P14Y	G P18 G P18	In sheet LA the 14 year year
P15V	G Q49 G Q49	In sheet LA the 15 year yearly payment sum
P15Y	G Q18 G Q18	In sheet LA the 15 year year
P16V	G R49 G R49	In sheet LA the 16 year yearly payment sum
P16Y	G R18 G R18	In sheet LA the 16 year year
P17V	G S49 G S49	In sheet LA the 17 year yearly payment sum
P17Y	G S18 G S18	In sheet LA the 17 year year
P18V	G T49 G T49	In sheet LA the 18 year yearly payment sum
P18Y	G T18 G T18	In sheet LA the 18 year year
P19V	G U49 G U49	In sheet LA the 19 year yearly payment sum
P19Y	G U18 G U18	In sheet LA the 19 year year
P1V	G C49 G C49	In sheet LA the 1 year yearly payment sum
P1Y	G C18 G C18	In sheet LA the 1 year year
P20V	G V49 G V49	In sheet LA the 20 year yearly payment sum
P20Y	G V18 G V18	In sheet LA the 20 year year
P21V	G W49 G W49	In sheet LA the 21 year yearly payment sum
P21Y	G W18 G W18	In sheet LA the 21 year year
P2V	G D49 G D49	In sheet LA the 2 year yearly payment sum
P2Y	G D18 G D18	In sheet LA the 2 year year
P3V	G E49 G E49	In sheet LA the 3 year yearly payment sum
P3Y	G E18 G E18	In sheet LA the 3 year year
P4V	G F49 G F49	In sheet LA the 4 year yearly payment sum
P4Y	G F18 G F18	In sheet LA the 4 year year
P5V	G G49 G G49	In sheet LA the 5 year yearly payment sum
P5Y	G G18 G G18	In sheet LA the 5 year year
P6V	G H49 G H49	In sheet LA the 6 year yearly payment sum
P6Y	G H18 G H18	In sheet LA the 6 year year
P7V	G I49 G I49	In sheet LA the 7 year yearly payment sum
P7Y	G I18 G I18	In sheet LA the 7 year year
P8V	G J49 G J49	In sheet LA the 8 year yearly payment sum
P8Y	G J18 G J18	In sheet LA the 8 year year
P9V	G K49 G K49	In sheet LA the 9 year yearly payment sum
P9Y	G K18 G K18	In sheet LA the 9 year year
PCAPIR	C H64 C H64	Percent of export capacity that is paid for in India Rs
PFIRMIR	C H65 C H65	Percent of export firm energy that is paid for in India Rs
PIP	C D164 C F169	Phased in power input range
PIPGWH1	C F164 C F164	GWhs of total energy for phased in power year 1
PIPGWH2	C F165 C F165	GWhs of total energy for phased in power year 2
PIPGWH3	C F166 C F166	GWhs of total energy for phased in power year 3
PIPGWH4	C F167 C F167	GWhs of total energy for phased in power year 4
PIPGWH5	C F168 C F168	GWhs of total energy for phased in power year 5
PIPGWH6	C F169 C F169	GWhs of total energy for phased in power year 6
PIPMW1	C E164 C E164	MW of capacity for phased in power year 1
PIPMW2	C E165 C E165	MW of capacity for phased in power year 2
PIPMW3	C E166 C E166	MW of capacity for phased in power year 3
PIPMW4	C E167 C E167	MW of capacity for phased in power year 4
PIPMW5	C E168 C E168	MW of capacity for phased in power year 5
PIPMW6	C E169 C E169	MW of capacity for phased in power year 6
PIPYR1	C D164 C D164	Phased in power year 1
PIPYR2	C D165 C D165	Phased in power year 2
PIPYR3	C D166 C D166	Phased in power year 3
PIPYR4	C D167 C D167	Phased in power year 4
PIPYR5	C D168 C D168	Phased in power year 5
PIPYR6	C D169 C D169	Phased in power year 6
PITCAP	C E223 C E223	Personal income tax as a percent of capital costs
PITOP	C F223 C F223	Personal income tax as a percent of O&M costs
PLANTFACTOR	B I19 B I19	Plant factor
PLIFE	C I32 C I32	The project life or length of total analysis
PPPP1	D A7 D AF19	Sheet PPP printing range 1 (top of page)
PPPP2	D A29 D AF84	Sheet PPP printing range 2 (middle of page)
PPPP3	D A85 D AF85	Sheet PPP printing range 3 (bottom of page)
PPPSTART	D A7 D A7	For sheet PPP the starting location to determine print ranges
PREVIEWYORN	P G171 P G171	Logical to set preview on or off when printing
PRINTALLPREVIEW	P B219 P B219	Named range for macro PrintAllPreview (print all sheets with preview)
PRINTALLSHEETS	P B180 P B180	Named range for macro PrintAllSheeets (print all sheets without preview)
PRINTDCF	P B409 P B409	Named range for macro PrintDCF (prints sheet DCF)
PRINTDCF1	P B399 P B399	Prints above with preview
PRINTDCF2	P B404 P B404	Prints above without preview
PRINTEFT	P B375 P B375	Named range for macro PrintEFT (prints sheet EFT)
PRINTEFT1	P B365 P B365	Prints above with preview
PRINTEFT2	P B370 P B370	Prints above without preview
PRINTFLD	P B591 P B591	Named range for macro PrintFLD (prints sheet FLD)
PRINTFLD1	P B579 P B579	Prints above with preview
PRINTFLD2	P B585 P B585	Prints above without preview
PRINTGPH1	P B634 P B634	Named range for macro PrintGPH1 (prints sheet GPH1)
PRINTGPH11	P B622 P B622	Prints above with preview
PRINTGPH12	P B628 P B628	Prints above without preview
PRINTGPH2	P B655 P B655	Named range for macro PrintGPH2 (prints sheet GPH2)
PRINTGPH21	P B643 P B643	Prints above with preview
PRINTGPH22	P B649 P B649	Prints above without preview
PRINTGPH3	P B676 P B676	Named range for macro PrintGPH3 (prints sheet GPH3)
PRINTGPH31	P B664 P B664	Prints above with preview
PRINTGPH32	P B670 P B670	Prints above without preview
PRINTHMGN	P B452 P B452	Named range for macro PrintHMGN (prints sheet HMGN)
PRINTHMGN1	P B442 P B442	Prints above with preview
PRINTHMGN2	P B447 P B447	Prints above without preview
PRINTINPUT	P B302 P B302	Named range for macro PrintINPUT (prints sheet INPUT)
PRINTINPUT1	P B292 P B292	Prints above with preview
PRINTINPUT2	P B297 P B297	Prints above without preview

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RANGE NAME	RANGE LOCATION	DESCRIPTION
PRINTIRRALL	P B523 P B523	Named range for macro PrintIRRAll (prints all irrigation output required)
PRINTIRRB	P B508 P B508	Named range for macro PrintIRRB (prints all irrigation results)
PRINTIRRB1	P B476 P B476	Prints above with preview
PRINTIRRB2	P B482 P B482	Prints above without preview
PRINTIRRI	P B554 P B554	Named range for macro PrintIRRI (prints all India irrigation results)
PRINTIRRI1	P B498 P B498	Prints above with preview
PRINTIRRI2	P B503 P B503	Prints above without preview
PRINTIRRN	P B540 P B540	Named range for macro PrintIRRI (prints all Nepal irrigation results)
PRINTIRRN1	P B488 P B488	Prints above with preview
PRINTIRRN2	P B493 P B493	Prints above without preview
PRINTLA	P B433 P B433	Named range for macro PrintLA (prints sheet LA)
PRINTLA1	P B423 P B423	Prints above with preview
PRINTLA2	P B428 P B428	Prints above without preview
PRINTMACROS	P B161 P B161	Named range for macro PrintMacro (prints macros)
PRINTPPP	P B351 P B351	Named range for macro PrintPPP (prints sheet PPP)
PRINTPPP1	P B341 P B341	Prints above with preview
PRINTPPP2	P B346 P B346	Prints above without preview
PRINTRANGES	P B1321 P B1321	Named range for macro PrintRanges (prints named ranges)
PRINTSA	P B613 P B613	Named range for macro PrintSA (prints sheet SA)
PRINTSA1	P B601 P B601	Prints above with preview
PRINTSA2	P B607 P B607	Prints above without preview
PRINTSUM	P B283 P B283	Named range for macro PrintSum (prints sheet Sum)
PRINTSUM1	P B273 P B273	Prints above with preview
PRINTSUM2	P B278 P B278	Prints above without preview
PRINTTOC	P B264 P B264	Named range for macro PrintTOC (prints sheet TOC)
PRINTTOC1	P B254 P B254	Prints above with preview
PRINTTOC2	P B259 P B259	Prints above without preview
PRODRYQ	C H393 C H393	Project dry weather base flow for irrigation
PROJECT	C C12 C C12	Name of project
PROPOSALN	C C16 C C16	A number that can be assigned to the developers proposal
PSECIR	C H66 C H66	Percent of export secondary energy that is paid for in India Rs
PTOUS	C G208 C G208	Conversion from English P to US$
PURCHASER	C C20 C C20	Purchaser
RNGTBL	P B215 P B215	Named range for macro RngTbl (sets up this table of range names)
RNGTBLNAME	Q A8 Q B8	Starting location for this table of ranges names and descriptions
SASTART	L A7 L A7	For sheet SA the starting location to determine print range
SCENARIOD	C C14 C C14	Scenario description for the model analysis
SCENARION	C H16 C H16	A number that can assigned to the scenario
SECENG	C D152 C D152	Annual secondary energy
SECENGTOI	C H152 C H152	Annual secondary energy that goes to India
SECENGTON	C F152 C F152	Annual secondary energy that goes to Nepal
SELLDTONEA	C H56 C H56	Logical for if power is sold directly to the Nepal Electrical Authority
SEN10NM	L E56 L E56	Sensitivity minus results for Nepal average power price Nepal rate of return % change
SEN10NP	L E55 L E55	Sensitivity plus results for Nepal average power price Nepal rate of return % change
SEN10PPM	L D56 L D56	Sensitivity minus value for Nepal average power price
SEN10PPP	L D55 L D55	Sensitivity plus value for Nepal average power price
SEN10ROIM	L F56 L F56	Sensitivity minus results for Nepal average power price Devolper Return on Equity
SEN10ROIP	L F55 L F55	Sensitivity plus results for Nepal average power price Devolper Return on Equity
SEN11NM	L E58 L E58	Sensitivity minus results for Nepal Tariff Escalation Nepal rate of return % change
SEN11NP	L E57 L E57	Sensitivity plus results for Nepal Tariff Escalation Nepal rate of return % change
SEN11ROIM	L F58 L F58	Sensitivity minus results for Nepal Tariff Escalation Devolper Return on Equity
SEN11ROIP	L F57 L F57	Sensitivity plus results for Nepal Tariff Escalation Devolper Return on Equity
SEN11TEM	L D58 L D58	Sensitivity minus value for Nepal Tariff Escalation
SEN11TEP	L D57 L D57	Sensitivity plus value for Nepal Tariff Escalation
SEN12NM	L E60 L E60	Sensitivity minus results for Export Average Power Price US$ Nepal rate of return % change
SEN12NP	L E59 L E59	Sensitivity plus results for Export Average Power Price US$ Nepal rate of return % change
SEN12PPM	L D60 L D60	Sensitivity minus value forExport Average Power Price US$
SEN12PPP	L D59 L D59	Sensitivity plus value forExport Average Power Price US$
SEN12ROIM	L F60 L F60	Sensitivity minus results for Export average power price US$ Devolper Return on Equity
SEN12ROIP	L F59 L F59	Sensitivity plus results for Export average power price US$ Devolper Return on Equity
SEN13NM	L E62 L E62	Sensitivity minus results for Export Tariff Escalation US$ Nepal rate of return % change
SEN13NP	L E61 L E61	Sensitivity plus results for Export Tariff Escalation US$ Nepal rate of return % change
SEN13ROIM	L F62 L F62	Sensitivity minus results for Export Tariff Escalation US$ Devolper Return on Equity
SEN13ROIP	L F61 L F61	Sensitivity plus results for Export Tariff Escalation US$ Devolper Return on Equity
SEN13TEM	L D62 L D62	Sensitivity minus value for Export Tariff Escalation US$
SEN13TEP	L D61 L D61	Sensitivity plus value for Export Tariff Escalation US$
SEN14NM	L E64 L E64	Sensitivity minus results for Export Average Power Price IRs Nepal rate of return % change
SEN14NP	L E63 L E63	Sensitivity plus results for Export Average Power Price IRs Nepal rate of return % change
SEN14PPM	L D64 L D64	Sensitivity minus value forExport Average Power Price IRs
SEN14PPP	L D63 L D63	Sensitivity plus value forExport Average Power Price IRs
SEN14ROIM	L F64 L F64	Sensitivity minus results for Export average power price IRs Devolper Return on Equity
SEN14ROIP	L F63 L F63	Sensitivity plus results for Export average power price IRs Devolper Return on Equity
SEN15NM	L E66 L E66	Sensitivity minus results for Export Tariff Escalation IRs Nepal rate of return % change
SEN15NP	L E65 L E65	Sensitivity plus results for Export Tariff Escalation IRs Nepal rate of return % change
SEN15ROIM	L F66 L F66	Sensitivity minus results for Export Tariff Escalation IRs Devolper Return on Equity
SEN15ROIP	L F65 L F65	Sensitivity plus results for Export Tariff Escalation IRs Devolper Return on Equity
SEN15TEM	L D66 L D66	Sensitivity minus value for Export Tariff Escalation IRs
SEN15TEP	L D65 L D65	Sensitivity plus value for Export Tariff Escalation IRs
SEN1NM	L E24 L E24	Sensitivity minus results for Project energy Nepal rate of return % change
SEN1NP	L E23 L E23	Sensitivity plus results for Project energy Nepal rate of return % change
SEN1ROIM	L F24 L F24	Sensitivity minus results forProject Energy Devolper Return on Equity
SEN1ROIP	L F23 L F23	Sensitivity plus results forProject Energy Devolper Return on Equity
SEN1TRANS	L D30 L D30	Sensitivity 1st value for number of years to transfer
SEN2NM	L E26 L E26	Sensitivity minus results for Construction and O&M cost Nepal rate of return % change
SEN2NP	L E25 L E25	Sensitivity plus results for Construction and O&M cost Nepal rate of return % change
SEN2ROIM	L F26 L F26	Sensitivity minus results forConstruction and O&M cost Devolper Return on Equity
SEN2ROIP	L F25 L F25	Sensitivity plus results forConstruction and O&M cost Devolper Return on Equity
SEN2TRANS	L D31 L D31	Sensitivity 2nd value for number of years to transfer
SEN3N1	L E30 L E30	Sensitivity 1st results forTransfer of Ownsership Nepal rate of return % change
SEN3N2	L E31 L E31	Sensitivity 2nd results forTransfer of Ownsership Nepal rate of return % change
SEN3N3	L E32 L E32	Sensitivity 3rd results forTransfer of Ownsership Nepal rate of return % change
SEN3N4	L E33 L E33	Sensitivity 4th results forTransfer of Ownsership Nepal rate of return % change
SEN3ROI1	L F30 L F30	Sensitivity 1st results forTransfer of Ownsership Developer rare of return on equity
SEN3ROI2	L F31 L F31	Sensitivity 2nd results forTransfer of Ownsership Developer rare of return on equity
SEN3ROI3	L F32 L F32	Sensitivity 3rd results forTransfer of Ownsership Developer rare of return on equity
SEN3ROI4	L F33 L F33	Sensitivity 4th results forTransfer of Ownsership Developer rare of return on equity

