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Economic Policy Co-ordinating Committee (EPCC)

Abuja, Federal Republic of Nigeria

NATURAL GAS FISCAL REGIMES

Presentation

Presented by:

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Topics

- Natural Gas Characteristics
- Current Natural Gas Situation in Nigeria
- The Economic Value of Natural Gas
- Gas Flaring in Nigeria
- Theory of Oil and Gas Tax Impacts
- Nigerian Tax Regime for Gas Production and Use
- Tax Regimes in Other Countries
- Some Preliminary Comparisons
- Analyzing Tax Incentives
- Conclusions
- Some References
- Glossary of Selected Terms
- Questions and Answers

Natural Gas Characteristics

Some Definitions

- Gaseous form of petroleum occurring underground
  - Can be onshore or offshore
- Mostly methane – CH_4
- Contains other hydrocarbons – natural gas liquids or NGLs
  - Ethane – C_2H_6 – C2s
  - Propane – C_3H_8 – C3s } Liquid petroleum gas - LPG
  - Butane – C_4H_{10} – C4s } Liquid petroleum gas - LPG
  - Pentanes – C_5H_{12} - and higher– C5s plus – natural gasoline
- Usually contains other impurities when produced
  - Water
  - Sulfur – usually in the form of H_2S (sour gas)
  - Nitrogen
  - Carbon dioxide – CO_2
  - Must be removed prior to transporting in a pipeline

Types of Natural Gas

- Associated gas or solution gas
  - Dissolved in solution with the oil in a reservoir
  - Onshore or offshore
  - Must be produced to produce the oil
  - Must be separated, treated, compressed and transported in order to use
  - Often flared or vented
- Non-associated gas or free gas
  - Occurring in a reservoir that is separate from the oil
  - Onshore or offshore
  - May still include NGLs or condensates
  - Must be treated, compressed (if necessary) and transported
- Wet gas
  - High concentrations of NGLs
  - Must be removed prior to use by end-users
  - Valuable by-products – ethane, LPG, natural gasoline
  - Can be onshore, offshore, associated or non-associated gas

Units and Conversions

Units

- ft^3 or cf = cubic foot
- scf = standard cubic foot (60^0F; 14.73 psia)
- Mcf = thousand cubic feet
- MMcf = million cubic feet
- Bcf = billion cubic feet
- Tcf = trillion cubic feet, or Ts
- d = day, as in MMcfd
- m^3 (or cm) = cubic meter
- MT = metric tons
- BOE = barrel of oil equivalent
- MMBtu = million British thermal units
- Kcal = kilocalories
- J = joules
- Kj = kilojoules
- Gj = gigajoules

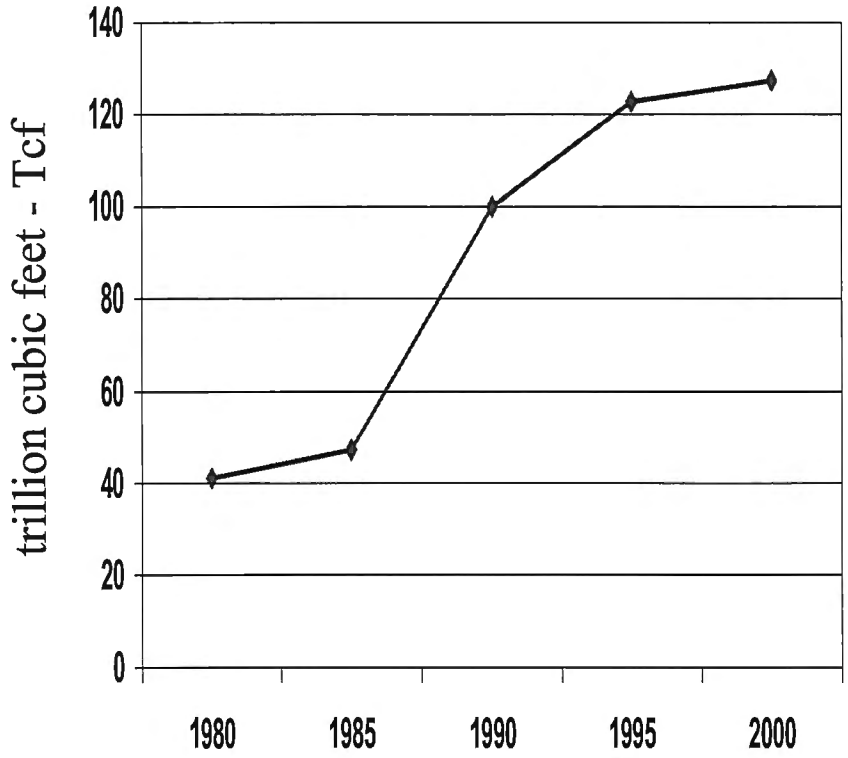
Conversions

- 1 scf gas = 1047 Btu (Nigeria)
- 1 Mcf gas ≈ 1 MMBtu
- 1 m^3 = 35.315 cf
- 1 m^3 = 9300 Kcal
- 1 Kcal = 3.968 Btu
- 1 MT LNG = 48.7 Mcf gas
- 1 MT LNG = 1,346 m^3 gas
- 1 BOE = 5.62 Mcf gas (Nigeria)
- 1 Mcf gas = 0.178 BOE (Nigeria)

Useful sites: www.eia.doe.gov/index.html ; www.ex.ac.uk/cimt/dictunit/dictunit.htm

Current Nigerian Gas Situation

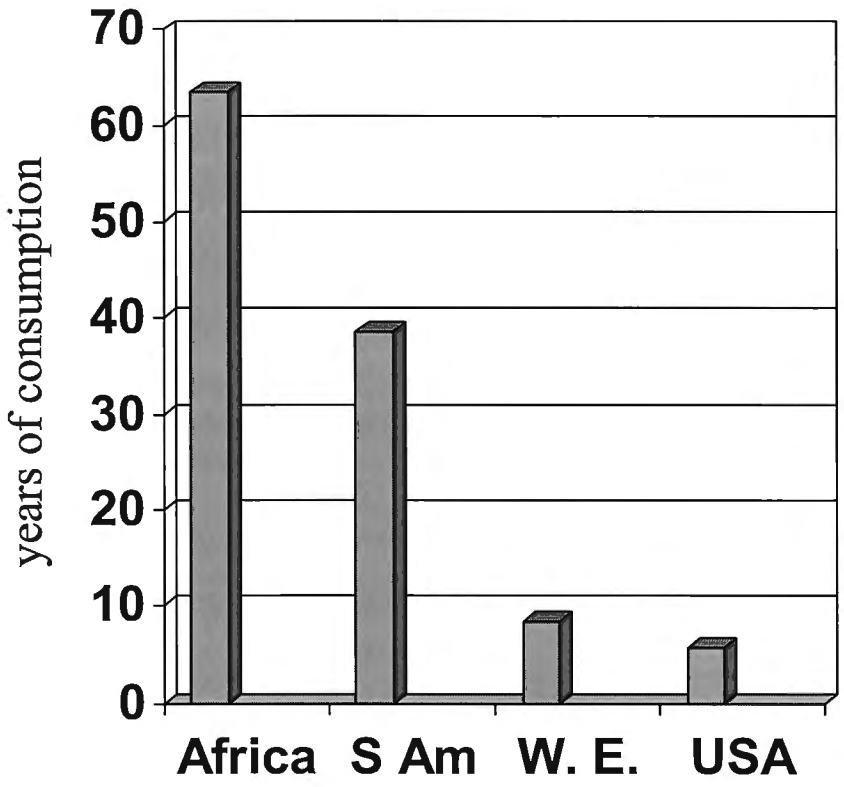
Gas Reserves in Nigeria



Key points

- About 127 Tcf in 2000
- Increased over 300 percent
- Big increase accompanies big increase in oil reserves
- About one-half is associated
- There is probably twice as much gas reserves

Gas Reserves in Perspective – Year 2000

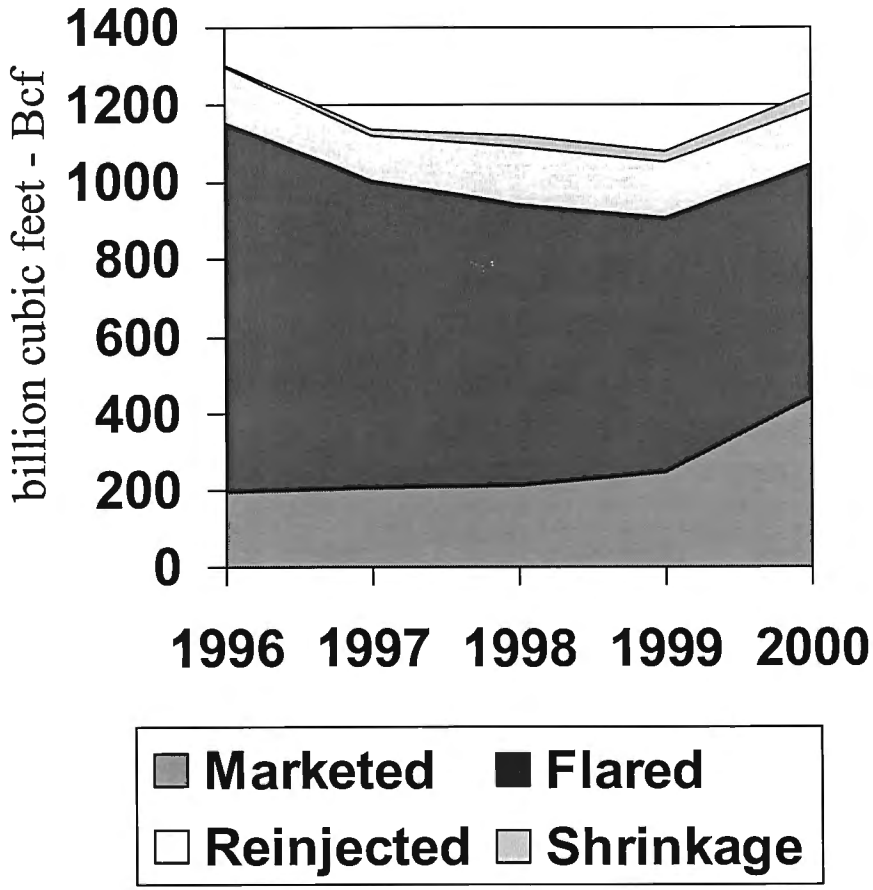


Source: OPEC and US DoE

Key points

- Could supply all African consumption for over 63 years
- Supply all of Central and South America for almost 39 years
- Could supply all of Western Europe for almost 8.5 years
- Could provide 5.6 years of gas consumption in USA – the world's largest gas-consuming country
- Nigeria is a gas surplus country

Gas Production – 1996 - 2000

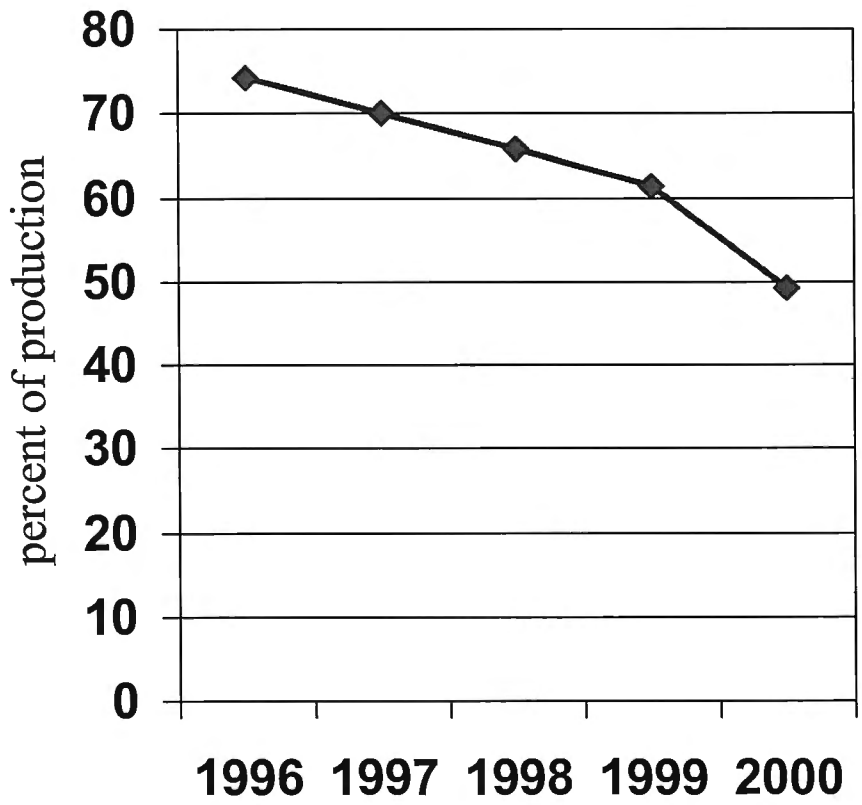


Source: OPEC

Major trends

- Total production tends to track oil production
- Increase in marketed gas in 2000 is primarily start-up of NLNG at end 1999
- After making some progress in reducing flaring, little progress was made in 2000 volume
- Very little change in amounts of reinjected gas
- Increased shrinkage is result of gas processing increases
- In 2000 the R/P equaled almost 104 years

Flared Production



Source: OPEC

Important trends

- Decreased over the time period
- But volume was nearly the same in 1999 and 2000
- Decrease in 2000 percentage is a result of increase in non-associated gas production
- The year 2000 trend may continue in the future

Current Internal Consumption

- Mostly non-associated gas – about 35 percent of production
- Supplied by National Gas Corporation (NGC), Shell and GASLINK
- NEPA – gas-fired power plants
- Steel – Delta, Ajaokuta
- Fertilizer – NAFCON
- Other industry
  - International Glass
  - ABA Textile Mills
  - Nigerian Breweries
  - Warri Refinery
  - Agbara-Ota Gas Supply Project – Shell Nigeria Gas
  - Others
- Domestic – cooking and water heating