RANGE NAME	RANGE LOCATION	DESCRIPTION
SEN3TRANS	L D32 L D32	Sensitivity 3rd value for number of years to transfer
SEN4NM	L E36 L E36	Sensitivity minus results forTax variables Nepal rate of return % change
SEN4NP	L E35 L E35	Sensitivity plus results forTax variables Nepal rate of return % change
SEN4ROIM	L F36 L F36	Sensitivity minus results for Tax variables Devolper Return on Equity
SEN4ROIP	L F35 L F35	Sensitivity plus results for Tax variables Devolper Return on Equity
SEN4TRANS	L D33 L D33	Sensitivity 4th value for number of years to transfer
SEN5N0	L E39 L E39	Sensitivity no holiday results for Tax Holiday Nepal rate of return % change
SEN5N15	L E37 L E37	Sensitivity 15 years holiday results for Tax Holiday Nepal rate of return % change
SEN5N7	L E38 L E38	Sensitivity 7 years holiday results for Tax Holiday Nepal rate of return % change
SEN5ROI0	L F39 L F39	Sensitivity no holiday results for Tax Holiday Developer return on equity
SEN5ROI15	L F37 L F37	Sensitivity 15 years holiday results for Tax Holiday Developer return on equity
SEN5ROI7	L F38 L F38	Sensitivity 7 years holiday results for Tax Holiday Developer return on equity
SEN6NCM	L E42 L E42	Sensitivity minus results for capacity royalties Nepal rate of return % change
SEN6NCP	L E41 L E41	Sensitivity plus results for capacity royalties Nepal rate of return % change
SEN6NEM	L E44 L E44	Sensitivity minus results for energy royalties Nepal rate of return % change
SEN6NEP	L E43 L E43	Sensitivity plus results for energy royalties Nepal rate of return % change
SEN6ROICM	L F42 L F42	Sensitivity minus results for capacity royalties -Developer return on equity
SEN6ROICP	L F41 L F41	Sensitivity plus results for capacity royalties -Developer return on equity
SEN6ROIEM	L F44 L F44	Sensitivity minus results for energy royalties -Developer return on equity
SEN6ROIEP	L F43 L F43	Sensitivity plus results for energy royalties -Developer return on equity
SEN7NWOB	L E48 L E48	Sensitivity witout downstream benefits Nepal rate of return % change
SEN7NWOI	L E47 L E47	Sensitivity witout India downstream benefits Nepal rate of return % change
SEN7NWON	L E46 L E46	Sensitivity witout Nepal downstream benefits Nepal rate of return % change
SEN7ROIWOB	L F48 L F48	Sensitivity witout downstream benefits Developer return on equity
SEN7ROIWOI	L F47 L F47	Sensitivity witout India downstream benefits Developer return on equity
SEN7ROIWON	L F46 L F46	Sensitivity witout Nepal downstream benefits Developer return on equity
SEN8ACDM	L D51 L D51	Sensitivity minus value for average cost of debt
SEN8ACDP	L D50 L D50	Sensitivity plus value for average cost of debt
SEN8NM	L E51 L E51	Sensitivity minus results for average cost of debt Nepal rate of return % change
SEN8NP	L E50 L E50	Sensitivity plus results for average cost of debt Nepal rate of return % change
SEN8ROIM	L F51 L F51	Sensitivity minus results for average cost of debt Developer return on equity
SEN8ROIP	L F50 L F50	Sensitivity plus results for average cost of debt Developer return on equity
SEN9DRM	L D53 L D53	Sensitivity minus value for NPV discount rate
SEN9DRP	L D52 L D52	Sensitivity plus value for NPV discount rate
SEN9NM	L E53 L E53	Sensitivity minus results for NPV discount rate Nepal rate of return % change
SEN9NP	L E52 L E52	Sensitivity plus results for NPV discount rate Nepal rate of return % change
SEN9ROIM	L F53 L F53	Sensitivity minus results for NPV discount rate Developer return on equity
SEN9ROIP	L F52 L F52	Sensitivity plus results for NPV discount rate Developer return on equity
SENCOMM	L D26 L D26	Sensitivity minus value for total construction and O&M cost
SENCOMP	L D25 L D25	Sensitivity plus value for total construction and O&M cost
SENCORP0	L D39 L D39	Sensitivity minus value for O years corporate tax holiday
SENCORP15	L D37 L D37	Sensitivity minus value for 15 years corporate tax holiday
SENCORP7	L D38 L D38	Sensitivity minus value for 7 years corporate tax holiday
SENENGM	L D24 L D24	Sensitivity minus value for total energy production
SENENGP	L D23 L D23	Sensitivity plus value for total energy production
SENSITIVITY	P B686 P B686	Named range for macro Sensitivity (sensitivity analysis macro)
SENTAXM	L D36 L D36	Sensitivity minus value for tax variables
SENTAXP	L D35 L D35	Sensitivity plus value for tax variables
SENWRCM	L D42 L D42	Sensitivity minus value water royalities for capacity
SENWRCP	L D41 L D41	Sensitivity plus value water royalities for capacity
SENWREM	L D44 L D44	Sensitivity minus value water royalities for energy
SENWREP	L D43 L D43	Sensitivity plus value water royalities for energy
SETPRINTNP	P B170 P B170	Named range for macro SetPrintNP (set variable so no preview with print)
SETPRINTWP	P B175 P B175	Named range for macro SetPrintWP (set variable so preview with print)
STCAP	C E227 C E227	Sales tax/VAT as a percent of capital costs
STOP	C F227 C F227	Sales tax/VAT as a percent of O&M costs
STRCNT	P G144 P G144	Counter in stripe macro to count number of lines striped
STRIPE	P B143 P B143	Named range for macro Stripe (set alternate white and blue lines in macro sheet)
SUMSTART	B A6 B A6	For sheet SUM the starting location to determine print range
TARRIFFSTYR	C A82 C A82	The starting year for which yearly tariffs are input
TAXHOLIDAY	C E231 C E231	Number of years of corporate tax holiday
TECAP	C D60 C D60	Export tariff for export capacity
TECAPESC	C F60 C F60	Export tariff annual escalation for export capacity
TECAPIR	C D64 C D64	Export tariff for export capacity in India Rs
TECAPIRESC	C F64 C F64	Export tariff annual escalation for export capacity in India Rs
TEFIRM	C D61 C D61	Export tariff for export firm energy
TEFIRMESC	C F61 C F61	Export tariff annual escalation for export firm energy
TEFIRMIR	C D65 C D65	Export tariff for export firm energy in India Rs
TEFIRMIRESC	C F65 C F65	Export tariff annual escalation for export firm energy in India Rs
TEMP	P G19 P G19	Temporary variable used in the irrigation computaTION
TESEC	C D62 C D62	Export tariff for secondary energy
TESECESC	C F62 C F62	Export tariff annual escalation for export secondary energy
TESECIR	C D66 C D66	Export tariff for secondary energy in India Rs
TESECIRESC	C F66 C F66	Export tariff annual escalation for export secondary energy in India Rs
TIMEDELAY	A J38 A J38	The number of seconds to delay printer between each page of printing to stay within memory capacity of printer
TNCAP	C D56 C D56	Tariff for Nepal capacity
TNCAPESC	C F56 C F56	Nepal tariff annual escalation for capacity
TNFIRM	C D57 C D57	Nepal tariff for firm energy
TNFIRMESC	C F57 C F57	Nepal tariff annual escalation for firm energy
TNSEC	C D58 C D58	Nepal tariff for secondary energy
TNSECESC	C F58 C F58	Nepal tariff annual escalation for secondary energy
TOPCORPPP	D A15 D A15	Starting point for determining ranges for sheet PPP
TOTALDEBT	C H275 C H275	Sum of all loans for the project
TOTALEQU	C H276 C H276	Developer's total equity in the project
TOTCAPCOST	C I28 C I28	Total capital cost of the project
TRADEBAL	C H192 C H192	Balance of trade decifit for the first year of construction
TRADEBALESC	C H195 C H195	Balance of trade estimate of annual escalation
TRANSLEX	C F178 C F178	Transmission losses for export energy
TWHLI	C D70 C D70	Wheeling charge in India
TWHLIESC	C F70 C F70	Annual escalation of wheeling change in India
TWHLN	C D68 C D68	Wheeling charge in Nepal
TWHLNESC	C F68 C F68	Annual escalation of wheeling change in Nepal
TWHLTI	C D69 C D69	Wheeling charge to the India border
TWHLTIESC	C F69 C F69	Annual escalation of wheeling charge to India border
UPDATEGRAPHS	P B1221 P B1221	Named range for macro UpdateGraphs (updates the graph ranges for all graphs)
USCPI	C B208 C B208	Base year consumer price index for the US

RANGE NAME	RANGE LOCATION	DESCRIPTION
USINFRT	C F187 C F187	US annual inflation rate
USTOUS	C D208 C D208	Conversion of US $ to US$ (=1)
Y	F V89 F V89	Variable to change the developer IRR guess rate in sheet DCF
YEAR	J B35 J B85	Year of operation for yearly flood benefits
YENTOUS	C I208 C I208	Conversion rate of Japanese Yen to US$
YROUT	J B35 J B35	First year of yearly flood benefits results
YRSTOTRANSFER	C I34 C I34	Number of years the developer will operate the plant before turn over to Nepal
YRTOT	K N18 K.N18	Each computed years total flood benefits computed on sheet FL_C
Z	E AK86 E AK86	Variable to change the project real IRR guess rate in sheet EFT
ZZ	E AL85 E AL85	Variable to change thethe NPV rate in sheet EFT (to help guess on IRR)
ZZRANGES	Q A8 Q C688	This range of named ranges and description

10 TYPICAL NEPSIM PRINTOUT (with illustrative inputs)

The following is a typical example of a NEPSIM simulation printout based on hypothetical inputs for illustrative purposes only

NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)
TABLE OF CONTENTS

Click a Sheet Tab or Button to GO TO Desired Page

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f	Developers Cash Flow
g	Loan Amortization
h	Goverment Net Revenues from Hydroelectric Project
i	Irrigation Benefits Summary
j	Flood Management Benefits
l	Sensitivity Analysis
m	Graphs 1
n	Graphs 2
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Project	Example Project		
Scenario Description	BASE CASE Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation		
Proposal Number	EX1	**Scenario Number**	1
Developer	Nepal Power International		

NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)

NEPSIM Summary Results

Item	Feasibility Study	Developer 1
Power Station Net Capacity MW		500
Plant Capacity Factor %		44%
Average Energy Output, GWh/year		1 920
Firm Energy GWh/year		1 500
Average Secondary Energy GWh/year		420
First Full Power Year		2005
Developer s Equity %		20 0%
Total Developer Capital Cost million $		700

Notes Power output figures are net output after plant load but before transmission losses
Costs including IDC engineering contingencies environment and administration costs are in 1999 US $

PROJECT KEY INDICATORS

Total project unit cost $/kW		1 400
Present Worth of Nepal Power Sales millions $		80 3
Average price of power sold to Nepal (year 1) USc/kWh		6 7
Present Worth of Power Exports millions $		940
Average Export Tariff (year 1) USc/kWh		8 36
Project Real Economic Rate of Return %		13 6%

DEVELOPER'S KEY INDICATORS

Developer Real Rate of Return on Equity %		25 7%
Developer Debt Service Ratio (minimum over debt service)		1 62
Developer Debt Service Ratio (debt service year 10)		3 00
Years of full operation until equity payback		6

HMGN KEY INDICATOR

Present Worth of Net Benefits to Nepal millions $		363
HMGN share of total Net Benefits %		55%
Developer share of total Net Benefits %		41%
India share of total Net Benefits %		3%

105

NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)
MODEL INPUTS

Project	Example Project
Scenario Description	BASE CASE - Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT, 5% Export Tax, 25% corporate tax after 15 years, total handover after 25 full years of operation
Proposal Number	EX1 — **Scenario Number** 1
Developer	Nepal Power International
Purchaser	XYZ State Electricity Board

First year of construction	1999
Last year of construction	2004
First full capacity commercial power production date	2005
Total Developer capital cost in 1999 million US$ *	700 0
Developer's equity % of total capital cost	20 00%
Project Life for this Analysis	50
Years of Full Developer operation before ownership transfer to HMGN	25
Developer proposed HMGN ownership % after transfer	100%

* Including all IDC taxes fees and direct socio-economic and environmental costs

Operation and Maintenance

Percentage of Capital Cost %/year (during private operation)	1 50%
Percentage of Capital Cost %/year (after handover to HMGN)	3 00%

Tariffs

	Year 1 Price 1999	Escalation Rate %/year
Nepal capacity $/kW/mo	6 50	2 5%
Nepal firm energy c/kWh	5 00	2 5%
Nepal secondary energy c/kWh	2.50	2.5%
Export capacity $/kW/mo	3 50	2 5%
Export firm energy c/kWh	7 00	2 5%
Export secondary energy c/kWh	3 70	2 5%
Export capacity IRs/kW/mo	150 0	7 0%
Export firm energy IRs/kWh	3 00	7 0%
Export secondary energy IRs/kWh	1 50	7 0%
Wheeling charge in Nepal $/MWh	0 50	1 00%
Wheeling charge to border $/MWh	0 75	1 00%
Wheeling charge in India $/MWh	0 75	1 00%

Developer sells direct to NEA? no (no or yes)

Developer gives power to HMGN which HMGN sells to NEA? yes (no or yes)

	% Paid in IRs
Export capacity IRs/kW/mo	30 0%
Export firm energy IRs/kWh	30 0%
Export secondary energy IRs/kWh	30 0%

Average tariffs based on time-of day operation to maximize revenues

MODEL INPUTS

Input of Yearly Tariffs

Calendar Year	Nepal Capacity $/kW/mo	Nepal Firm Energy c/kWh	Nepal Secondary E c/kWh	Export Capacity Tariff in $ $/kW/mo	Export Firm Tariff in $ c/kWh	Export Sec Tariff in $ c/kWh	Export Capacity Tariff in IRs IRs/kW/mo	Export Firm Tariff in IRs IRs/kWh	Export Sec Tariff in IRs IRs/kWh
2004									
2005									
2006									
2007									
2008									
2009									
2010									
2011									
2012									
2013									
2014									
2015									
2016									
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2049									
2050									
2051									
2052									
2053									
2054									

Note If these annual tariffs are not specified the tariffs will be calculated from the inputs on the previous page

MODEL INPUTS

Power Production Assumptions

	Net Power Output	Delivery to Nepal	Delivery to India
Capacity MW	500	50	443
Firm Energy GWh/year	1,500	150	1,330
Secondary Energy GWh/year	420	42	372
Average Energy GWh/year	1,920	192	1 702

Phase-In of Power Production

Operating Year	Calendar Year	MW	GWh
1	2004	300	1 140
2	2005	500	1 900
3			
4			
5			
6			

Transmission losses, %

to deliver to import customer 1 5%

Inflation, Exchange Rate Depreciation and Discount Rate

US ave Inflation Rate %/year	2 0%
Nepal ave Inflation Rate %/year	10 0%
Depreciation Rate NRs/US$ % year	7 0%
Depreciation Rate NRs/IRs %/year	2 0%
Real Discount Rate %/year	10 0%

Balance of Trade Deficit thousands of US$ in first year of construction: 1,110 000

Deficit Growth Rate % per Year: 0 0%

Exchange Rate Assumptions

mid Calendar Year	Inflation Indeces: US CPI	Nepal CPI	Exchange Rates by Currency Type: (a) US $ per US $	(b) NRs per US $	(c) IRs per US $	(d) Pound per US $	(e) DM per US $	(f) Yen per US $
1997	311	337	1 00	56.75	35 70	0 613	1 71	124 80

	Exchange Rates by Currency Type: (g) Ecu per US $	(h) Australian $ per US $	(i) per US $	(j) per US $	(k) per US $	(l) per US $	(m) per US $
1997	0 877	1 290					

MODEL INPUTS

Tax Rate Assumptions

	% of Cap cost	% of O&M cost	
Personal Income Tax	0 80%	2 80%	
Import Duties	0.62%	0.55%	
Sales Tax or VAT	1 96%	0 70%	
Local Taxes	0 08%	0 06%	
Corp Tax holiday years	15		
Corp Income Tax	25%		of net profit
Export Tax	5%		of net export revenues
Nepal Revenue Sharing	5%		of net revenues
Mortgage Registration Fee	0%		of debt financing

	First 15 years	Year 16 on
Capacity Royalty Rs/kW/yr	100	1,000
Energy Royalty % of total energy revenue	2%	10%

Loan Ammounts and Terms

(thousands)

Loan Number	1	2	3	4	5
Lender	Multilateral	Commercial	Export Credit		
Currency type*	(a)	(a)	(a)		
Currency	US $	US $	US $	US $	US $
Amount thousands	170 000	260,000	130 000		
Interest Rate	10 00%	9 00%	8 50%	0 00%	0 00%
Amortization period years	15	12	8		
Grace Period years	6	6	6		
Initial US $ equivalent	170 000	260 000	130 000	0	0
Loan Number	6	7	8	9	10
Lender					
Currency type					
Currency	US $	US $	US $	US $	US $
Amount thousands					
Interest Rate	0 00%	0 00%	0 00%	0.00%	0 00%
Amortization period years					
Grace Period years					
Initial US $ equivalent	0	0	0	0	0

From Exchange Rate Assumptions on the previous page

Total Debt thousands of US $	560,000
Total Equity thousands of US $	140,000
Total Capital Cost, thousands of US $	700,000