Gas Export Projects

- Nigeria Liquefied Natural Gas Corp. – NLNG
  - Sometimes called Bonny LNG
  - NNPC, Shell, TotalFinaElf and Agip
  - Liquefied by cooling and pressure
  - Denser – cheaper to transport by ship
  - Start-up in late 1999
  - NGLs precipitate out – good by-product
  - Trains 1 and 2 use non-associated gas – about 252 Bcf per year
  - Planned train 3 will use associated gas – about 131 Bcf per year
- West Africa Gas Pipeline – WAGP
  - Offshore pipeline
  - Gas exports to Benin, Togo and Ghana
  - Fed by Escravos-to-Lagos Pipeline System (ELPS)
  - NNPC, Shell, ChevronTexaco
  - Associated and non-associated gas – about 47 Bcf per year (144 Bcf capacity)
  - Scheduled to start in 2006

Future Export Projects

- West Niger Delta LNG
  - ChevronTexaco, Conoco and ExxonMobil
  - MOU for feasibility study signed February 2001
  - Expected onstream by 2008
  - About 550 Bcf per year
  - Associated gas
- Brass River LNG Plant
  - Phillips and Agip
  - World's first offshore LNG plant
  - MOU signed in September 2001
  - About 310 Bcf per year
  - Expected onstream by 2004 (?)
  - Associated gas
- Escravos Gas-to-liquids Plant (EGTL)
  - ChevronTexaco and SASOL technologies
  - About 35,000 BPD of diesel, kerosene, jet fuel and naphtha
  - Sulfur and particulate free
  - Scheduled onstream by 2005 (?)

Future Internal Projects

- Ajaokuta-Abuja-Kaduna-Kano pipeline
  - Serves NEPA, industrial and domestic markets
  - First gas availability in northern Nigeria
- Aba-Enugu-Bboko pipeline
  - Serves industrial markets
- Gaslink Nigeria Limited
  - Possible expansion to 150 more industrial customers
  - Possible power plants
  - Possible 150,000 domestic/commercial customers
    - Cooking and water heating

Current Market Prices in Nigeria

- NEPA – $0.10-0.12/Mcf (N12.94/Mcf)
- IPP - $0.43/MMbtu
- Some industrial users – $0.50/Mcf
- WAGP – US$0.50/Mcf plus US$0.25/Mcf for transportation
- "Commercial" – $1.54-1.91/Mcf (N194.0-210.0/Mcf) – competing fuel price

Market Prices in Some Other Countries

- United States in year 2000:
  - Households: $7.76/Mcf
  - Commercial: $6.59/Mcf
  - Industrial: $4.48/Mcf
  - Wellhead price: $3.68
  - Gas transmission: about $0.80/Mcf
- Argentina in year 1999:
  - Households: $5.34/MMBtu
  - Industry: $3.18/MMBtu
  - Field price: $0.91-1.46/MMBtu
- Trinidad and Tobago in year 1999:
  - Industry: $1.02/MMBtu
  - Power plants: $1.02/MMBtu

On the Economic Value of Natural Gas

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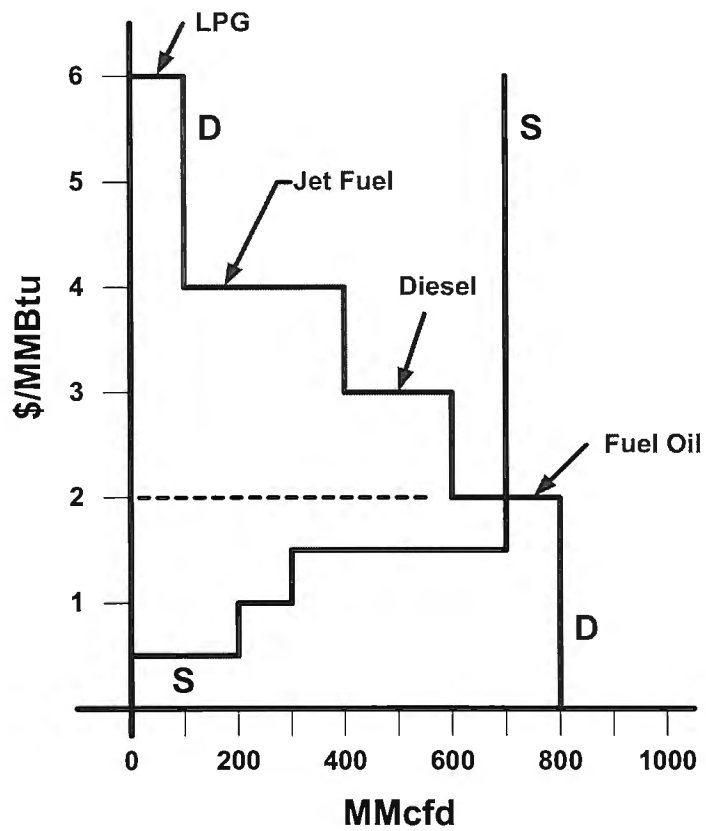
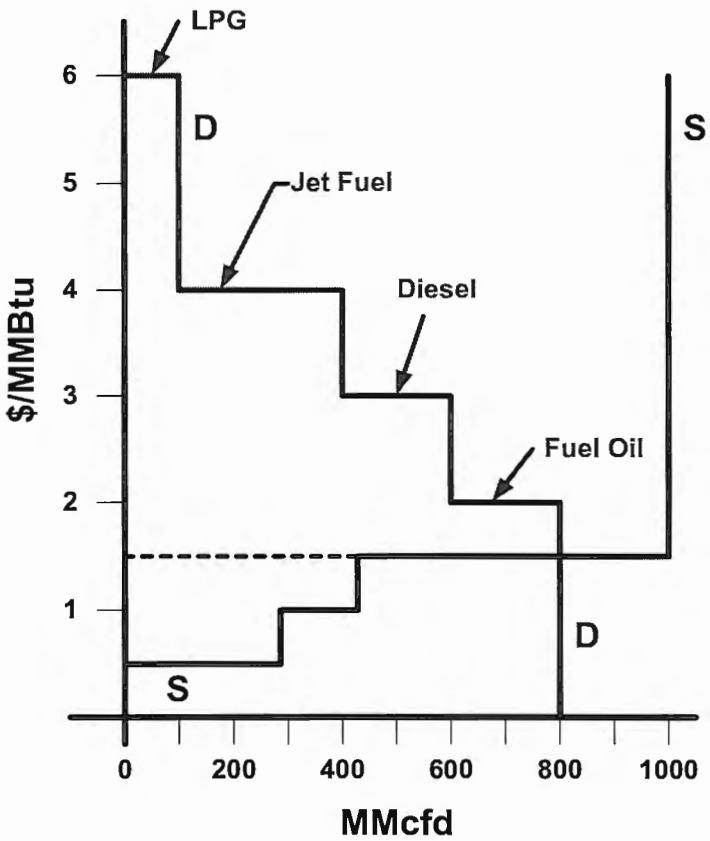
Economic Market Price of Gas – Excess Demand



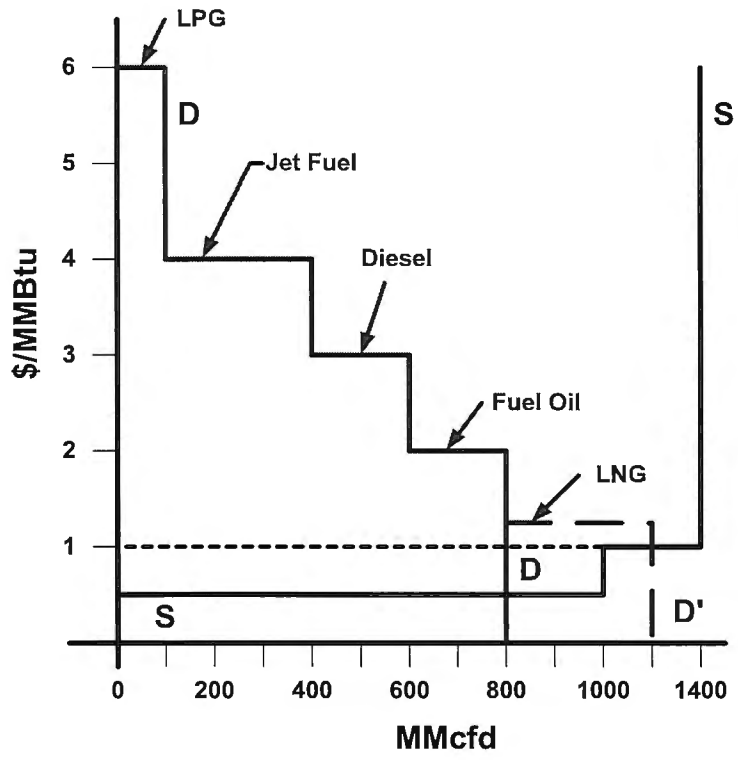
- **Demand**
  - Alternate fuels
    - Glass plant uses LPG
    - Peaking power plants use jet
    - Industry using diesel
    - Industry using fuel oil
  - Total demand is 800 MMcfd
- **Supply**
  - 200 MMcfd at $0.5/MMBtu
  - Another 100 MMcfd at $1/MMBtu
  - Another 400 MMcfd at $1.50/MMBtu
  - Total supply is 700 MMcfd
  - Includes transportation costs
- **Equilibrium price is $2.00/MMcfd**

Economic Market Price of Gas – Excess Supply



- **Demand**
  - Same as before
  - Total demand is 800 MMcfd
- **Supply**
  - An additional 300 MMcfd of gas is developed at $1.50/MMBtu
  - Total supply is 1000 MMcfd
  - Includes transportation costs
- **Price is about $1.50/MMBtu**

Economic Market Price of Gas – With Exports



- Same original demand as before – 800 MMcfd total (DD)
- A total of 1000 MMcfd available at $0.50/MMBtu – e.g. non-associated gas
- Another 400 MMcfd available at $1.00/MMBtu – e.g. associated gas
- Total supply is 1400 MMcfd
- An LNG export market is found at an FOB price of $1.25/MMBtu (DD')
- All of non-associated gas is sold and some of the associated gas is sold
- Price increases from $0.50/MMBtu to $1.00/MMBtu

Economic Market Price of Gas – Summary

- In an excess demand market the price is the equivalent of the marginal alternative fuel displaced by the natural gas
- In an excess supply market the price tends toward the price offered by the lowest cost marginal producer
- These two cases define the bounds of the market price of natural gas in a competitive market
- In an excess supply market gas resource owners have an over-whelming incentive to find viable export markets
- The examples include transportation costs from the field to the internal markets in question and just the FOB price for the exports; that is, the in-country market prices are shown
- The depletion cost, or premium, of a non-renewable resource is not included

Value of Gas to the Producer

- The concept of netback to the field
- Start with the market price
- Less
  - Transportation costs to market – transmission and distribution
  - Gas processing costs – remove NGLs and liquefy as required
  - Gas gathering costs
  - Gas treating costs – remove impurities
  - Gas production costs – including separating associated gas
  - Amortized exploration and development costs
  - All taxes
- Equals netback to the field or the producer's value of gas

Natural Gas is Not the Same as Crude Oil

- Crude Oil
  - Crude oil is a derived demand
  - Price is driven by the price of high-value motor gasoline and the ability of producers (OPEC) to restrict supply and increase the price
  - May 2002 price of OPEC basket was $24.76/b or about $4.23/MMBtu
  - Cost to the dock is about $5/b or about $0.85/MMBtu
  - Leaves about $19.76/b or some $3.37/MMBtu of windfall profit or economic rent that can be taxed away
- Natural gas
  - A competitive fuel
  - Price is usually heat content equivalent of fuel oil or residual oil – alternate fuel price
  - About the price of crude oil or about $3.85/MMBtu
  - Less about $0.85-$1.00/MMBtu to get to market
  - Less producers' costs of about $1.50/MMBtu (non-associated)
  - Leaves about $1.00-$1.50/MMBtu of economic rent that can be taxed away
  - Cannot be treated just like oil – less rent to play with

Gas Flaring in Nigeria

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Flaring Costs

- Environmental costs
  - Direct
    - CO_2, NO_x and SO_x
    - Smoke
    - Light
  - Indirect
    - Use of "dirtier" alternate fuels
- Larger energy bill for country
- Reserves not monetized
- Lower employment, national income and so on
- Foregone tax revenue
- Economic value of gas is zero

Why Gas Flaring?

- Associated production
  - Must be produced to obtain oil
- Lack of viable markets
- Lack of infrastructure
- Low prices
  - Circular
- Producer avoids investment and operating costs
  - Separating
  - Processing
  - Compression
  - Transportation to markets
  - Especially expensive for: offshore fields and small fields
- Penalty of N10/Mcf or $0.09/Mcf versus costs of about 2-3 times penalty (non-Nigerian costs)

What are the Alternatives?

- Larger penalties
  - Less attractive investment climate for Nigerian oil sector
- Prohibitions or laws against flaring
  - Reduction in oil production
  - Concomitant loss of income and tax revenue for Nigeria
- Increased markets for gas
  - Within Nigeria
    - Limited opportunities
    - No space heating market
  - Exports
    - Limited by economics to low netback for gas
- Tax Incentives
  - Reduces costs
  - Improves project economics
  - Allows greater netback or value for gas reserves

Theory of Impacts of Oil and Gas Taxes

Justification for Taxes

- Tax away the rent
  - Theory says can tax away all the rent and not affect production
  - Hard to determine the actual rent involved
  - Difficult to do in an optimal way
- Legal/philosophical reasons
  - Oil and gas under the land (often public land) and government is the rightful owner in trust for the people who elect them
- Practical reasons
  - A lot of money at stake – large economic rents
  - Government needs revenue
  - Tax the foreigners or foreign companies

General Types of Taxes

- Typical types of E&P taxes, usually on oil, but also on gas
  - License Fees
    - Rental value of the site to which it applies
  - Royalties
    - Taxes on gross revenues
    - Widely applied
  - Profit Taxes
    - Levied on earnings before taxes (EBT)
  - Resource Rent Tax
    - Tax on profits after all investment costs have been paid off
    - "Tax away the rent"
- Production sharing contracts (PSCs) or agreements (PSAs)
  - Government takes oil and/or gas instead of, or in addition to, payment of other taxes
  - No up-front or recurring government costs except administration
  - A form of profit tax
- Corporate income tax
  - Tax on company earnings after other taxes
- Many other taxes