MODEL INPUTS

Assumed Distribution of Equity Spending

Construction Duration years

Period	3	4	5	6	7	8	9	10	11	12	13	14	15
1	20 0%	10 0%	10 0%	10 0%	5 0%	5 0%	5 0%	4 0%	4 0%	4 0%	3 0%	3 1%	0 4%
2	45 0%	35 0%	25 0%	15 0%	10 0%	5 0%	7 0%	6 0%	5 0%	5 0%	4 0%	3 6%	1 0%
3	35 0%	35 0%	30 0%	20 0%	20 0%	10 0%	10 0%	9 0%	7 0%	6 0%	5 0%	4 9%	4 2%
4		20 0%	25 0%	25 0%	20 0%	20 0%	14 0%	12 0%	8 0%	7 0%	6 0%	7 2%	5.3%
5			10 0%	20 0%	20 0%	25 0%	19 0%	15 0%	11 0%	8 0%	7 0%	5 2%	5 5%
6				10 0%	15 0%	20 0%	21 0%	19 0%	14 0%	10 0%	8 0%	7 3%	5 5%
7					10 0%	10 0%	12 0%	13 0%	17 0%	15 0%	11 0%	12 3%	9 2%
8						5 0%	7 0%	11 0%	15 0%	16 0%	15 0%	16 5%	12 0%
9							5 0%	7 0%	10 0%	13 0%	15 0%	14 6%	14 3%
10								4 0%	6 0%	9 0%	12 0%	10 7%	17 1%
11									3 0%	5 0%	8 0%	8 0%	11 5%
12										2 0%	4 0%	3 1%	8 2%
13											2 0%	2 1%	4 6%
14												1 4%	1 0%
15													0 3%
Totals	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%	100 0%

MODEL INPUTS

Are HMGN pre-development costs credited as HMGN equity in the development? **Yes**
(Type in Yes or No)

HMGN Costs and Benefits
(Thousands of 1 999 US$)

Calendar Year	HMGN * pre-developer Investment	Direct * Infrastructure Benefits	HMGN Other Costs
1999	(5,000)		
2000			
2001			
2002			
2003			
2004		10 000	
2005			
2006			
2007			
2008			
2009			
2010			
2011			
2012			
2013			
2014			
2015			
2016			
2017			
2018			
2019			
2020			
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2051			
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2053			
2054			
NPV	(5,000)	5,645	0

Studies surveys land cost of public hearings etc
** Access roads and other social infrastructure available to HMGN
** HMGN costs other than operating and wheeling after ownership transfer

MODEL INPUTS

Irrigation Benefits

Based on Reliability Factor of 75%	
(e g available 3 of 4 Years)	
Existing Dry Weather Base Flow (cms)	300
Project Dry Weather Base Flow (cms)	800
Annual Escalation of Irrigation Benefits (%)	2 0%
Annual Escalation of O&M Costs (%)	5 0%
% of India Irrigation Benefits to Nepal	50 0%

Flood Damages

Flood Damages Escalation %/Year
1 5%

% of Net Flood Benefits in India Benefits to Nepal
50 0%

Flood Damages

(Thousands 1999 US$)

Flood Return Period (years)	Without Project Development: Flood Peak Q (cms)	Flood Duration (days)	Flood Damages	Percent of Flood Damages in Nepal	Project Flood Storage (mcm)	Project Flood Attenuation (cms)
50	8 000	2	$20,000	20 0%	115	1 331
100	10 000	2	$25 000	20 0%	115	1 331
200	12 000	2	$32 500	20 0%	115	1 331
500	14 000	3	$40 000	20 0%	115	887
1 000	18 000	3	$80 000	20 0%	115	887
2 000	20 000	3	$100 000	20 0%	115	887
10 000	26,000	3	$120 000	20 0%	115	887

MODEL INPUTS

Other Downstream Benefits

Year of Operation	Other Nepal Benefits	Other India Benefits	% India Other D/S Benefits to Nepal
	1 999	Thousands US$	50 0%
2 004			
2005	7	10	
2006	7	10	
2007	7	10	
2008	7	10	
2009	7	10	
2010	8	10	
2011	8	11	
2012	8	11	
2013	8	11	
2014	8	11	
2015	8	11	
2016	8	11	
2017	8	11	
2018	9	14	
2019	9	14	
2020	9	14	
2021	9	14	
2022	9	14	
2023	9	14	
2024	10	14	
2025	10	16	
2026	10	16	
2027	10	16	
2028	10	16	
2029	11	16	
2030	11	16	
2031	11	16	
2032	11	18	
2033	12	18	
2034	12	18	
2035	12	18	
2036	12	18	
2037	12	21	
2038	13	21	
2039	13	21	
2040	13	21	
2041	13	21	
2042	13	21	
2043			
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2050			
2051			
2052			
2053			
2054			

MODEL INPUTS

Nepal Irrigation Data Input

(Thousands 1999 US$)

NEPAL

Improvement of Existing or Development of New Irrigation Areas

	District	Scheme	Hectares New	Hectares Improved	Water Requirement cms per Hectare	Initial Capital Improvement per 1000 Hectare	Annual Additional O&M per 1000 Hectare	Annual Differential Benefit per 1000 Hectare	PER CROP RESULTS: Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Econ Benefit
1	One	New	200		0.20	$15 000	$200	$5 500	40 00	$3 000	$40	$1 100
2									0 00	$0	$0	$0
3									0 00	$0	$0	$0
4									0 00	$0	$0	$0
5									0 00	$0	$0	$0
6									0 00	$0	$0	$0
7									0 00	$0	$0	$0
8									0 00	$0	$0	$0
9									0 00	$0	$0	$0
10									0 00	$0	$0	$0
11									0 00	$0	$0	$0
12									0 00	$0	$0	$0
13									0 00	$0	$0	$0
14									0 00	$0	$0	$0
15									0 00	$0	$0	$0
16									0 00	$0	$0	$0
17									0 00	$0	$0	$0
18									0 00	$0	$0	$0
19									0 00	$0	$0	$0
20									0 00	$0	$0	$0
21									0 00	$0	$0	$0
22									0 00	$0	$0	$0
23									0 00	$0	$0	$0
24									0 00	$0	$0	$0
25									0 00	$0	$0	$0
26									0 00	$0	$0	$0
27									0 00	$0	$0	$0
28									0 00	$0	$0	$0
29									0 00	$0	$0	$0
30									0 00	$0	$0	$0
31									0 00	$0	$0	$0
32									0 00	$0	$0	$0
33									0 00	$0	$0	$0
34									0 00	$0	$0	$0
35									0 00	$0	$0	$0
36									0 00	$0	$0	$0
37									0 00	$0	$0	$0
38									0 00	$0	$0	$0
39									0 00	$0	$0	$0
40									0 00	$0	$0	$0
41									0 00	$0	$0	$0
42									0 00	$0	$0	$0
43									0 00	$0	$0	$0
44									0 00	$0	$0	$0
45									0 00	$0	$0	$0
46									0 00	$0	$0	$0
47									0 00	$0	$0	$0
48									0 00	$0	$0	$0
49									0 00	$0	$0	$0
50									0 00	$0	$0	$0
51									0 00	$0	$0	$0
52									0 00	$0	$0	$0
53									0 00	$0	$0	$0
54									0 00	$0	$0	$0
55									0 00	$0	$0	$0
56									0 00	$0	$0	$0
57									0 00	$0	$0	$0
58									0 00	$0	$0	$0
59									0 00	$0	$0	$0
60									0 00	$0	$0	$0
61									0 00	$0	$0	$0
62									0 00	$0	$0	$0
63									0 00	$0	$0	$0
64									0 00	$0	$0	$0
65									0 00	$0	$0	$0
66									0 00	$0	$0	$0
67									0 00	$0	$0	$0
68									0 00	$0	$0	$0
69									0 00	$0	$0	$0
70									0 00	$0	$0	$0
71									0 00	$0	$0	$0
72									0 00	$0	$0	$0
73									0 00	$0	$0	$0
74									0 00	$0	$0	$0
75									0 00	$0	$0	$0
76									0 00	$0	$0	$0
77									0 00	$0	$0	$0
78									0 00	$0	$0	$0
79									0 00	$0	$0	$0
80									0 00	$0	$0	$0
81									0 00	$0	$0	$0
82									0 00	$0	$0	$0
83									0 00	$0	$0	$0
84									0 00	$0	$0	$0
85									0 00	$0	$0	$0
86									0 00	$0	$0	$0
87									0 00	$0	$0	$0
88									0 00	$0	$0	$0
89									0 00	$0	$0	$0
90									0 00	$0	$0	$0
91									0 00	$0	$0	$0
92									0 00	$0	$0	$0
93									0 00	$0	$0	$0
94									0 00	$0	$0	$0
95									0 00	$0	$0	$0
96									0 00	$0	$0	$0
97									0 00	$0	$0	$0
98									0 00	$0	$0	$0
99									0 00	$0	$0	$0
100									0 00	$0	$0	$0
										0	0	0

Use individual line for each improved or new crop (e g do not include hectares of improvement and new irrigation on same line)

MODEL INPUTS

India Irrigation Data Input

(Thousands 1999 US$)

	INDIA								PER CROP RESULTS			
	Improvement of Existing or Development of New Irrigation Areas											
	Distrct	Scheme	Hectares New	Hectares Improved	Water Requirement cms Per Hectare	Initial Capital Improvement per 1000 Hectare	Annual Additional O&M per 1000 Hectare	Annual Differential Benefit per 1000 Hectare	Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Econ Benefit
1	One	New	900		0.09	$10 000	$250	$3 000	81 00	$9 000	$225	$2 700
2	Two	Improved		2,000	0 02	$2,000	$300	$1 000	40 00	$4 000	$600	$2 000
3	Three	New	10 000		0.09	$10 000	$250	$3 000	900 00	$100 000	$2 500	$30 000
4									0 00	$0	$0	$0
5									0 00	$0	$0	$0
6									0 00	$0	$0	$0
7									0 00	$0	$0	$0
8									0 00	$0	$0	$0
9									0 00	$0	$0	$0
10									0 00	$0	$0	$0
11									0 00	$0	$0	$0
12									0 00	$0	$0	$0
13									0 00	$0	$0	$0
14									0 00	$0	$0	$0
15									0 00	$0	$0	$0
16									0 00	$0	$0	$0
17									0 00	$0	$0	$0
18									0 00	$0	$0	$0
19									0 00	$0	$0	$0
20									0 00	$0	$0	$0
21									0 00	$0	$0	$0
22									0 00	$0	$0	$0
23									0 00	$0	$0	$0
24									0 00	$0	$0	$0
25									0 00	$0	$0	$0
26									0 00	$0	$0	$0
27									0 00	$0	$0	$0
28									0 00	$0	$0	$0
29									0 00	$0	$0	$0
30									0 00	$0	$0	$0
31									0 00	$0	$0	$0
32									0 00	$0	$0	$0
33									0 00	$0	$0	$0
34									0 00	$0	$0	$0
35									0 00	$0	$0	$0
36									0 00	$0	$0	$0
37									0 00	$0	$0	$0
38									0 00	$0	$0	$0
39									0 00	$0	$0	$0
40									0 00	$0	$0	$0
41									0 00	$0	$0	$0
42									0 00	$0	$0	$0
43									0 00	$0	$0	$0
44									0 00	$0	$0	$0
45									0 00	$0	$0	$0
46									0 00	$0	$0	$0
47									0 00	$0	$0	$0
48									0 00	$0	$0	$0
49									0 00	$0	$0	$0
50									0 00	$0	$0	$0
51									0 00	$0	$0	$0
52									0 00	$0	$0	$0
53									0 00	$0	$0	$0
54									0 00	$0	$0	$0
55									0 00	$0	$0	$0
56									0 00	$0	$0	$0
57									0 00	$0	$0	$0
58									0 00	$0	$0	$0
59									0 00	$0	$0	$0
60									0 00	$0	$0	$0
61									0 00	$0	$0	$0
62									0 00	$0	$0	$0
63									0 00	$0	$0	$0
64									0 00	$0	$0	$0
65									0 00	$0	$0	$0
66									0 00	$0	$0	$0
67									0 00	$0	$0	$0
68									0 00	$0	$0	$0
69									0 00	$0	$0	$0
70									0 00	$0	$0	$0
71									0 00	$0	$0	$0
72									0 00	$0	$0	$0
73									0 00	$0	$0	$0
74									0 00	$0	$0	$0
75									0 00	$0	$0	$0
76									0 00	$0	$0	$0
77									0 00	$0	$0	$0
78									0 00	$0	$0	$0
79									0 00	$0	$0	$0
80									0 00	$0	$0	$0
81									0 00	$0	$0	$0
82									0 00	$0	$0	$0
83									0 00	$0	$0	$0
84									0 00	$0	$0	$0
85									0 00	$0	$0	$0
86									0 00	$0	$0	$0
87									0 00	$0	$0	$0
88									0 00	$0	$0	$0
89									0 00	$0	$0	$0
90									0 00	$0	$0	$0
91									0 00	$0	$0	$0
92									0 00	$0	$0	$0
93									0 00	$0	$0	$0
94									0 00	$0	$0	$0
95									0 00	$0	$0	$0
96									0 00	$0	$0	$0
97									0 00	$0	$0	$0
98									0 00	$0	$0	$0
99									0 00	$0	$0	$0
100									0 00	$0	$0	$0

* Use individual line for each improved or new crop (e g do not include hectares of improvement and new irrigation on same line)

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P ject: Example Project

Sce rio De cription: BASE CASE Average hydrology 90% power xport at 7 00 cts/kWh starting firm export pric 5% MGN evenue share 1 % VAT 5% Export Tax 25% corporat t aft 15 ye h ndover fter 25 full years of operation