License Fees

- Company makes extra profit if it retains any share of the rent
- Company must be high bidder to win
  - Lots of uncertainty
  - Large sums of money
  - May have to borrow to pay license fee
- Company will bid less than expected profit
  - Not a very effective way to get the rent
  - Exposes company to very high risks
- Problem of asymmetry of information
  - Timing is important
- Problem of winner's curse
  - Won the bid
  - Went bankrupt

Royalties

- Levied on gross revenue
- May make some pre-tax profitable fields unprofitable fields
- May cause some fields to be shut down too early
  - Revenue is above operating costs pre-royalty
  - Revenue less costs less royalty is a loss
- As a result there may be less than optimal extraction of the resource
- One government advantage is tax revenue even if resource extraction is not that profitable
- Also, tax revenue starts early in a profitable project
- Considered a regressive tax

Profit Taxes

- Should prevent problems of not developing or operating profitable fields
- Considered a more progressive tax
- But it doesn't always do that
- Problem is in depreciation allowance
- Or inadequate definition of profits
- We will analyze the profit tax
- Illustrates some important points

Profit Tax Analysis

$$\pi = PV = -K + \sum_{t=1}^{T} \frac{R_t}{(1+r)^t}$$

but if PV=0; $\sum_{t=1}^{T} \frac{R_t}{(1+r)^t} = K$

add a profits tax, s

$$PV = -K + \sum_{t=1}^{T} \left[R_t - s(R_t - K/T)\right](1+r)^{-t}$$

for breakeven:

$$PV = 0 = -K + \sum_{t=1}^{T} \frac{R_t}{(1+r)^t} - s\sum_{t=1}^{T} \frac{R_t}{(1+r)^t} + s\frac{K}{T}\sum_{t=1}^{T} \frac{1}{(1+r)^t}$$

but $\sum_{t=1}^{T} \frac{R_t}{(1+r)^t} = K$

$$s\sum_{t=1}^{T} \frac{R_t}{(1+r)^t} = s\frac{K}{T}\sum_{t=1}^{T} \frac{1}{(1+r)^t}$$

$$\sum_{t=1}^{T} \frac{1}{(1+r)^t} \neq T$$

$$sK \neq s\frac{K}{T}\sum_{t=1}^{T} \frac{1}{(1+r)^t}$$

- Profit, π, = PV of investment, K, spent at beginning of project plus stream of revenue, net of operating costs, discounted at r for life of investment, T
- If breakeven: K=discounted net revenue stream
- Add a profit tax, s
- Profit tax makes breakeven projects unprofitable
- May make barely profitable projects unprofitable
- A problem with all profit taxes
- Solution: adjust the tax depreciation; that is, use a capital uplift or tax incentive
- Problem is how much tax incentive

Further Profit Tax Analysis

From the previous analysis

$$PV = 0 = -s\sum_{t=1}^{T}\frac{R_t}{(1+r)^t} + s\frac{K}{T}\sum_{t=1}^{T}\frac{1}{(1+r)^t}$$

$$s\sum_{t=1}^{T}\frac{R_t}{(1+r)^t} \neq s\frac{K}{T}\sum_{t=1}^{T}\frac{1}{(1+r)^t}$$

But with tax incentive

$$s\sum_{t=1}^{T}\frac{R_t}{(1+r)^t} = s\frac{K}{T-x}\sum_{t=1}^{T-x}\frac{1}{(1+r)^t}$$

$$1 - s\sum_{t=1}^{T}\frac{R_t}{(1+r)^t} = 1 - s\left[\frac{K}{T-x}\right]\sum_{t=1}^{T}\frac{1}{(1+r)^t}$$

$$s_r = 1 - s\sum_{t=1}^{T}\frac{R_t}{(1+r)^t}$$

$$s_k = 1 - s\left[\frac{K}{T-x}\right]\sum_{t=1}^{T}\frac{1}{(1+r)^t}$$

$$s_r = s_k$$

- From the previous analysis we showed that a profit tax would distort the economics of a project
- But we can accelerate the depreciation or offer a tax incentive to make the equality hold
- Let s_r=the company's share of its revenue less operating costs, and s_k=the share that the company pays of its investment costs
- Then we have the important result s_r=s_k
- A tax system will not distort the allocation of resources if the post-tax income the company gets from a marginal investment is equal to the share that the company pays of that investment cost.
- Adjusting the uplift, or accelerating depreciation, can also make a project more attractive for a company
- This is an important result

Profit Tax Summary

- Any tax on profits may result in a poor allocation of resources
  - May make breakeven projects unprofitable
  - May make barely profitable projects unprofitable
- Must have accelerated depreciation, or tax incentive, to be optimal
- General Rule: A profit tax will not distort resource allocation if the company's after-tax income from an investment equals the company's share of the investment cost of the project.
- There are still issues of defining the company's discount rate
- Capital uplifts, or accelerated depreciation, can also be used to make profitable projects out of unprofitable projects

Resource Rent Tax

- Supposedly a neutral tax
- Companies make the present value of their depreciation allowance equal to their investment
- Company must eventually make a profit
- Takes a long time
- May not happen
- Best description is an example used by Garnaut and Ross

Example Resource Rent Tax

Year	Investment	Net Revenue	Accumu-lated Loss	Profit	Tax (50%)
1	100		100		
2	100		210		
3	100		331		
4		50	314		
5		50	296		
6		50	275		
7		50	253		
8		50	228		
9		50	201		
10		50	171		
11		50	138		
12		50	102		
13		50	62		
14		50	18		
15		50		30	15
16		50		50	25
17		50		50	25
18		50		50	25
19		50		50	25
20		50		50	25

- 20-year project
- r=10 percent
- Three-year investment
- Revenue starts year 4
- Investment carried forward at 10 percent
- Tax rate is 50 percent
- Takes 15 years to get tax revenue
- Alternative method available

Alternative Resource Rent Tax

Year	Investment	Net Revenue	Depreciation Allowance	Taxable Profit	Tax (50%)
1	100				
2	100				
3	100				
4		50	41.28	8.72	4.36
5		50	41.28	8.72	4.36
6		50	41.28	8.72	4.36
7		50	41.28	8.72	4.36
8		50	41.28	8.72	4.36
9		50	41.28	8.72	4.36
10		50	41.28	8.72	4.36
11		50	41.28	8.72	4.36
12		50	41.28	8.72	4.36
13		50	41.28	8.72	4.36
14		50	41.28	8.72	4.36
15		50	41.28	8.72	4.36
16		50	41.28	8.72	4.36
17		50	41.28	8.72	4.36
18		50	41.28	8.72	4.36
19		50	41.28	8.72	4.36
20		50	41.28	8.72	4.36

- Make PV of total investment (331.1) equal to PV of depreciation (d) for years 4 through 20

$$d = rK\left[1 + \frac{1}{(1+r)^T - 1}\right]$$

$$(0.1)331.1\left[1 + \frac{1}{(1+0.1)^{17} - 1}\right] = 41.28$$

- Taxable profit is 8.72
- Tax is 4.36
- PV of tax is same as PV of previous discounted to end of year 3
- Allows tax revenue earlier
- Must know company's discount rate

Resource Rent Tax Summary

- Is theoretically a neutral tax
- Can accommodate high variability of resource prices and company's revenues without changing tax code
- Companies have greater certainty of tax regime
- But government's do change the tax regimes if necessary
- Discount rates used by companies are unknown
- Depends on correct information on revenues and costs
- Companies can shift costs and profits between subsidiaries such that they earn little in countries or sectors with high tax regimes and more in others

Production Sharing Contracts

- Essentially a net revenue sharing arrangement
- But works like a tax on revenue net of costs, but not other taxes
- Often a bid by a company for the right to exploit the field
- Can result in the winner's curse
- May be in addition to other taxes
- May include other taxes in the owner's (government or state firm) share
- Government does not have to pay in funds to the project as in a joint venture agreement
- Divided into "cost gas" and "profit gas"
- Costs usually include exploration, development and other capital costs using a depreciation schedule and annual operating costs in the year occurred
- Shares are usually result of bidding or negotiations

Example Production Sharing Contract

- Gas price is $2
- Cost recovery maximum is 55 percent
- Profit split is 65 percent government and 35 percent company
- Operating costs are 10 percent of gas price

Before cost recovery:	
Government share:	
$2 x 0.45 x 0.65=	$0.585
Company share:	
($2 x 0.55)+($2 x 0.45 x 0.35)=	$1.415
After cost recovery:	
Government share:	
$2 x 0.9 x 0.65=	$1.170
Company share:	
($2 x 0.1)+($2 x 0.9 x 0.35)=	$0.830

Production Sharing Contract Summary

- Really a tax on gross revenue less some investment and operating costs
- Usually bid or negotiated
- Government not required to invest or contribute to other costs
- Subject to winner's curse in some cases
- Profit share percentages often applied arbitrarily
- Requires information on company's costs
  - Administrative burden for government
- Requires a determination of wellhead gas price
- Difficult to analyze
  - Lump in with other profit taxes

Other Taxes

- Corporate income tax – CIT
  - Applied to both upstream and downstream projects
  - Essentially a profit tax
  - Same analysis as a profit tax
  - Applied by almost all countries
  - Sometimes eliminated as a tax incentive for a specific project
- Value added tax – VAT
  - Called sales tax in some countries
  - Must be included in netback calculations
    - Unless market price is quoted without VAT
- Miscellaneous
  - Lots of them, particularly local taxes
  - Includes taxes such as "export tax"
  - Sometimes called "funds"
    - Education fund
    - Employment fund
    - Others

Summary of Tax Theory

- Lots of taxes
  - Regimes often need simplification
- Government objectives
  - Raise revenue
  - Tax away the rent
  - Provide incentives
- Can increase or decrease the profitability of a project
- General Rule: A tax regime will not distort resource allocation if the company's after-tax income from an investment equals the company's share of the investment cost of the project.
- Major problems
  - Difficulties in defining variables
  - Government revenue now versus later
  - Government revenue versus other goals
    - Environment
    - Employment – "indiginezation"
    - Other economic development objectives

Nigerian Gas Tax Regime

Upstream Tax Regime

- Gas price – "function of market price, provided due account is given for quantity and quality and price of other Nigerian gas sources"
- Royalty – 7 percent for on-shore and 5 percent for off-shore
  - Versus 4 percent to 16.7 percent for oil, depending on off-shore depth
- Profit tax – same as CIT of 40 percent (oil is 50-85 %)
- Capital allowances – 20 percent first four years, 19 percent, fifth year or 99 percent
  - Versus 20 percent on-shore and 50 percent off-shore for oil
  - Gas separation investment is part of oil investment for associated gas
  - Investment to get gas to transfer point is part of oil development for tax purposes
- Investment tax credit – 5 percent
- Education tax – 2 percent, deductible for CIT
- Tax holiday – 3 years, extendable for up to 2 more years
- All operating expenses recovered in year of expenditure for PSCs
- Profit gas split for PSCs – about 60/40 government/company for large fields
- Ringfenced

NLNG Tax Regime

- Enjoys pioneer status
- Pays tax of 45 percent instead of PPT of 50-85 percent
- Investment tax credit of 10 percent
- Tax allowance on loan interest
- Royalties are tax deductible
- Capital allowance is 33 percent for first three years, 99 percent
- Tax holiday for three to five years
- No customs, levies, import or export taxes

Downstream Tax Regime

- Marketing and distribution of gas for domestic and industrial uses
  - Extended to power generation, liquid plants, fertilizer plants, and gas transmission and distribution pipelines
- Subject to CIT of 30 percent
- Tax holiday for five years (extended from three years)
  - Seven years for pioneer systems
- Accelerated capital allowances after tax holiday are:
  - Plant and machinery is 90 percent annual allowance
  - Additional allowance of 15 percent (extended from 5 percent)
- Dividends during tax holiday are tax free
- Loan interest is tax deductible

Other Country Tax Regimes

Algeria

Egypt

Trinidad and Tobago

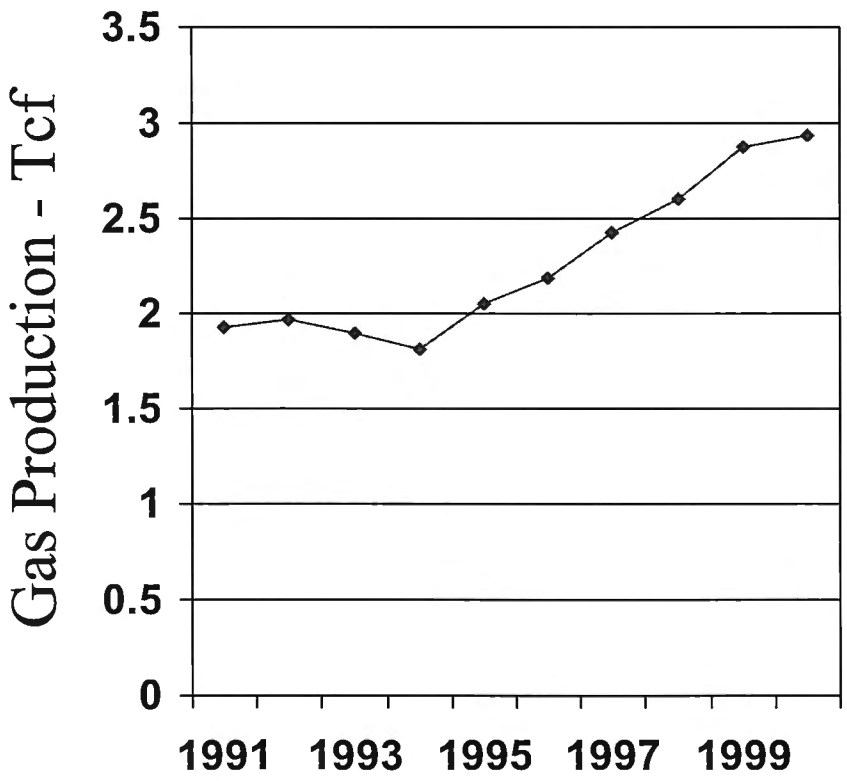
Indonesia

Papua New Guinea

[redacted]