Proposal Number: EXt | Sc io Number: 1

Dev loper: Nepal Power International

Power Production Pricing & Annual Re

Power Production Pricing and Annual Revenues

Prices nd Reve ues in thousands of constant 1999 US$

Calendar Year	Operating ear	Power Production Total Net Output MW	Firm GWh	Sec GWh	Power Sales Nepal Power MW	Firm GWh	Sec GWh	Export Powe MW	Firm GWh	Sec GWh	N pal $/kW/mo	Nep Firm c/kWh	Nep Sec c/kWh	Export $/kW mo	Exp Firm c/kWh	Exp Sec c/kWh	Selling Pric Export in R $/kW/mo	Exp Firm in R c/kWh	Exp Sec in Re c/kWh	Wheeling Nepal $/MWh	Wheeling-Border $/MWh	Wheeling-India $/MWh
1990	15	0	0	0	0	0	0	0	0	0												
1991	14	0	0	0	0	0	0	0	0	0												
992	13	0	0	0	0	0	0	0	0	0												
1993	12	0	0	0	0	0	0	0	0	0												
1994	11	0	0	0	0	0	0	0	0	0												
1995	10	0	0	0	0	0	0	0	0	0												
1996	-9	0	0	0	0	0	0	0	0	0												
1997	-8	0	0	0	0	0	0	0	0	0												
1998	7	0	0	0	0	0	0	0	0	0												
1999	-6	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
2000	5	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
2001	-4	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
2002	3	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
2003	2	0	0	0	0	0	0	0	0	0	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
2004	1	300	891	249	30	89	25	266	790	221	6 73	5 17	2 59	3 62	7 24	3 83	4 79	9 59	4 79	0 50	0 75	0 75
2005	1	500	1 500	420	50	150	42	443	1 330	372	6 76	5 20	2 60	3 64	7 28	3 85	4 89	9 77	4 89	0 51	0 76	0 76
2006	2	500	1 500	20	50	150	42	443	1 330	372	6 79	5 22	2 61	3 66	7 31	3 87	4 98	9 96	4 98	0 51	0 77	0 77
2007	3	500	500	420	50	150	42	443	1 330	372	6 83	5 25	2 63	3 68	7 35	3 89	5 07	10 15	5 07	0 52	0 77	0 77
2008	4	500	1 500	420	50	150	42	443	1 330	372	6 86	5 28	2 64	3 69	7 38	3 90	5 17	10 34	5 17	0 52	0 78	0 78
2009	5	500	1 500	20	50	150	42	443	1 330	372	6 89	5 30	2 65	3 71	7 42	3 92	5 27	10 54	5 27	0 53	0 79	0 79
2010	6	500	1 500	420	50	150	42	3	1 330	372	6 93	5 33	2 66	3 73	7 46	3 94	5 37	10 74	5 37	0 53	0 80	0 80
2011	7	500	1 500	420	50	150	42	43	1 330	372	6 96	5 35	2 68	3 75	7 50	3 96	5 7	10 94	5 47	0 54	0 80	0 80
2012	8	500	1 500	420	50	150	42	4 3	1 330	372	6 99	5 38	2 69	3 77	7 53	3 98	5 58	11 15	5 58	0 54	0 81	0 81
2013	9	500	1 500	420	50	150	42	43	1 330	372	7 03	5 41	2 70	3 78	7 57	4 00	5 68	11 36	5 68	0 55	0 82	0 82
2014	10	500	1 500	420	50	150	42	443	1 330	372	7 06	5 43	2 72	3 80	7 61	02	5 79	11 58	5 79	0 55	0 83	0 83
2015	11	500	1 500	420	50	150	42	43	1 330	372	7 10	5 46	2 73	3 82	7 64	4 04	5 90	11 80	5 90	0 56	0 84	0 84
20 6	12	500	1 500	420	50	150	42	443	1 330	372	7 13	5 49	2 74	3 84	7 68	4 06	6 01	12 03	6 01	0 56	0 85	0 85
2017	13	500	1 500	420	50	50	42	443	1 330	372	7 17	5 51	2 76	3 86	7 72	4 08	6 13	12 26	6 13	0 57	0 85	0 85
2018	14	500	1 500	420	50	150	42	443	1 330	372	7 20	5 54	2 77	3 88	7 76	4 10	6 24	12 49	6 24	0 57	0 86	0 86
20 9	15	500	1 500	20	50	150	42	443	1 330	372	7 24	5 57	2 78	3 90	7 80	4 12	6 36	12 73	6 36	0 58	0 87	0 87
2020	16	500	500	420	50	150	42	443	1 330	372	7 27	5 60	2 80	3 92	7 83	4 14	6 48	12 97	6 48	0 59	0 88	0 88
2021	17	500	1 500	420	50	150	42	443	1 330	372	7 31	5 62	2 81	3 94	7 87	4 16	6 61	3 22	6 61	0 59	0 89	0 89
2022	18	500	1 500	20	50	150	42	443	1 330	372	7 35	5 65	2 83	3 96	7 91	4 18	6 73	13 47	6 73	0 60	0 90	0 90
2023	19	500	1 500	420	50	150	42	443	1 330	372	7 38	5 68	2 84	3 97	7 95	4 20	6 86	13 72	6 86	0 60	0 91	0 91
2024	20	500	1 500	420	50	150	42	443	1 330	372	7 42	5 71	2 85	3 99	7 99	4 22	6 99	13 99	6 99	0 61	0 92	0 92
2025	21	500	1 500	420	50	150	42	443	1 330	372	7 45	5 73	2 87	4 01	8 03	4 24	7 13	14 25	7 13	0 62	0 92	0 92
2026	22	500	1 500	420	50	150	42	443	1 330	372	7 49	5 76	2 88	4 03	8 07	4 26	7 26	14 52	7 26	0 62	0 93	0 93
2027	23	500	1 500	420	50	150	42	443	1 330	372	7 53	5 79	2 90	4 05	8 11	4 28	7 40	14 80	7 40	0 63	0 94	0 94
2028	24	500	1 500	420	50	150	42	443	1 330	372	7 56	5 82	2 91	4 07	8 15	4 31	7 54	15 08	7 54	0 63	0 95	0 95
2029	25	500	1 500	420	50	150	42	443	1 330	372	7 60	5 85	2 92	4 09	8 19	4 33	7 69	15 37	7 69	0 64	0 96	0 96
2030	26	500	1 500	420	50	150	42	443	1 330	372	7 64	5 88	2 94	4 11	8 23	4 35	7 83	15 66	7 83	0 65	0 97	0 97
2031	27	500	1 500	420	50	150	42	443	1 330	372	7 68	5 90	2 95	4 13	8 27	4 37	7 98	15 96	7 98	0 65	0 98	0 98
2032	28	500	1 500	420	50	150	42	443	1 330	372	7 71	5 93	2 97	4 15	8 31	4 39	8 13	16 27	8 13	0 66	0 99	0 99
2033	29	500	1 500	420	50	150	42	443	1 330	372	7 75	5 96	2 98	4 17	8 35	4 41	8 29	16 58	8 29	0 67	1 00	1 00
2034	30	500	1 500	420	50	150	42	443	1 330	372	7 79	5 99	3 00	4 19	8 39	4 43	8 45	16 89	8 45	0 67	1 01	1 01
2035	31	500	1 500	20	50	150	42	443	1 330	372	7 83	6 02	3 01	4 21	8 43	4 46	8 61	17 21	8 61	0 68	1 02	1 02
2036	32	500	1 500	420	50	150	42	443	1 330	372	7 87	6 05	3 03	4 24	8 47	4 48	8 77	17 54	8 77	0 69	1 03	1 03
2037	33	500	1 500	420	50	150	42	443	1 330	372	7 90	6 08	3 04	4 26	8 51	4 50	8 94	17 87	8 94	0 69	1 04	1 04
2038	34	500	1 500	420	50	150	42	443	1 330	372	7 94	6 11	3 06	4 28	8 55	4 52	9 11	18 21	9 11	0 70	1 05	1 05
2039	35	500	1 500	420	50	150	42	443	1 330	372	7 98	6 14	3 07	4 30	8 60	4 54	9 28	18 56	9 28	0 71	1 06	1 06
2040	36	500	1 500	420	50	150	42	443	1 330	372	8 02	6 17	3 09	4 32	8 64	4 57	9 46	18 92	9 46	0 72	1 07	1 07
2041	37	500	1 500	420	50	150	42	443	1 330	372	8 06	6 20	3 10	4 34	8 68	4 59	9 64	19 28	9 64	0 72	1 08	1 08
2042	38	500	1 500	420	50	150	42	443	1 330	372	8 10	6 23	3 12	4 36	8 72	4 61	9 82	19 64	9 82	0 73	1 09	1 09
2043	39	500	1 500	420	50	150	42	443	1 330	372	8 14	6 26	3 13	4 38	8 77	4 63	10 01	20 02	10 01	0 74	1 11	1 11
2044	40	500	1 500	420	50	150	42	443	1 330	372	8 18	6 29	3 15	4 40	8 81	4 66	10 20	20 40	10 20	0 74	1 12	1 12
2045	41	500	1 500	420	50	150	42	443	1 330	372	8 22	6 32	3 6	4 43	8 85	4 69	10 39	20 79	10 39	0 75	1 13	1 13
2046	42	500	1 500	420	50	150	42	443	1 330	372	8 26	6 35	3 18	4 45	8 90	4 70	10 59	21 18	10 59	0 76	1 14	1 14
2047	43	500	1 500	420	50	150	42	443	1 330	372	8 30	6 38	3 19	4 47	8 94	4 72	10 79	21 58	10 79	0 77	1 15	1 15
2048	44	500	1 500	420	50	150	42	443	1 330	372	8 34	6 42	3 2	4 49	8 98	4 75	11 00	22 00	11 00	0 77	1 16	1 16
2049	45	500	1 500	420	50	150	42	443	1 330	372	8 38	6 45	3 22	4 51	9 03	4 77	11 21	22 42	11 21	0 78	1 17	1 17
2050	46	500	1 500	420	50	150	42	443	1 330	372	8 42	6 48	3 24	4 54	9 07	4 79	11 42	22 84	11 42	0 79	1 19	1 19
2051	47	500	1 500	420	50	150	42	443	1 330	372	8 46	6 51	3 26	4 56	9 12	4 82	11 64	23 28	11 64	0 80	1 20	1 20
2052	48	500	1 500	420	50	150	42	443	1 330	372	8 51	6 54	3 27	4 58	9 16	4 84	11 86	23 72	11 86	0 81	1 21	1 21
2053	49	500	1 500	420	50	150	42	443	1 330	372	8 55	6 58	3 29	4 60	9 21	4 87	12 09	24 17	12 09	0 81	1 22	22
2054	50	500	1 500	420	50	150	42	443	1 330	372	8 59	6 61	3 30	4 63	9 25	4 89	12 32	24 63	12 32	0 82	23	23

Calendar Year	Wheeling-India $/MWh	Capacity Revenues	Nepal Power Gross Revenues Firm Energy	Secondary Energy	Total Revenues	Export Power Gros Revenues Capacity Revenues	Firm Energy	Secondary Energy	Total Revenues	Total Power Revenues
1990		0	0	0	0	0	0	0	0	0
1991		0	0	0	0	0	0	0	0	0
992		0	0	0	0	0	0	0	0	0
1993		0	0	0	0	0	0	0	0	0
1994		0	0	0	0	0	0	0	0	0
1995		0	0	0	0	0	0	0	0	0
1996		0	0	0	0	0	0	0	0	0
1997		0	0	0	0	0	0	0	0	0
1998		0	0	0	0	0	0	0	0	0
1999	0 00	0	0	0	0	0	0	0	0	0
2000	0 00	0	0	0	0	0	0	0	0	0
2001	0 00	0	0	0	0	0	0	0	0	0
2002	0 00	0	0	0	0	0	0	0	0	0
2003	0 00	0	0	0	0	0	0	0	0	0
2004	0 75	2 421	4 808	845	7 875	12 682	82 749	9 105	84 537	92 211
2005	0 76	4 056	7 798	1 092	12 947	21 348	108 742	15 488	143 577	156 524
2006	0 77	4 075	7 837	1 087	13 0 0	21 563	107 817	15 639	145 020	158 030
2007	0 77	4 095	7 878	1 103	13 074	21 782	106 906	15 794	148 484	56 558
2008	0 78	4 116	7 914	1 108	13 138	22 003	110 014	15 952	147 969	18 107
2009	0 79	4 136	7 953	1 113	13 202	22 227	111 137	16 112	1 9 476	182 879
2010	0 80	4 156	7 992	1 119	13 267	22 455	112 277	18 274	151 006	164 273
2011	0 80	4 176	8 031	1 12	13 332	22 687	113 433	18 439	152 558	165 891
2012	0 81	4 197	8 071	1 130	13 398	22 921	114 607	18 606	154 134	167 531
2013	0 82	4 217	8 110	1 135	13 463	23 160	115 798	16 775	155 733	89 198
2014	0 83	4 238	8 150	1 141	13 529	23 401	117 007	16 947	157 355	170 885
2015	0 84	4 258	8 190	1 147	13 595	23 647	118 234	17 122	159 003	172 598
20 6	0 85	4 280	8 230	1 152	13 662	23 898	119 479	17 299	160 674	174 337
2017	0 85	4 301	8 271	1 158	13 729	24 149	120 744	17 479	162 371	176 101
2018	0 86	4 322	8 311	1 164	13 796	24 405	122 027	17 661	164 094	177 891
20 9	0 87	4 343	8 352	1 169	13 864	24 666	123 330	17 847	165 843	179 707
2020	0 88	4 364	8 393	1 175	13 932	24 931	124 653	18 035	167 618	181 550
2021	0 89	4 386	8 434	1 181	14 000	25 199	125 996	18 229	169 421	183 42
2022	0 90	4 407	8 475	1 187	14 069	25 472	127 359	18 419	171 251	185 319
2023	0 91	4 429	8 517	1 192	14 138	25 749	128 744	18 616	173 108	87 248
2024	0 92	4 450	8 559	1 198	14 207	26 030	130 149	18 816	74 995	189 202
2025	0 92	4 472	8 601	1,204	14 277	26 315	131 578	19 018	178 910	9 187
2026	0 93	4 494	8 643	1 210	14 347	26 605	133 028	19 224	178 855	193 202
2027	0 94	4 516	8 685	1 216	14 417	26 899	134 497	19 433	180 830	195 2 7
2028	0 95	4 538	8 729	1 222	14 488	27 198	135 992	19 645	182 836	197 324
2029	0 96	4 561	8 770	1 228	14 559	27 502	137 510	19 86	184 873	199 431
2030	0 97	4 583	8 813	1 234	14 630	27 810	139 051	20 080	186 941	201 571
2031	0 98	4 605	8 857	1 240	14 702	28 123	140 617	20 302	189 042	203 744
2032	0 99	4 628	8 900	1 246	14 774	28 44	142 207	20 527	191 175	205 949
2033	1 00	4 651	8 944	1 252	14 846	28 764	143 822	20 757	193 343	208 189
2034	1 01	4 673	8 987	1 258	14 919	29 092	145 462	20 989	195 544	210 463
2035	1 02	4 696	9 032	1 264	14 992	29 426	1 7 128	21 226	197 779	212 772
2036	1 03	4 719	9 078	1 271	15 066	28 764	146 821	21 466	200 050	2 5 1 8
2037	1 04	4 743	9 120	1 277	15 140	30 108	150 540	21 709	202 357	217 87
2038	1 05	4 766	9 165	1 283	15 214	30 457	152 287	21 957	204 701	219 9 5
2039	1 06	4 789	9 210	1 289	15 288	30 812	154 061	22 206	207 082	222 370
2040	1 07	4 813	9 255	1 296	15 363	31 173	155 864	22 464	209 500	224 864
2041	1 08	4 836	9 300	1 302	15 439	31 539	157 695	22 72	211 958	227 397
2042	1 09	4 860	9 346	1 308	15 514	31 911	159 558	22 987	214 454	229 969
2043	1 11	4 884	9 392	1 315	15 590	32 289	161 446	23 255	216 991	232 581
2044	1 12	4 908	9 438	1 321	15 667	32 673	163 367	23 527	219 568	235 235
2045	1 13	4 932	9 484	1 328	15 744	33 064	165 318	23 804	222 187	237 931
2046	1 14	4 956	9 531	1,334	15 821	33 46	167 303	24 065	224 848	240 669
2047	1 15	4 980	9 577	1 341	15 898	33 864	169 318	24 370	227 552	243 50
2048	1 16	5 005	9 624	1 347	15 976	34 273	171 366	24 680	230 300	246 276
2049	1 17	5 029	9 671	1 354	16 055	34 690	173 448	2 955	233 092	2 9
2050	1 19	5 054	9 719	1 361	16 133	35 113	175 563	25 254	235 930	252 063
2051	1 20	5 079	9 767	1 367	16 212	35 542	177 712	25 558	238 814	255 026
2052	1 21	5 103	9 814	1 374	16 292	35 979	179 897	25 868	2 1 744	258 036
2053	22	5 129	9 863	1 381	16 372	36 424	182 118	26 182	244 723	28 095
2054	23	5 154	9 911	1 388	16 452	36 875	84 375	26 501	2 7 751	26 2 3

Note It is assumed that the PPA will allow for purchase power factor and reactive power in the unit prices per kW and per kWh

Project E mple P ject

BASE CASE A erage hydrology 90% power xport t 7 00 cts/kWh tarting fi m port price 5% HMGN ev nue ha 14% VAT 5% Export Tax 25% corporate tax fte 15 years total