Algeria

Gas Situation



Significant points

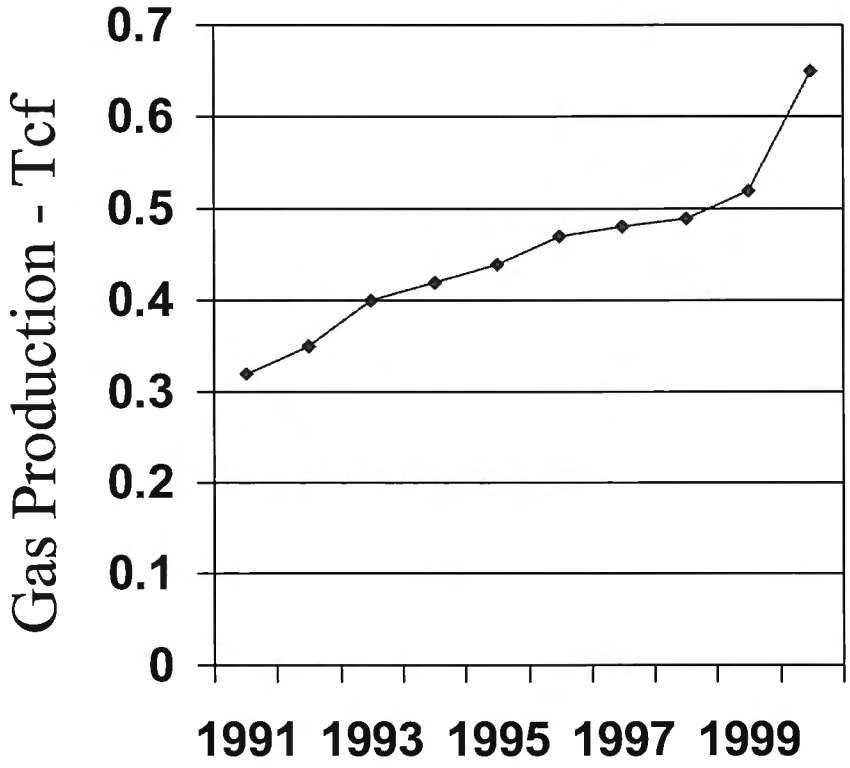
- Gas production increased 52 percent
- Reserves equal 160 Tcf, with potential of 204 Tcf, all primarily associated
- R/P is 54 years; gas surplus country
- World's first LNG producer, but high cost operations
- Pipelines to Europe
  - TransMed – Tunisia-Sicily-Italy
  - MEG – Morocco-Spain
- Planned line: Arzew-Almeria
- Feasibility study for line to Sicily and Italy
- About 95 percent of Algeria's power generation is gas-fired

Gas Tax Regime

- Gas has separate terms where appropriate
- Based on 1999 law; new law is being enacted
- Royalty is 20 percent down to 10 percent for difficult areas
- Price of gas: foreign is Sonatrach selling price, domestic is government-set price
- Tax is 85 percent down to 42 percent for marginal fields
- Deductions for royalties and loan interest
- Depreciation is 100 percent of investment
- Profit gas split is 85/15 down to 50/50 for difficult areas
- CIT is paid by Sonatrach out of its share
- Ringfenced
- No information on LNG (Sonatrach)

Egypt

Gas Situation



Significant points

- Gas production doubled in 10 years
- Reserves estimate is 55 Tcf
- R/P is almost 85 years
- Gas surplus country
- New projects being started
- New LNG project announced
- Gas production forecasted to increase rapidly
- Egyptian Gas Holding Company (EGAS) uses PSCs for exploitation of gas resources

Tax Regime in Latest Bid Round

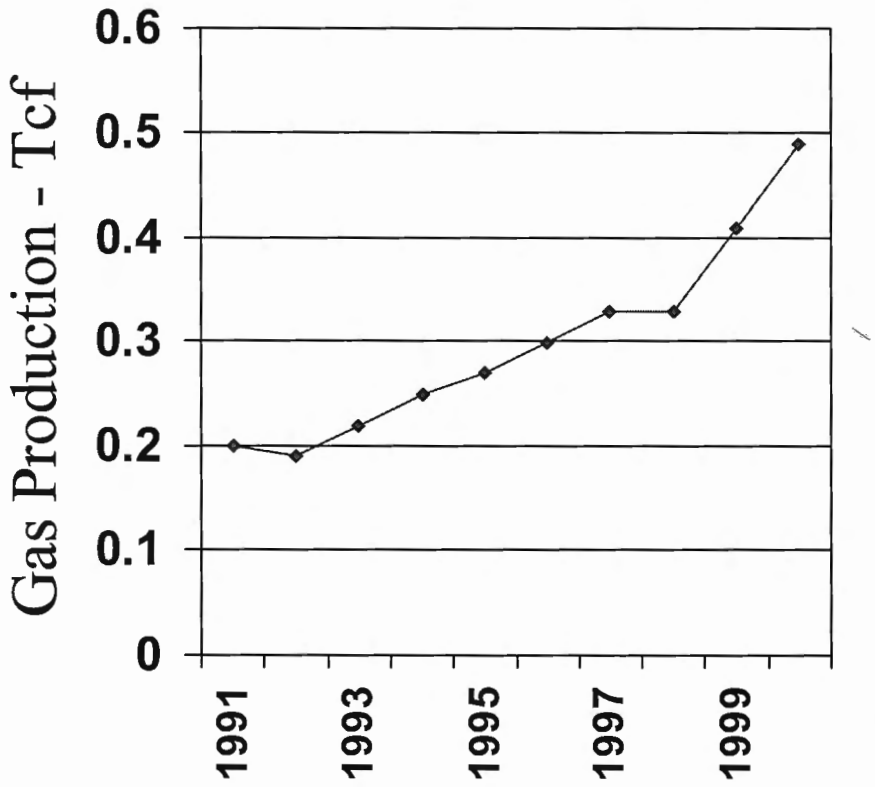
- Oil and gas are treated separately
- Lots of competitive terms in the latest bid round
- Royalty and income taxes paid out of EGAS share
- Bonuses are competitively bid
- Contractor recovers E&D cost up to 40 percent in minimum of four years
- Profit gas is by tranche and competitively bid
  - Less than 25, 25-50, 50-125, 125-250, 250-500, over 500 MMcfd
- Specified value of gas
  - LNG for export is netback price
  - Other gas is average prevailing price in Mediterranean region

Tax Regime for LNG Project

- LNG project is in tax free zone
- No taxes applied to LNG project
- All sales are for export
- No export or excise taxes
- Government takes large share out of gas production
- Government take is said to be "about 47 percent"
- Note the trade-off the Government makes
  - Tax regime makes project more viable
  - Gets higher netback for gas by not taxing project
  - Higher price and thus tax revenue for the gas
- Note that this project competes with NLNG

Trinidad and Tobago

Gas Situation



Significant points

- Gas production doubled in 10 years
- Reserves estimate is 23.45 Tcf
- Latest discoveries indicate more than 100 Tcf
- Clearly a gas surplus country
- Atlantic LNG first train operating
- Second train in 2002
- Third train in 2003
- Government uses PSCs for gas development

Tax Regime for PSCs

- Oil and gas terms are separate
- Cost recovery percents are bid according to production tranches
- Capital cost recovery is 40 percent in first year and 20 percent in each of remaining three years
- Annual operating costs recovered in year of expenditure
- Profit natural gas is bid by production tranche and price category
  - Up to 60, 60-150, 150-300, 300-450, and over 450 MMcfd tranches
  - Prices of up to $1, $1.00-1.50, $1.50-2.00, and over $2.00 per MMcfd
- Value of gas is weighted average price at measurement point
- Other charges or taxes: administrative fee, lease, training, R&D, signature bonus, production bonus, education fund, technical assistance fund
- Government pays PPT, Unemployment Levy and other taxes out of its share of gas
- Ringfenced