Scenario Description handove fter 25 full year f ope tion

Proposal Number EX1 **Scenario Number** 1

Developer Nepal Power I ternatonal

Economic and Financial Inputs and Tax Rates

Economic and Financial Inputs and Tax Rates

Operation Yea	Calendar Yea	I flation US CPI	Nepal CPI	NR per IR	NRs per US $	IR per US $	Pound per US $	DM per US $	Yen per US $	E h nge R te Ecu pe US $	Austr lia $ per US $	per US $	per US $	per US $	per US $	per US $	per US $	Corporate Income	Export Tax	Mortgage Tax	Personal Income Capital	Personal Income Operating	Tax Rates Import Dubes C pital	Import Dubes Operating	Sales/VAT Capital	Sales/VAT Operating	Local C pital	Local Operating
15	1990																											
14	1991																											
13	1992																											
12	1993																											
11	1994																											
10	1995																											
9	1996																											
-8	1997																											
7	1998																											
-6	1999	324	408	1 65	65 0	39 4	0 70	1 98	142 9	1 00	1 48	0 00	0 00	0 00	0 00	0 00	0 00			0 0%	0 80%		0 62%		1 96%		0 08%	
5	2000	330	449	1 69	69 5	41 3	0 75	2 09	152 9	1 07	1 58	0 00	0 00	0 00	0 00	0 00	0 00				0 80%		0 62%		1 96%		0 08%	
-4	2001	337	493	1 72	74 4	43 4	0 80	2 24	163 6	1 15	1 69	0 00	0 00	0 00	0 00	0 00	0 00				0 80%		0 62%		1 96%		0 08%	
3	2002	343	543	1 76	79 6	45 6	0 86	2 40	175 0	1 23	1 81	0 00	0 00	0 00	0 00	0 00	0 00				0 80%		0 62%		1 96%		0 08%	
2	2003	350	597	1 79	85 2	47 8	0 92	2 57	187 3	1 32	1 94	0 00	0 00	0 00	0 00	0 00	0 00				0 80%		0 62%		1 96%		0 08%	
1	2004	357	657	1 83	91 1	50 2	0 99	2 75	200 4	1 41	2 07	0 00	0 00	0 00	0 00	0 00	0 00		5 0%		0 80%	2 80%	0 62%	0 55%	1 96%	0 70%	0 08%	0 08%
1	2005	364	722	1 86	97 5	52 7	1 05	2 94	214 4	1 51	2 22	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
2	2006	372	795	1 90	104 3	55 4	1 13	3 14	229 4	1 61	2 37	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
3	2007	379	874	1 94	111 6	58 2	1 21	3 36	245 5	1 73	2 54	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
4	2008	387	962	1 98	119 5	61 1	1 29	3 60	262 7	1 85	2 72	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
5	2009	394	1 058	2 02	127 8	64 1	1 38	3 85	281 1	1 98	2 91	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
6	2010	402	1 163	2 06	136 8	67 3	1 48	4 12	300 7	2 11	3 11	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
7	2011	410	1 280	2 10	146 3	70 7	1 58	4 41	321 8	2 26	3 33	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
8	2012	419	1 408	2 14	156 6	74 2	1 69	4 72	344 3	2 42	3 56	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
9	2013	427	1 549	2 18	167 5	77 8	1 81	5 05	368 4	2 59	3 81	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
10	2014	435	1 703	2 23	179 3	81 8	1 94	5 40	394 2	2 77	4 07	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
11	2015	444	1 874	2 27	191 8	85 9	2 07	5 78	421 8	2 96	4 36	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
12	2016	453	2 061	2 32	205 2	90 2	2 22	6 18	451 3	3 17	4 67	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
13	2017	462	2 267	2 36	219 6	94 7	2 37	6 62	482 9	3 39	4 99	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
14	2018	471	2 494	2 41	235 0	89 5	2 54	7 08	516 7	3 63	5 34	0 00	0 00	0 00	0 00	0 00	0 00		5 0%			2 80%		0 55%		0 70%		0 08%
15	2019	481	2 743	2 46	251 4	104 4	2 72	7 58	552 9	3 89	5 72	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
16	2020	490	3 018	2 51	269 0	109 7	2 91	8 11	591 6	4 16	6 12	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
17	2021	500	3 319	2 56	287 9	115 1	3 11	8 67	633 0	4 45	6 54	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
18	2022	510	3 651	2 61	308 0	120 9	3 33	9 28	677 3	4 76	7 00	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
19	2023	520	4 016	2 66	329 6	126 9	3 56	9 93	724 8	5 09	7 49	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
20	2024	531	4 418	2 71	352 6	133 3	3 81	10 63	775 5	5 45	8 02	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
21	2025	541	4 860	2 77	377 3	139 9	4 08	11 37	829 8	5 83	8 58	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
22	2026	552	5 346	2 82	403 7	146 9	4 36	12 17	887 9	6 24	9 18	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
23	2027	563	5 880	2 88	432 0	154 3	4 67	13 02	950 0	6 68	9 82	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
24	2028	575	6 468	2 94	462 2	162 0	5 00	13 93	1 016 5	7 14	10 51	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
25	2029	586	7 115	3 00	494 6	170 1	5 35	14 90	1 087 7	7 64	11 24	0 00	0 00	0 00	0 00	0 00	0 00	25 0%	5 0%			2 80%		0 55%		0 70%		0 08%
26	2030	598	7 827	3 06	529 2	178 6	5 72	15 95	1 163 8	8 18	12 03	0 00	0 00	0 00	0 00	0 00	0 00											
27	2031	610	8 610	3 12	566 3	187 5	6 12	17 06	1 245 3	8 75	12 87	0 00	0 00	0 00	0 00	0 00	0 00											
28	2032	622	9 471	3 18	605 9	196 9	6 55	18 29	1 332 4	9 37	13 77	0 00	0 00	0 00	0 00	0 00	0 00											
29	2033	634	10 418	3 24	648 3	206 8	7 01	19 53	1 425 7	10 02	14 74	0 00	0 00	0 00	0 00	0 00	0 00											
30	2034	647	11 459	3 31	693 7	217 1	7 50	20 90	1 525 5	10 72	15 77	0 00	0 00	0 00	0 00	0 00	0 00											
31	2035	660	12 605	3 37	742 2	228 0	8 02	22 37	1 632 3	11 47	16 87	0 00	0 00	0 00	0 00	0 00	0 00											
32	2036	673	13 866	3 44	794 2	239 4	8 59	23 93	1 746 6	12 28	18 05	0 00	0 00	0 00	0 00	0 00	0 00											
33	2037	687	15 252	3 51	849 8	251 3	9 19	25 61	1 868 8	13 14	19 32	0 00	0 00	0 00	0 00	0 00	0 00											
34	2038	700	16 778	3 58	909 3	263 9	9 83	27 40	1 999 6	14 05	20 67	0 00	0 00	0 00	0 00	0 00	0 00											
35	2039	714	18 455	3 65	972 9	277 1	10 52	29 32	2 139 6	15 04	22 12	0 00	0 00	0 00	0 00	0 00	0 00											
36	2040	729	20 301	3 72	1 041 0	290 9	11 25	31 37	2 289 4	16 09	23 68	0 00	0 00	0 00	0 00	0 00	0 00											
37	2041	743	22 331	3 80	1 113 9	305 5	12 04	33 56	2 449 6	17 22	25 32	0 00	0 00	0 00	0 00	0 00	0 00											
38	2042	758	24 564	3 88	1 191 9	320 8	12 88	35 91	2 621 1	18 42	27 09	0 00	0 00	0 00	0 00	0 00	0 00											
39	2043	773	27 021	3 95	1 275 3	336 8	13 79	38 43	2,804 6	19 71	28 99	0 00	0 00	0 00	0 00	0 00	0 00											
40	2044	789	29 723	4 03	1 364 6	353 6	14 75	41 12	3 000 9	21 09	31 02	0 00	0 00	0 00	0 00	0 00	0 00											
41	2045	805	32,695	4 11	1 460 1	371 3	15 78	44 00	3 211 0	22 57	33 19	0 00	0 00	0 00	0 00	0 00	0 00											
42	2046	821	35 964	4 19	1 562 3	389 9	16 89	47 06	3 435 7	24 15	35 51	0 00	0 00	0 00	0 00	0 00	0 00											
43	2047	837	39 561	4 28	1 671 7	409 4	18 07	50 37	3 676 2	25 84	38 00	0 00	0 00	0 00	0 00	0 00	0 00											
44	2048	854	43 517	4 36	1 788 7	429 9	19 34	53 90	3 933 6	27 65	40 66	0 00	0 00	0 00	0 00	0 00	0 00											
45	2049	871	47 868	4 45	1 913 9	451 3	20 69	57 67	4 208 9	29 58	43 51	0 00	0 00	0 00	0 00	0 00	0 00											
46	2050	888	52 655	4 54	2 047 9	473 9	22 14	61 71	4 503 5	31 65	46 55	0 00	0 00	0 00	0 00	0 00	0 00											
47	2051	906	57 921	4 63	2 191 2	497 6	23 69	66 03	4 818 8	33 87	49 81	0 00	0 00	0 00	0 00	0 00	0 00											
48	2052	924	63 713	4 72	2,344 6	522 5	25 35	70 65	5 156 1	36 24	53 30	0 00	0 00	0 00	0 00	0 00	0 00											
49	2053	943	70 064	4 82	2 508 8	548 6	27 12	75 59	5 517 0	38 78	57 03	0 00	0 00	0 00	0 00	0 00	0 00											
50	2054	962	77,083	4 91	2,684 4	576 0	29 02	80 89	5,903 2	41 49	61 02	0 00	0 00	0 00	0 00	0 00	0 00											

Notes the CPI indeces are guesses and are illustrative only

The Corporate Income Tax Rate is applied to the Developer' Net Profit Before Tax

The Personal Income Tax, Import Dubes Sales/VAT and Local Taxes are determined as % of the Capital Cost

The Export Tax is determined as % of the pre-tax Export Revenue

Project	Example Project
Scenario Descriptio	BASE CASE Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

Calculation of Project Real Economic Rate of Return

(costs and benefits excluding taxes and transfers in constant 1999 US$)

Operation Year	Calendar Year	Capital Costs	O&M	Total Power Benefits	Nepal total d/s Benefits	Total Net Benefits
15	1990		0	0	0	0
14	1991		0	0	0	0
13	1992		0	0	0	0
12	1993		0	0	0	0
11	1994		0	0	0	0
10	1995		0	0	0	0
9	1996		0	0	0	0
8	1997		0	0	0	0
7	1998		0	0	0	0
-6	1999	(72 828)	(21 848)	0	0	(94 676)
5	2000	(111 427)	(22 285)	0	0	(133 712)
-4	2001	(151 541)	(22 731)	0	0	(174 272)
3	2002	(193 214)	(23 186)	0	0	(216 400)
2	2003	(157 663)	(23 649)	0	0	(181 312)
1	2004	(80 408)	(24 122)	92 211	(3 000)	(15 319)
1	2005		(12 302)	156 524	2 644	146 865
2	2006		(12 548)	158 030	3 422	148 903
3	2007		(12 799)	159 558	3 488	150 246
4	2008		(13 055)	161 107	3 556	151 608
5	2009		(13 317)	162 679	3 625	152 987
6	2010		(13 583)	164 273	3 697	154 387
7	2011		(13 855)	165 891	3 768	155 804
8	2012		(14 132)	167 531	3 841	157 241
9	2013		(14 414)	169 196	3 916	158 697
10	2014		(14 703)	170 885	3 992	160 174
11	2015		(14 997)	172 598	4 069	161 670
12	2016		(15 297)	174 337	4 147	163 187
13	2017		(15 602)	176 101	4 228	164 726
14	2018		(15 914)	177 891	4 310	166 286
15	2019		(16 233)	179 707	4 393	167 868
16	2020		(16 557)	181 550	4 478	169 471
17	2021		(16 889)	183 421	4 564	171 097
18	2022		(17 226)	185 319	4 652	172 745
19	2023		(17 571)	187 246	4 742	174 417
20	2024		(17 922)	189 202	4 834	176 114
21	2025		(18 281)	191 187	4 927	177 833
22	2026		(18 646)	193 202	5 021	179 577
23	2027		(19 019)	195 247	5 117	181 345
24	2028		(19 400)	197 324	5 215	183 139
25	2029		(19 788)	199 431	5 316	184 960
26	2030		(40 367)	201 571	5 417	166 622
27	2031		(41 174)	203 744	5 521	168 090
28	2032		(41 998)	205 949	5 626	169 578
29	2033		(42 838)	208 189	5 734	171 085
30	2034		(43 694)	210 463	5 843	172 612
31	2035		(44 568)	212 772	5 954	174 157
32	2036		(45 460)	215 116	6 067	175 724
33	2037		(46 369)	217 497	6 182	177 310
34	2038		(47 296)	219 915	6 300	178 918
35	2039		(48 242)	222 370	6 419	180 547
36	2040		(49 207)	224 864	6 540	182 196
37	2041		(50 191)	227 397	6 663	183 868
38	2042		(51 195)	229 969	6 788	185 562
39	2043		(52 219)	232 581	6 902	187 265
40	2044		(53 263)	235 235	7 032	189 004
41	2045		(54 328)	237 931	7 163	190 766
42	2046		(55 415)	240 669	7 297	192 551
43	2047		(56 523)	243 450	7 433	194 360
44	2048		(57 654)	246 276	7 572	196 194
45	2049		(58 807)	249 147	7 713	198 052
46	2050		(59 983)	252 063	7 856	199 936
47	2051		(61 183)	255 026	8 001	201 844
48	2052		(62 406)	258 036	8 149	203 779
49	2053		(63 654)	261 095	8 299	205 739
50	2054		(64,928)	264 203	8 451	207,726

Project Real Economic Rate of Return = **13.6%**

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Project E mple Project

Scenario Description BASE CASE A e ag hyd ology 90 / power export at 7 00 cts/kWh t rtu g f m exp rt p e 5 / HMGN revenue share 14 / VAT 5 / Exp rt T x 25 % corporate tax after 15 years total ha do r aft 25 full years of p tio n

Proposal Number EX1 **Scenario Number** 1

Developer Nepal Power Internati nal

Developers Cash Flow

DEVELOPER S CASH FLOW

thousands of curr nt (fl t d) $

Period	Y ar	Total Ope ting Revenue	Equity Investment	Mortgage Registration Fee	Import Duties	Sales/VAT Tax	Export Tax	Re nu Sharing	Local Taxes	O&M Cost	Wheeling Nep l	Whe ling t Bo der	Wheeling Ind	Electricity Royalties	Debt Service	Before Tax Expenditure	G ss Pre tax Pr fit	Corp at Income Tax	Net Profit After Tax	HMGN Dividends	Developer Net Profit
15	1990	0														0	0	0	0	0	0
14	1991	0														0	0	0	0	0	0
13	1992	0														0	0	0	0	0	0
12	1993	0														0	0	0	0	0	0
11	1994	0														0	0	0	0	0	0
10	1995	0														0	0	0	0	0	0
9	1996	0														0	0	0	0	0	0
8	1997	0														0	0	0	0	0	0
7	1998	0														0	0	0	0	0	0
-6	1999	0	(14 566)	0	(452)	(1 427)	0	0	(58)					0		(16 503)	(16 503)	0	(16 503)	0	(16 503)
5	2000	0	(22 285)		(691)	(2 184)	0	0	(89)					0		(25 249)	(25 249)	0	(25 249)	0	(25 249)
-4	2001	0	(30 308)		(940)	(2 970)	0	0	(121)					0		(34 339)	(34 339)	0	(34 339)	0	(34 339)
3	2002	0	(38 643)		(1 198)	(3 787)	0	0	(155)					0		(43 782)	(43 782)	0	(43 782)	0	(43 782)
2	2003	0	(31 533)		(978)	(3 090)	0	0	(126)					0		(35 726)	(35 726)	0	(35 726)	0	(35 726)
1	2004	97 106	(16 082)		(565)	(1 660)	(4 812)	(5 386)	(72)		(65)	(871)	(871)	(1 592)		(31 976)	65 130	0	65 130	(2 326)	62 804
1	2005	168 223			(68)	(86)	(8 336)	(9 326)	(7)	(12 302)	(114)	(1 511)	(1 511)	(2 651)	(81 713)	(117 624)	50 599	0	50 599	(1 807)	48 792
2	2006	173 312			(69)	(88)	(8 588)	(9 604)	(8)	(12 548)	(117)	(1 556)	(1 556)	(2 627)	(81 713)	(118 474)	54 838	0	54 838	(1 958)	52 879
3	2007	178 563			(70)	(90)	(8 848)	(9 891)	(8)	(12 799)	(121)	(1 603)	(1 603)	(2 605)	(81 713)	(119 352)	59 211	0	59 211	(2 115)	57 096
4	2008	183 981			(72)	(91)	(9 116)	(10 187)	(8)	(13 055)	(124)	(1 652)	(1 652)	(2 586)	(81 713)	(120 256)	63 725	0	63 725	(2 276)	61 449
5	2009	189 572			(73)	(93)	(9 394)	(10 492)	(8)	(13 317)	(128)	(1 702)	(1 702)	(2 566)	(81 713)	(121 189)	68 383	0	68 383	(2 442)	65 941
6	2010	195 342			(75)	(95)	(9 679)	(10 807)	(8)	(13 583)	(132)	(1 753)	(1 753)	(2 553)	(81 713)	(122 151)	73 192	0	73 192	(2 614)	70 578
7	2011	201 298			(76)	(97)	(9 975)	(11 132)	(8)	(13 855)	(136)	(1 806)	(1 806)	(2 539)	(81 713)	(123 141)	78 156	0	78 156	(2 791)	75 365
8	2012	207 444			(78)	(99)	(10 279)	(11 467)	(8)	(14 132)	(140)	(1 860)	(1 860)	(2 526)	(81 713)	(124 162)	83 281	0	83 281	(2 974)	80 307
9	2013	213 788			(79)	(101)	(10 594)	(11 812)	(9)	(14 414)	(144)	(1 917)	(1 917)	(2 515)	(58 660)	(102 161)	111 626	0	111 626	(3 987)	107 640
10	2014	220 336			(81)	(103)	(10 918)	(12 169)	(9)	(14 703)	(148)	(1 975)	(1 975)	(2 506)	(58 660)	(103 245)	117 091	0	117 091	(4 182)	112 909
11	2015	227 095			(82)	(105)	(11 253)	(12 537)	(9)	(14 997)	(153)	(2 034)	(2 034)	(2 498)	(58 660)	(104 361)	122 733	0	122 733	(4 383)	118 350
12	2016	234 072			(84)	(107)	(11 599)	(12 916)	(9)	(15 297)	(158)	(2 096)	(2 096)	(2 491)	(58 660)	(105 511)	128 561	0	128 561	(4 591)	123 970
13	2017	241 275			(86)	(109)	(11 956)	(13 308)	(9)	(15 602)	(162)	(2 159)	(2 159)	(2 485)	(22 351)	(70 386)	170 890	0	170 890	(6 103)	164 786
14	2018	248 712			(88)	(111)	(12 324)	(13 712)	(10)	(15 914)	(167)	(2 224)	(2 224)	(2 480)	(22 351)	(71 605)	177 107	0	177 107	(6 325)	170 782
15	2019	256 390			(89)	(114)	(12 705)	(14 129)	(10)	(16 233)	(172)	(2 291)	(2 291)	(13 375)	(22 351)	(83 760)	172 630	(43 158)	129 473	(4 624)	124 848
16	2020	264 317			(91)	(116)	(13 098)	(14 559)	(10)	(16 557)	(178)	(2 360)	(2 360)	(13 296)	0	(62 626)	201 691	(50 423)	151 268	(5 402)	145 866
17	2021	272 502			(93)	(118)	(13 504)	(15 003)	(10)	(16 889)	(183)	(2 432)	(2 432)	(13 226)	0	(63 889)	208 614	(52 153)	156 460	(5 588)	150 873
18	2022	280 955			(95)	(121)	(13 922)	(15 462)	(10)	(17 226)	(188)	(2 505)	(2 505)	(13 163)	0	(65 198)	215 757	(53 939)	161 817	(5 779)	156 038
19	2023	289 683			(97)	(123)	(14 355)	(15 935)	(11)	(17 571)	(194)	(2 581)	(2 581)	(13 108)	0	(66 555)	223 128	(55 782)	167 346	(5 977)	161 369
20	2024	298 696			(99)	(125)	(14 802)	(16 423)	(11)	(17 922)	(200)	(2 659)	(2 659)	(13 061)	0	(67 960)	230 736	(57 684)	173 052	(6 180)	166 872
21	2025	308 005			(101)	(128)	(15 263)	(16 927)	(11)	(18 281)	(206)	(2 739)	(2 739)	(13 020)	0	(69 414)	238 591	(59 648)	178 943	(6 391)	172 552
22	2026	317 619			(103)	(131)	(15 740)	(17 448)	(11)	(18 646)	(212)	(2 822)	(2 822)	(12 985)		(70 919)	246 701	(61 675)	185 025	(6 608)	178 417
23	2027	327 549			(105)	(133)	(16 232)	(17 985)	(11)	(19 019)	(219)	(2 907)	(2 907)	(12 956)		(72 474)	255 075	(63 769)	191 306	(6 832)	184 474
24	2028	337 805			(107)	(136)	(16 741)	(18 539)	(12)	(19 400)	(225)	(2 995)	(2 995)	(12 932)		(74 081)	263 725	(65 931)	197 794	(7 064)	190 730
25	2029	348 400			(109)	(139)	(17 266)	(19 112)	(12)	(19 788)	(232)	(3 085)	(3 085)	(12 914)		(75 741)	272 659	(68 165)	204 494	(7 303)	197 191
26	2030				0	0	0	0	0					0		0	0	0	0	0	0
27	2031				0	0	0	0	0					0		0	0	0	0	0	0
28	2032				0	0	0	0	0					0		0	0	0	0	0	0
29	2033				0	0	0	0	0					0		0	0	0	0	0	0
30	2034				0	0	0	0	0					0		0	0	0	0	0	0
31	2035				0	0	0	0	0					0		0	0	0	0	0	0
32	2036				0	0	0	0	0					0		0	0	0	0	0	0
33	2037				0	0	0	0	0					0		0	0	0	0	0	0
34	2038				0	0	0	0	0					0		0	0	0	0	0	0
35	2039				0	0	0	0	0					0		0	0	0	0	0	0
36	2040				0	0	0	0	0					0		0	0	0	0	0	0
37	2041				0	0	0	0	0					0		0	0	0	0	0	0
38	2042				0	0	0	0	0					0		0	0	0	0	0	0
39	2043				0	0	0	0	0					0		0	0	0	0	0	0
40	2044				0	0	0	0	0					0		0	0	0	0	0	0
41	2045				0	0	0	0	0					0		0	0	0	0	0	0
42	2046				0	0	0	0	0					0		0	0	0	0	0	0
43	2047				0	0	0	0	0					0		0	0	0	0	0	0
44	2048				0	0	0	0	0					0		0	0	0	0	0	0
45	2049				0	0	0	0	0					0		0	0	0	0	0	0
46	2050				0	0	0	0	0					0		0	0	0	0	0	0
47	2051				0	0	0	0	0					0		0	0	0	0	0	0
48	2052				0	0	0	0	0					0		0	0	0	0	0	0
49	2053				0	0	0	0	0					0		0	0	0	0	0	0
50	2054				0	0	0	0	0					0		0	0	0	0	0	0

D f p R al Retur f e tm t 25 7%

De elope Nominal Retu n n l tm t 27 6 /

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Project Example Project

Scenario Description BASE CASE Average hydrology 90 / power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14 % VAT 5% Export Tax 25 / corporate tax after 15 years total handover after 25 full years of operation

Proposal Number EX1 **Scenario Number** 1

Developer Nepal Power International

Loan Amortization

Loan Amortization

(all debt service figures in thousands for current year)

Loan Number	Item	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	Year																					
	Amortization	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)						
1	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)	(22 351)						
	Amortization	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)									
2	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)	(36 309)									
	Amortization	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)													
3	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)	(23 053)													
	Amortization																					
4	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
5	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
6	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
7	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
8	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
9	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
	US $ Equiv																					
	Amortization																					
10	$/currency	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00	1 00
Total Debt Service $		(81,713)	(81,713)	(81,713)	(81,713)	(81,713)	(81,713)	(81,713)	(81 713)	(58,660)	(58,660)	(58 660)	(58 660)	(22,351)	(22 351)	(22 351)	0	0	0	0	0	0

Assuming single annual mid-year payments

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Project E ample P j t

BASE CASE A g hyd l gy 90% p w p rt t 7 00 cts/kWh starti g f m port p 5% HMGN ev h 14% VAT 5% Export Ta 25% co p t t ft 15 y

Scenario Description total ha do e afte 25 f ll yea s of operation

Proposal Number EX1 **Scenario Number** 1

Developer N p l P w l t t l

Goverment Net Revenues from Hydroelectric Project

HMGN DIRECT NET REVENUES FROM HYDROELECTRIC PROJECT

(all alues in tho sa ds of constant 1999 US$)

Cale dar Y	C pa ity	Elect ty Royalt es E e gy	T tal	HMGN Free Powe V l	HMGN ret n eq ty	Corporate I om Tax	E port Tax	N p l R Shar ng	M rig ge R g st atio Fee	P l Income T	C st m Import D t	Sale T	Lo l Taxes	Total T	Di ct f ast t e Benefits	T T of Ownership	d/ B fit N p T Flood Co t l	I g ti	Oth	Nepal share of India d/s Be efits Flood C t l	I gat o	Other	D ect HMGN Costs	D ct HMGN Net Be efits
1990														0										0
1991														0										0
1992														0										0
1993														0										0
1994														0										0
1995														0										0
1996														0										0
1997														0										0
1998														0										0
1999	0	0	0	0	0	0	0	0	0	560	434	1 372	56	2 422	0								(5 000)	(2 578)
2000	0	0	0	0	0	0	0	0		840	651	2 058	84	3 633	0								0	3 633
2001	0	0	0	0	0	0	0	0		1 120	868	2 744	112	4 844	0								0	4 844
2002	0	0	0	0	0	0	0	0		1 400	1 085	3 430	140	6 055	0								0	6 055
2003	0	0	0	0	0	0	0	0		1 120	868	2 744	112	4 844	0								0	4 844
2004	287	1 100	1 386	7 675	2 025	0	4 189	4 689		854	492	1 446	62	11 732	10 000			(3 000)	0			0	0	29 818
2005	438	1 825	2 263	12 947	1 542	0	7 114	7 960		294	58	74	6	15 506	0		33	757	7	66	1 780	0	0	34 901
2006	401	1 797	2 198	13 010	1 639	0	7 188	8 037		294	58	74	6	15 654	0		34	771	7	67	2 543	0	0	35 923
2007	367	1 770	2 137	13 074	1 735	0	7 258	8 114		294	58	74	6	15 804	0		34	786	7	68	2 593	0	0	36 239
2008	337	1 743	2 080	13 138	1 830	0	7 332	8 193		294	58	74	6	15 957	0		35	800	7	69	2 645	0	0	36 561
2009	308	1 717	2 025	13 202	1 926	0	7 407	8 273		294	58	74	6	16 111	0		35	815	7	70	2 698	0	0	36 890
2010	283	1 691	1 973	13 267	2 021	0	7 483	8 354		294	58	74	6	16 268	0		36	829	8	71	2 752	0	0	37 226
2011	259	1 665	1 924	13 332	2 115	0	7 559	8 437		294	58	74	6	16 428	0		36	844	8	72	2 807	0	0	37 567
2012	237	1 640	1 877	13 398	2 210	0	7 638	8 520		294	58	74	6	16 589	0		37	860	8	73	2 863	0	0	37 915
2013	217	1 615	1 832	13 463	2 804	0	7 717	8 605		294	58	74	6	16 753	0		37	875	8	75	2 921	0	0	38 868
2014	199	1 590	1 790	13 529	2 986	0	7 797	8 691		294	58	74	6	16 919	0		38	891	8	76	2 979	0	0	39 216
2015	183	1 566	1 749	13 596	3 069	0	7 879	8 778		294	58	74	6	17 088	0		38	907	8	77	3 039	0	0	39 570
2016	167	1 542	1 710	13 662	3 152	0	7 962	8 866		294	58	74	6	17 259	0		39	923	8	78	3 099	0	0	39 930
2017	153	1 519	1 672	13 729	4 107	0	8 046	8 956		294	58	74	6	17 433	0		40	939	8	79	3 161	0	0	41 169
2018	140	1 496	1 636	13 796	4 173	0	8 131	9 047		294	58	74	6	17 610	0		40	956	9	80	3 225	0	0	41 526
2019	1 286	7 365	8 652	13 864	2 991	27 916	8 218	9 139		294	58	74	6	45 705	0		41	973	9	82	3 289	0	0	75 605
2020	1 179	7 253	8 432	13 932	3 426	31 978	8 306	9 233		294	58	74	6	49 946	0		41	990	9	83	3 355	0	0	80 214
2021	1 080	7 143	8 223	14 000	3 474	32 425	8 395	9 328		294	58	74	6	50 580	0		42	1 007	9	84	3 422	0	0	80 841
2022	989	7 034	8 023	14 069	3 523	32 878	8 486	9 424		294	58	74	6	51 220	0		43	1 025	9	85	3 490	0	0	81 487
2023	907	6 927	7 833	14 138	3 572	33 334	8 578	9 522		294	58	74	6	51 866	0		43	1 043	9	87	3 560	0	0	82 151
2024	831	6 821	7 652	14 207	3 621	33 795	8 672	9 622		294	58	74	6	52 520	0		44	1 061	10	88	3 631	0	0	82 834
2025	761	6 717	7 478	14 277	3 671	34 260	8 767	9 723		294	58	74	6	53 181	0		45	1 079	10	89	3 704	0	0	83 533
2026	697	6 614	7 312	14 347	3 721	34 730	8 863	9 825		294	58	74	6	53 850	0		45	1 097	10	91	3 778	0	0	84 251
2027	639	6 513	7 152	14 417	3 772	35 205	8 961	9 928		294	58	74	6	54 527	0		46	1 116	10	92	3 854	0	0	84 986
2028	585	6 414	6 999	14 488	3 823	35 685	9 061	10 034		294	58	74	6	55 212	0		47	1 135	10	93	3 931	0	0	85 738
2029	536	6 318	6 852	14 559	3 875	36 171	9 162	10 141		294	58	74	6	55 905	0		47	1 154	11	95	4 009	0	0	86 508
2030			0	14 630	0	0	0	0		588				588	0	201 571	48	1 173	11	96	4 090	0	(27 596)	194 611
2031			0	14 702	0	0	0	0		588				588	0	203 744	49	1 192	11	98	4 171	0	(27 785)	196 760
2032			0	14 774	0	0	0	0		588				588	0	205 949	49	1 212	11	99	4 255	0	(28 000)	198 937
2033			0	14 846	0	0	0	0		588				588	0	208 189	50	1 232	12	100	4 340	0	(28 212)	201 146
2034			0	14 919	0	0	0	0		588				588	0	210 463	51	1 251	12	102	4 427	0	(28 429)	203 384
2035			0	14 992	0	0	0	0		588				588	0	212 772	52	1 272	12	104	4 515	0	(28 654)	205 652
2036			0	15 066	0	0	0	0		588				588	0	215 116	53	1 292	12	105	4 605	0	(28 885)	207 952
2037			0	15 140	0	0	0	0		588				588	0	217 497	53	1 312	12	107	4 698	0	(29 123)	210 284
2038			0	15 214	0	0	0	0		588				588	0	219 915	54	1 333	13	108	4 792	0	(29 368)	212 648
2039			0	15 288	0	0	0	0		588				588	0	222 370	55	1 353	13	110	4 887	0	(29 621)	215 044
2040			0	15 363	0	0	0	0		588				588	0	224 864	56	1 374	13	112	4 985	0	(29 881)	217 474
2041			0	15 439	0	0	0	0		588				588	0	227 397	57	1 395	13	113	5 085	0	(30 150)	219 936
2042			0	15 514	0	0	0	0		588				588	0	229 969	57	1 416	13	115	5 187	0	(30 426)	222 433
2043			0	15 590	0	0	0	0		588				588	0	232 581	58	1 437	0	117	5 290	0	(30 711)	224 951
2044			0	15 667	0	0	0	0		588				588	0	235 235	59	1 458	0	118	5 396	0	(31 004)	227 518
2045			0	15 744	0	0	0	0		588				588	0	237 931	60	1 479	0	120	5 504	0	(31 306)	230 120
2046			0	15 821	0	0	0	0		588				588	0	240 669	61	1 500	0	122	5 614	0	(31 617)	232 758
2047			0	15 898	0	0	0	0		588				588	0	243 450	62	1 521	0	124	5 726	0	(31 938)	235 432
2048			0	15 976	0	0	0	0		588				588	0	246 276	63	1 543	0	126	5 841	0	(32 268)	238 144
2049			0	16 055	0	0	0	0		588				588	0	249 147	64	1 564	0	128	5 958	0	(32 608)	240 893
2050			0	16 133	0	0	0	0		588				588	0	252 063	65	1 585	0	129	6 077	0	(32 959)	243 681
2051			0	16 212	0	0	0	0		588				588	0	255 026	66	1 606	0	131	6 198	0	(33 320)	246 507
2052			0	16 292	0	0	0	0		588				588	0	258 036	67	1 626	0	133	6 322	0	(33 692)	249 373
2053			0	16 372	0	0	0	0		588				588	0	261 095	68	1 647	0	135	6 449	0	(34 076)	252 278
2054			0	16 452	0	0	0	0		588				588	0	264 203	69	1 667	0	137	6 578	0	(34 470)	255 224
NPV	2,303	14,351	16,655	80,344	13,866	31,742	41,807	46,628	0	5,963	3,438	10 249	437	140 284	5 645	103 740	216	3 397	45	432	16 819	0	(18 443)	362 979

After tra sfer of ownersh p th full power be fits e credited to HMGN and O&M costs a e ass med to se to 3%

Nepal revenue sharing based on percent of energy revenue net all wheeling cha ges

Export t b sed percent of energy revenu net wheeli g ch rges to bo der

Project	West Seti
Scenario Descriptio	BASE CASE SMEC costs 100% power export at 7 3 cts/MWh ave starting price 10% Export Tax 25 year total handover with illustrative d/s benefits
Proposal Number	WS1 **Scenario Number** 1
Developer	Snowy Mountains Engineering Corporation (SMEC)

Share of Net Benefits
(all values in thousands of constant 1999 US$)

Calendar Year	HMGN Total Net Benefits	Developer after tax profits	India d/s net benefit share	Totals
1990	0		0	0
1991	0		0	0
1992	0		0	0
1993	0		0	0
1994	0		0	0
1995	0		0	0
1996	0		0	0
1997	0		0	0
1998	0		0	0
1999	(2 578)	(15 862)	0	(18 440)
2000	3 633	(23 793)	0	(20 160)
2001	4 844	(31 724)	0	(26 880)
2002	6 055	(39 655)	0	(33 600)
2003	4 844	(31 724)	0	(26 880)
2004	29 818	54 675	0	84 493
2005	34 901	41 644	2 947	79 492
2006	35 923	44 247	3 699	83 869
2007	36 239	46 839	3 741	86 818
2008	36 561	49 421	3 783	89 765
2009	36 890	51 994	3 826	92 710
2010	37 226	54 559	3 871	95 656
2011	37 567	57 117	3 917	98 601
2012	37 915	59 669	3 964	101 548
2013	38 868	78 410	4 012	121 290
2014	39 216	80 635	4 062	123 913
2015	39 570	82 864	4 113	126 547
2016	39 930	85 097	4 165	129 192
2017	41 169	110 897	4 218	156 284
2018	41 526	112 678	4 273	158 476
2019	75 605	80 757	4 329	160 691
2020	80 214	92 502	4 387	177 103
2021	80 841	93 801	4 446	179 088
2022	81 487	95 110	4 506	181 103
2023	82 151	96 431	4 568	183 150
2024	82 834	97 764	4 632	185 229
2025	83 533	99 110	4 697	187 340
2026	84 251	100 469	4 763	189 483
2027	84 986	101 843	4 832	191 660
2028	85 738	103 232	4 901	193 871
2029	86 508	104 636	4 973	196 117
2030	194 611	0	5 046	199 657
2031	196 760	0	5 121	201 880
2032	198 937	0	5 197	204 135
2033	201 146	0	5 275	206 421
2034	203 384	0	5 356	208 739
2035	205 652	0	5 438	211 090
2036	207 952	0	5 521	213 474
2037	210 284	0	5 607	215 891
2038	212 648	0	5 695	218 343
2039	215 044	0	5 784	220 829
2040	217 474	0	5 876	223 350
2041	219 936	0	5 970	225 906
2042	222 433	0	6 066	228 499
2043	224 951	0	6 164	231 115
2044	227 518	0	6 264	233 782
2045	230 120	0	6 366	236 486
2046	232 758	0	6 471	239 229
2047	235 432	0	6 578	242 010
2048	238 144	0	6 687	244 831
2049	240 893	0	6 799	247 692
2050	243 681	0	6 913	250 594
2051	246 507	0	7 029	253 536
2052	249 373	0	7 148	256 521
2053	252 278	0	7 270	259 548
2054	255 224	0	7 394	262,618
NPV	362 979	269,681	22,879	655,539
% Share	55%	41%	3%	100%

132

Project	Example Project
Scenario Description	BASE CASE - Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

Downstream Benefits - Irrigation Summary

Irrigation Inputs

Based on Reliability Factor of 75% (e g available 3 of 4 Years)

Existing Dry Weather Base Flow (cms)	300
Project Dry Weather Base Flow (cms)	800
Additional Irrigation Flow Available (cms)	500
Start Year of Project Operation	2005
Project Life (years)	50
Annual Escalation of Irrigation Benefits (%)	2 0%
Annual Escalation of O&M Costs (%)	5 0%
% of India Irrigation Benefits to Nepal	50 0%

Combined Irrigation Annual Summary for Nepal

Combination of Nepal and Nepal's share of India's downstream benefits

(Thousands 1999 US$)

Total Dry Weather Base Flow (cms)	201
Hectares of Irrigation Improvement	4000 0
Hectares of New Irrigation	1100 0
Initial Capital Investment	$3 000
Annual additional O&M costs	$40
Estimated Gross Annual Benefits	$3 290

Note Combined includes no costs and specified % of benefits for India

Nepal Irrigation Annual Summary

(Thousands 1999 US$)

Total Dry Weather Base Flow (cms)	40
Hectares of Irrigation Improvement	0 0
Hectares of New Irrigation	200 0
Initial Capital Investment	$3 000
Annual additional O&M costs	$40
Estimated Gross Annual Benefits	$797

Note All dollar values 1000*(97 US$)

India Irrigation Annual Summary

(Thousands 1999 US$)

Total Dry Weather Base Flow (cms)	161
Hectares of Irrigation Improvement	4000 0
Hectares of New Irrigation	900 0
Initial Capital Investment	$17 000
Initial Capital Investment	$1 425
Estimated Gross Annual Benefits	$4 985

Note All dollar values 1000*(97 US$)

Nepal Irrigation Results

(Thousands 1999 US$)

NEPAL

			Improvement of Existing or Development of New Irrigation Areas							PER CROP RESULTS			
	District	Scheme	Hectares New	Hectares Improved	Water Requirement cms Per Hectare	Initial Capital Improvement per 1000 Hectare	Annual Additional O&M per 1000 Hectare	Annual Differential Benefit per 1000 Hectare	Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Econ Benefit
1	One	New	200 0		0.20	$15 000	$200	$5 500	40 00	$3 000	$40	$1 100
2									0 00	$0	$0	$0
3									0 00	$0	$0	$0
4									0 00	$0	$0	$0
5									0 00	$0	$0	$0
6									0 00	$0	$0	$0
7									0 00	$0	$0	$0
8									0 00	$0	$0	$0
9									0 00	$0	$0	$0
10									0 00	$0	$0	$0
11									0 00	$0	$0	$0
12									0 00	$0	$0	$0
13									0 00	$0	$0	$0
14									0 00	$0	$0	$0
15									0 00	$0	$0	$0
16									0 00	$0	$0	$0
17									0 00	$0	$0	$0
18									0 00	$0	$0	$0
19									0 00	$0	$0	$0
20									0 00	$0	$0	$0
21									0 00	$0	$0	$0
22									0 00	$0	$0	$0
23									0 00	$0	$0	$0
24									0 00	$0	$0	$0
25									0 00	$0	$0	$0
26									0 00	$0	$0	$0
27									0 00	$0	$0	$0
28									0 00	$0	$0	$0
29									0 00	$0	$0	$0
30									0 00	$0	$0	$0
31									0 00	$0	$0	$0
32									0 00	$0	$0	$0
33									0 00	$0	$0	$0
34									0 00	$0	$0	$0
35									0 00	$0	$0	$0
36									0 00	$0	$0	$0
37									0 00	$0	$0	$0
38									0 00	$0	$0	$0
39									0 00	$0	$0	$0
40									0 00	$0	$0	$0
41									0 00	$0	$0	$0
42									0 00	$0	$0	$0
43									0 00	$0	$0	$0
44									0 00	$0	$0	$0
45									0 00	$0	$0	$0
46									0 00	$0	$0	$0
47									0 00	$0	$0	$0
48									0 00	$0	$0	$0
49									0 00	$0	$0	$0
50									0 00	$0	$0	$0
51									0 00	$0	$0	$0
52									0 00	$0	$0	$0
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54									0 00	$0	$0	$0
55									0 00	$0	$0	$0
56									0 00	$0	$0	$0
57									0 00	$0	$0	$0
58									0 00	$0	$0	$0
59									0 00	$0	$0	$0
60									0 00	$0	$0	$0
61									0 00	$0	$0	$0
62									0 00	$0	$0	$0
63									0 00	$0	$0	$0
64									0 00	$0	$0	$0
65									0 00	$0	$0	$0
66									0 00	$0	$0	$0
67									0 00	$0	$0	$0
68									0 00	$0	$0	$0
69									0 00	$0	$0	$0
70									0 00	$0	$0	$0
71									0 00	$0	$0	$0
72									0 00	$0	$0	$0
73									0 00	$0	$0	$0
74									0 00	$0	$0	$0
75									0 00	$0	$0	$0
76									0 00	$0	$0	$0
77									0 00	$0	$0	$0
78									0 00	$0	$0	$0
79									0 00	$0	$0	$0
80									0 00	$0	$0	$0
81									0 00	$0	$0	$0
82									0 00	$0	$0	$0
83									0 00	$0	$0	$0
84									0 00	$0	$0	$0
85									0 00	$0	$0	$0
86									0 00	$0	$0	$0
87									0 00	$0	$0	$0
88									0 00	$0	$0	$0
89									0 00	$0	$0	$0
90									0 00	$0	$0	$0
91									0 00	$0	$0	$0
92									0 00	$0	$0	$0
93									0 00	$0	$0	$0
94									0 00	$0	$0	$0
95									0 00	$0	$0	$0
96									0 00	$0	$0	$0
97									0 00	$0	$0	$0
98									0 00	$0	$0	$0
99									0 00	$0	$0	$0
100									0 00	$0	$0	$0

India Irrigation Results

(Thousands $1 999 US$)

INDIA

PER CROP RESULTS

Improvement of Existing or Development of New Irrigation Areas

	District	Scheme	Hectares New	Hectares Improved	Water Requirement cms Per Hectare	Initial Capital Improvement per 1000 Hectare	Annual Additional O&M per 1000 Hectare	Annual Differential Benefit per 1000 Hectare	Total Water per Crop (cms)	Total Capital Improvement per Crop	Total Annual Additional O&M	Annual Differential Econ Benefit
1	One	New	900 0		0 09	$10 000	$250	$3 000	61 00	$9 000	$225	$2 700
2	Two	Improved		2 000 0	0 02	$2 000	$300	$1 000	40 00	$4 000	$600	$2 000
3	Two	Improved		2 000 0	0 02	2000	300	1000	40 00	$4 000	$600	$2 000
4									0 00	$0	$0	$0
5									0 00	$0	$0	$0
6									0 00	$0	$0	$0
7									0 00	$0	$0	$0
8									0 00	$0	$0	$0
									0 00	$0	$0	$0
10									0 00	$0	$0	$0
11									0 00	$0	$0	$0
12									0 00	$0	$0	$0
13									0 00	$0	$0	$0
14									0 00	$0	$0	$0
15									0 00	$0	$0	$0
16									0 00	$0	$0	$0
17									0 00	$0	$0	$0
18									0 00	$0	$0	$0
19									0 00	$0	$0	$0
20									0 00	$0	$0	$0
21									0 00	$0	$0	$0
22									0 00	$0	$0	$0
23									0 00	$0	$0	$0
24									0 00	$0	$0	$0
25									0 00	$0	$0	$0
26									0 00	$0	$0	$0
27									0 00	$0	$0	$0
28									0 00	$0	$0	$0
29									0 00	$0	$0	$0
30									0 00	$0	$0	$0
31									0 00	$0	$0	$0
32									0 00	$0	$0	$0
33									0 00	$0	$0	$0
34									0 00	$0	$0	$0
35									0 00	$0	$0	$0
36									0 00	$0	$0	$0
37									0 00	$0	$0	$0
38									0 00	$0	$0	$0
39									0 00	$0	$0	$0
40									0 00	$0	$0	$0
41									0 00	$0	$0	$0
42									0 00	$0	$0	$0
43									0 00	$0	$0	$0
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73									0 00	$0	$0	$0
74									0 00	$0	$0	$0
75									0 00	$0	$0	$0
76									0 00	$0	$0	$0
77									0 00	$0	$0	$0
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79									0 00	$0	$0	$0
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88									0 00	$0	$0	$0
89									0 00	$0	$0	$0
90									0 00	$0	$0	$0
91									0 00	$0	$0	$0
92									0 00	$0	$0	$0
93									0 00	$0	$0	$0
94									0 00	$0	$0	$0
95									0 00	$0	$0	$0
96									0 00	$0	$0	$0
97									0 00	$0	$0	$0
98									0 00	$0	$0	$0
99									0 00	$0	$0	$0
100									0 00	$0	$0	$0

Project	Example Project
Scenario Description	BASE CASE Average hydrology 50% power export at 1.5 US cents/kWh starting 1 Sept 2 p 50 3 HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

Downstream Benefits - Irrigation Summary

(Thousands 1999 US$)

Year of Operation	Nepal Irrigation Benefits	India Irrigation Benefits	Total Nepal Irrigation Benefits
2004	($3 000)	$0	($3 000)
2005	$757	$3 560	$2 538
2006	$771	$5 085	$3 314
2007	$786	$5 187	$3 379
2008	$800	$5 291	$3 445
2009	$815	$5 396	$3 513
2010	$829	$5 504	$3 582
2011	$844	$5 614	$3 652
2012	$860	$5 727	$3 723
2013	$875	$5 841	$3 796
2014	$891	$5 958	$3 870
2015	$907	$6 077	$3 945
2016	$923	$6 199	$4 022
2017	$939	$6 323	$4 101
2018	$956	$6 449	$4 181
2019	$973	$6 578	$4 262
2020	$990	$6 710	$4 345
2021	$1 007	$6 844	$4 429
2022	$1 025	$6 981	$4 515
2023	$1 043	$7 120	$4 603
2024	$1 061	$7 263	$4 692
2025	$1 079	$7 408	$4 783
2026	$1 097	$7 556	$4 875
2027	$1 116	$7 707	$4 969
2028	$1 135	$7 861	$5 065
2029	$1 154	$8 019	$5 163
2030	$1 173	$8 179	$5 262
2031	$1 192	$8 343	$5 364
2032	$1 212	$8 510	$5 467
2033	$1 232	$8 680	$5 571
2034	$1 251	$8 853	$5 678
2035	$1 272	$9 030	$5 787
2036	$1 292	$9 211	$5 897
2037	$1 312	$9 395	$6 010
2038	$1 333	$9 583	$6 124
2039	$1 353	$9 775	$6 241
2040	$1 374	$9 970	$6 359
2041	$1 395	$10 170	$6 480
2042	$1 416	$10 373	$6 602
2043	$1 437	$10 580	$6 727
2044	$1 458	$10 792	$6 854
2045	$1 479	$11 008	$6 983
2046	$1 500	$11 228	$7 114
2047	$1 521	$11 453	$7 248
2048	$1 543	$11 682	$7 383
2049	$1 564	$11 915	$7 521
2050	$1 585	$12 154	$7 661
2051	$1 606	$12 397	$7 804
2052	$1 626	$12 645	$7 949
2053	$1 647	$12 898	$8 096
2054	$1 667	$13 156	$8 245

Project	Example Project
Scenario Description	BASE CASE Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

Downstream Benfits - Flood Management Summary

Flood Frequency and Damage Assessment Inputs

(Thousands 1999 US$)

Without Project Development					Project	Project
Flood Return Period (years)	Flood Peak Q (cms)	Flood Duration (days)	Flood Damages Estimate	Percent of Flood Damages in Nepal	Flood Storage (mcm)	Flood Attenuation (cms)
50	8 000	2	20 000	20%	115	1 331
100	10 000	2	25 000	20%	115	1 331
200	12 000	2	32 500	20%	115	1 331
500	14 000	3	40 000	20%	115	887
1000	18 000	3	80 000	20%	115	887
2000	20 000	3	100 000	20%	115	887
10000	26 000	3	120 000	20%	115	887

Year of Operation	Nepal Flood Benefits	India Flood Benefits	Total Nepal Flood Benefits
	(Thousands	1999	US$)
2005	$33	$132	$99
2006	$34	$134	$101
2007	$34	$136	$102
2008	$35	$138	$104
2009	$35	$141	$105
2010	$36	$143	$107
2011	$36	$145	$109
2012	$37	$147	$110
2013	$37	$149	$112
2014	$38	$151	$114
2015	$38	$154	$115
2016	$39	$156	$117
2017	$40	$158	$119
2018	$40	$161	$121
2019	$41	$163	$122
2020	$41	$166	$124
2021	$42	$168	$126
2022	$43	$171	$128
2023	$43	$173	$130
2024	$44	$176	$132
2025	$45	$178	$134
2026	$45	$181	$136
2027	$46	$184	$138
2028	$47	$187	$140
2029	$47	$189	$142
2030	$48	$192	$144
2031	$49	$195	$146
2032	$49	$198	$148
2033	$50	$201	$151
2034	$51	$204	$153
2035	$52	$207	$155
2036	$53	$210	$158
2037	$53	$213	$160
2038	$54	$216	$162
2039	$55	$220	$165
2040	$56	$223	$167
2041	$57	$226	$170
2042	$57	$230	$172
2043	$58	$233	$175
2044	$59	$237	$178
2045	$60	$240	$180
2046	$61	$244	$183
2047	$62	$248	$186
2048	$63	$251	$188
2049	$64	$255	$191
2050	$65	$259	$194
2051	$66	$263	$197
2052	$67	$267	$200
2053	$68	$271	$203
2054	$69	$275	$206

Project	Example Project
Scenario Description	BASE CASE Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25 % corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

NEPAL EXPORT OF POWER SIMULATION MODEL (NEPSIM)
Sensitivity Analysis
Impact of changing an input on a specific output
(% change from the Base Case assuming everything else remains unchanged)

Input Variables	Degree of Variation	%change HMGN Net Benefits	Developer Return on Equity
Base Case		362,979	25 7%
Project Variables			
Energy	10%	7 4%	28 1%
	-10%	7 4%	23 1%
Project Capital and O&M Costs	20%	1 1%	21 8%
	20%	1.2%	30 7%
Project Implementation Delay	1 year	9 1%	25 7%
	5 years	37 9%	25 7%
	10 years	-61 4%	25 7 %
Transfer of ownership (from 25 years to)	25	0 0%	25 7%
	30	-6 0%	25 7%
	40	12 5%	25 8%
	50	15 3%	25 8%
Tax Variables			
HMGN total taxes and charges	20%	7 9%	24 3%
	-20%	-8 1%	27 1%
Corporate Tax holiday (years)	15	0 0%	25 7%
	7	9 3%	24 7%
	0	19 5%	21 7%
Water Royalties			
Capacity charge	20%	0 1%	25 7%
	20%	-0 1%	25 7%
Energy charge	20%	0 7%	25 6%
	20%	0 7%	25 8%
Downstream Benefits			
Nepal Downstream Benefits	without	1 0%	25 7%
HMGN Share of Indian Downstream Benefits	without	-4 8%	25 7%
Nepal and HMGN Share of Indian D/S B	without	5 8%	25 7 %
Financial Variables			
Average Cost of Debt	20%	0 2%	24 4%
	20%	0 2%	26 9%
NPV Discount Rate (from 10% to)	8%	55 3%	25 7%
	12%	31 3%	25 7%
Electricity Tariff Variables			
Nepal Average Power Price	20%	5 0%	25 7%
	20%	5 0%	25 7%
Nepal Tariff (Base escalation changed by)	1 5%	8 5%	25 7%
	1 5%	5 9%	25 7%
Export Average Power Price	20%	8 4%	29 7%
(Paid in US$)	20%	8 4%	21 3%
Export Tariff (Base escalation changed by)	1.5%	19 8%	29 2%
(Paid in US$)	1.5%	12 5%	22 3%
Export Average Power Price	20 0%	5 7%	28 2%
(Paid in IRs)	20 0%	5 7%	23 0%
Export Tariff (Base escalation changed by)	1 0%	9 0 %	27 1%
(Paid in IRs)	1 0%	-6 6 %	24 3%

Impact of a Change in HMGN Taxes and Charges

	Developer Return on Equity
+20 % Taxes and Charges with Tariffs unchanged	24 3%
20 / Taxes and Charges with Tariffs unchanged	27 1%
	First Year Average Tariff (c/kWh)
Base Case	8 4
+20% Taxes and Charges with Developer Return on Equity unchanged	8 6
20% Taxes and Charges with Developer Return on Equity unchanged	8 1

Thousands of 1999 US$

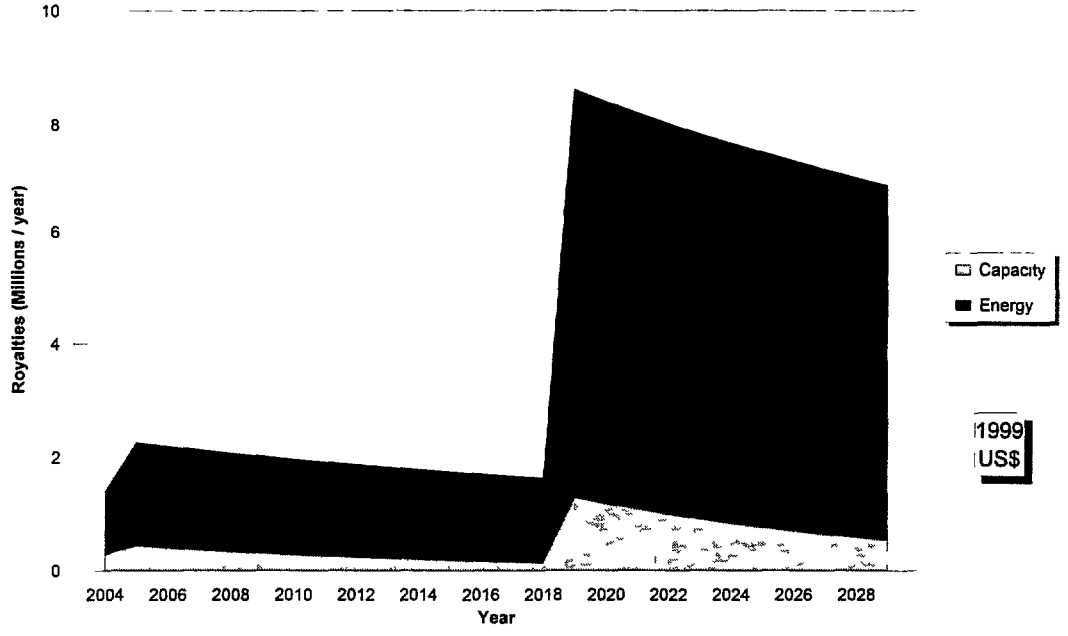
Project Example Project

Scenario Description BASE CASE - Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation

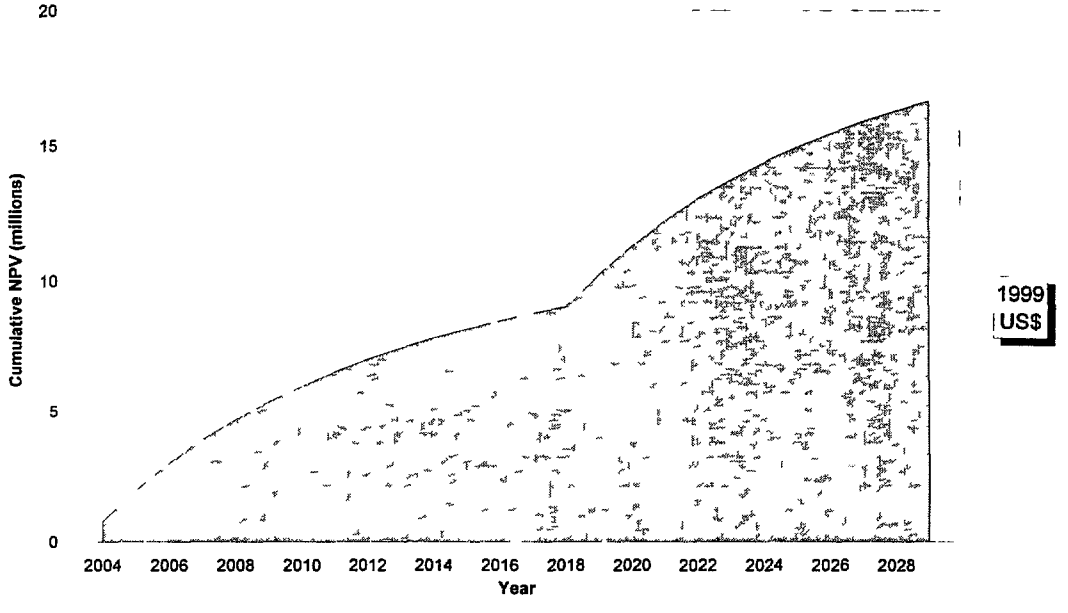
Proposal Number EX1 **Scenario Number** 1

Developer Nepal Power International

ELECTRICITY ROYALTY GROWTH PATTERN



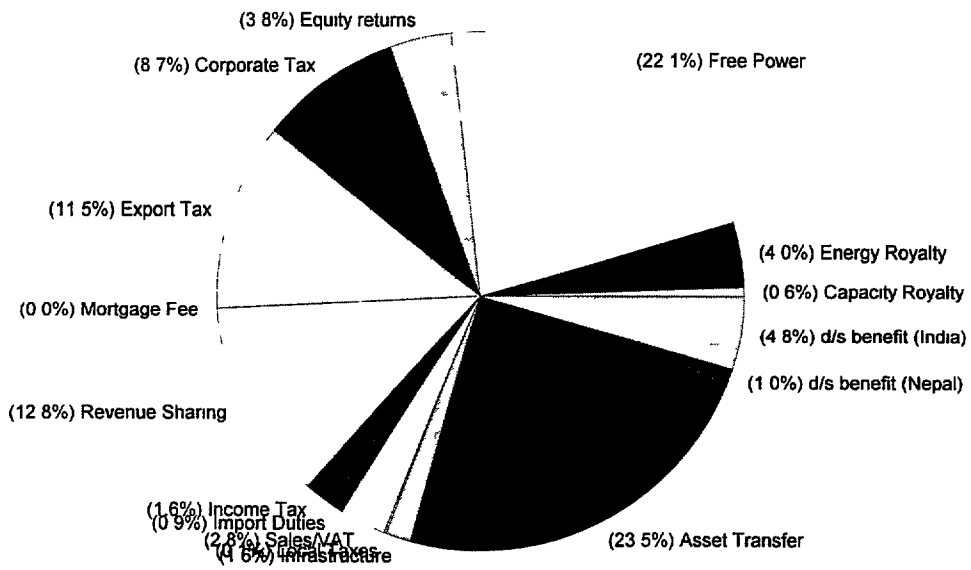
CUMULATIVE NPV OF ELECTRICITY ROYALTIES



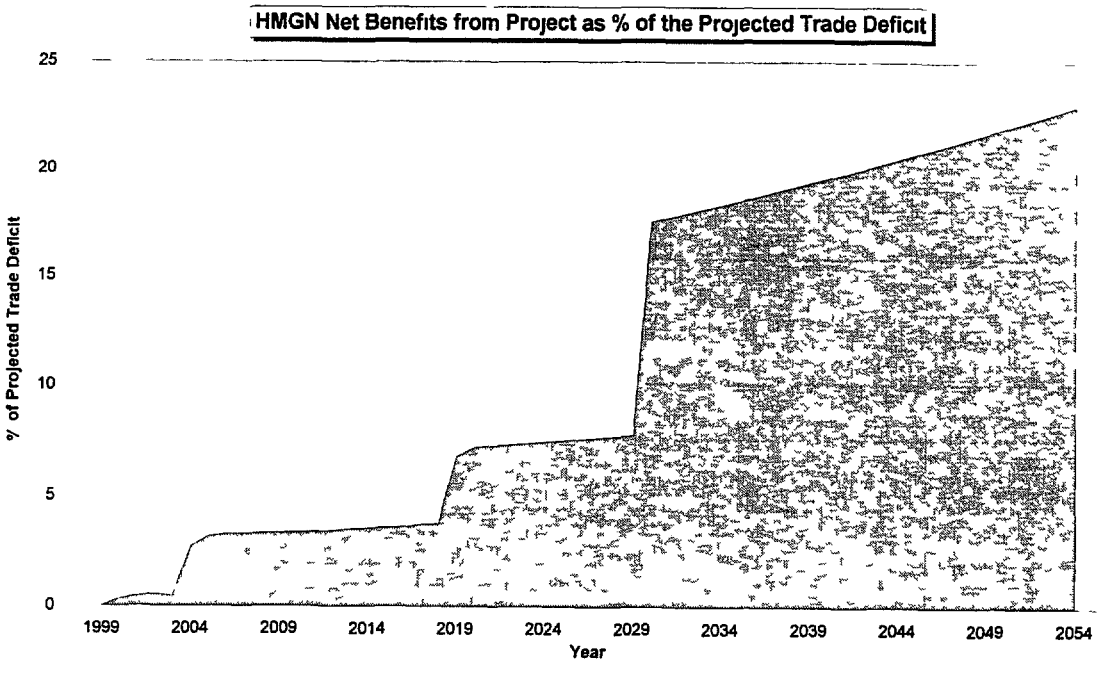
Project	Example Project
Scenario Description	BASE CASE Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation
Proposal Number	EX1 **Scenario Number** 1
Developer	Nepal Power International

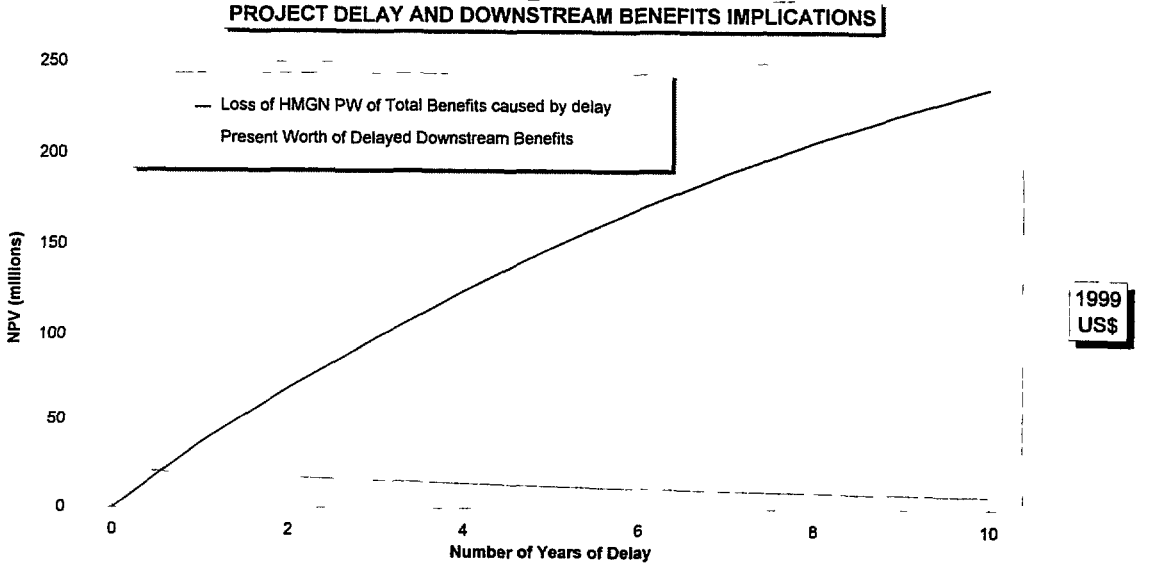
GOVERNMENT REVENUES PATTERN
Prior to Ownership Transfer

PRESENT VALUE SHARE OF GOVERNMENT BENEFITS



Scenario Description	BASE CASE - Average hydrology 90% power export at 7 00 cts/kWh starting firm export price 5% HMGN revenue share 14% VAT 5% Export Tax 25% corporate tax after 15 years total handover after 25 full years of operation		
Proposal Number	EX1	**Scenario Number**	1
Developer	Nepal Power International		





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Appendix C

Typical Project Taxation Assumptions
As NEPSIM Input Assumptions

CAPITAL COSTS (showing effective Tax % of project capital cost)

Tax Category	Rate %	Labour		Equipmt & Materials		Consumable Matls		Totals
		Foreign	Local	Foreign	Local	Foreign	Local	
Weighting		***16%***	***8%***	***55%***	***5%***	***7%***	***9%***	***100%***
Personal Income Tax	***10%***		0 80%					0 80%
Customs and Import Duties	***1%***			0 55%		0 07%		0 62%
Sales Tax or VAT	***14%***				0 70%		1 26%	1 96%
Local Taxes	***0 10%***			0 06%	0 01%	0 01%	0 01%	0 08%
							Total	3 46%

OPERATING COST (showing effective Tax % of project operating cost)

Tax Category	Rate %	Labour		Equipmt & Materials		Totals
		Foreign	Local	Foreign	Local	
Weighting		***12%***	***28%***	***55%***	***5%***	***100%***
Personal Income Tax	***10%***		2 80%			2 80%
Customs and Import Duties	***1%***			0 55%		0 55%
Sales Tax or VAT	***14%***				0 70%	0 70%
Local Taxes	***0 10%***			0 06%	0 01%	0 06%
					Total	4 11%

Note Assume that O&M costs are 1 5%/year of project capital costs

OPERATING REVENUES

	Rate %	Tax Holiday
Corporate Income Tax		
Generation Projects	25%	15 years
Transmission Projects	25%	10 years
Distribution Projects	25%	5 years
Operating Contracts	25%	5 years
Export Tax/Sales Tax	?	

Notes Corporate Income Tax applied to Developer Net Profit Before Tax
Export Tax or Sales Tax applied to Export Price

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Appendix D

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