Tax Regime for Atlantic LNG

- Corporate Income Tax – 35 percent of EBT
- Dividend withholding tax of 10 percent
- Interest withholding tax of 10 percent
- Ten-year tax holiday on train 1
- Same tax holiday anticipated on trains 2 and 3

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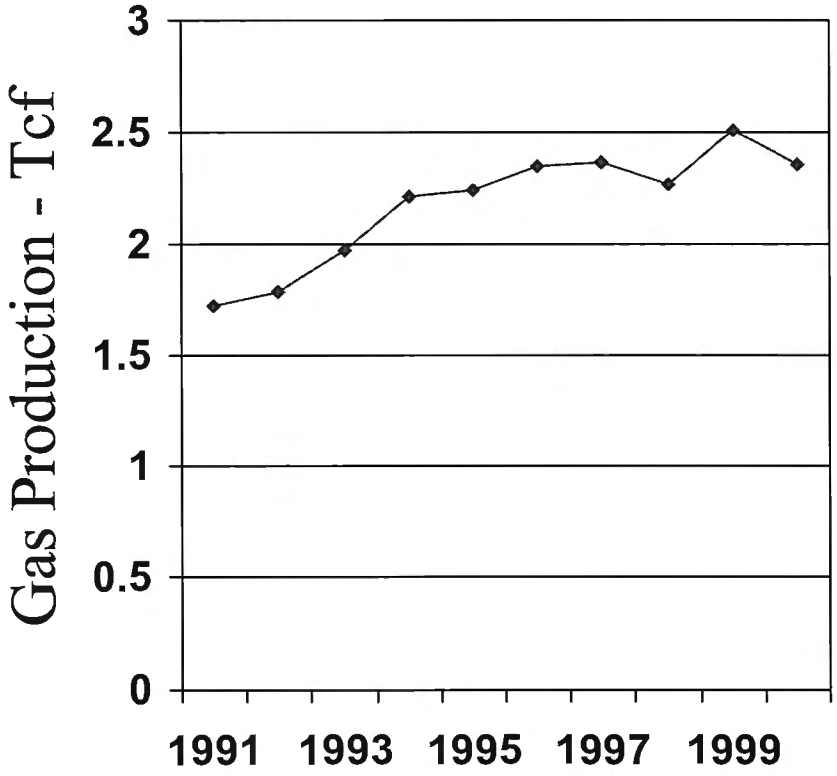
Indonesia

Gas Situation



Significant points

- Gas production has increased 37 percent, but slowed
- Reserves estimate is 92.5 Tcf
- R/P is over 26 years – a gas surplus country
- World's largest exporter of LNG
  - Arun and Bontang
- Possible GTL plant
- Pipeline to Singapore
- Ivian LNG plant in planning stages
- Considered bad investment climate
- New oil and gas law in 2001

New Gas Tax Regime – PSCs

- New PSC called First Tranche Petroleum – FTP
- Government gets 13 percent of gross revenues up front
- There is no royalty other than above
- Cost recovery is 100 percent after FTP
- Can depreciate investment using one-half of useful life
- Investment credit of 17 percent for new field
- Profit gas split is 65/35 for conventional areas; 60/40 for frontier areas and 55/45 for deep sea areas; previous was 70/30 for all
- CIT is 48 percent; government pays other taxes out of its share gas
- Price of domestic gas is 15 percent of export price (old was 10%)
- Ringfenced
- No tax information on LNG projects

Papua New Guinea

Gas Situation

- Just beginning to develop gas resources
- Gas production is less than 5 Bcf per year
- Total gas reserves are estimated to be from 7.9 to 16.9 Tcf
- Clearly a gas surplus country
- Proposed pipeline export project to Australia
- Talk of a LNG project for South East Asia markets
- Government uses a license system for E&D and production

Tax Regime for Gas Licenses

- Royalty of 2 percent of wellhead value
  - Tax credit if Development Levy is paid
- Development Levy of 2 percent of wellhead value
  - Normal tax deduction
- Income tax is 30 percent versus 50 percent for oil
- Additional Profits Tax of 30 percent with 20% ROR threshold
  - Versus 50 percent and 27% ROR for oil
- Past exploration costs are 20-year carry forward
  - Versus 11 years for oil
- Depreciation is 10 years, straight line method
- Accelerated depreciation in early years if cash flow is below 25% of initial investment
- Debt/equity ratio of 3 to 1, versus 2 to 1 for oil
- Ringfenced

Some Preliminary Comparisons

Upstream Operations

ITEM	NIGERIA	RANGE OF OTHERS
Royalty	5-7%	2-20%
Petroleum Profit Tax	0%	0-85%
Income Tax	40%	0-48%
Capital Allowances	100%	100%
Investment Tax Credit	5%	0-17%
Education Tax	2%	0-minimal
Tax Holiday	3-5 years	NA
Profit Gas Split (PSCs)	60/40	55/45-85/15
Ringfencing	Yes	Yes

LNG Projects

ITEM	NIGERIA	RANGE OF OTHERS
Income Tax	45%	0-35%
Investment Tax Credit	10%	0-NA
Royalties	5-7%, deductible	NA
Capital Allowances	99%	100%
Tax Holiday	3-5 years	10 years to permanent
Customs, export taxes	0	0
Other taxes	NA	0-20% of dividends

Analyzing Tax Incentives

Some Major Issues

- Nigerian system is very complicated
- Generally requires analysis of individual contracts
  - Problem of different vintages of contracts
- Must compare with existing changes in tax regulations
- Prevalence of associated gas complicates the issue
  - Very difficult to identify gas-specific costs
- Moving gas separation costs to oil production further complicates the issue
- Difficult to quantify some of the benefits
  - Reduction in pollution
  - Trade-offs between gas price and taxing projects
  - Benefits to other sectors – pricing mechanisms
- Issue of tax revenue now versus revenue in the future

One Suggested Approach

- Perform a cost-benefit analysis on tax revenue now versus tax revenue gains in the future
- Could be treated as if it is with and without a project
  - Tax incentive is loss of tax revenue
  - Gain in tax revenue because new project or situation is viable
- Calculate internal rate of return (IRR)
- Must include interactions that are difficult to analyze
  - Increased gas use leads to increased contractor revenue, which leads to increased tax revenue
  - Less upstream tax revenue may lead to more downstream tax revenue as in Egypt example
- Must include consideration of external effects such as
  - Environmental improvement
  - Balance of payments considerations

Conclusions

Some Final Observations

- On a very preliminary basis the Nigerian upstream gas tax regime compares favorably with those of some other gas surplus countries
- Especially true given the magnitude and complexity of the problem in Nigeria
- Tax regime for LNG project does not appear favorable compared to competing countries
- Analyzing the impact of Nigerian tax incentives is very complicated
- Some type of cost-benefit analysis may help in analyzing the issues involved in gas tax incentives
- Tax incentives appear to be more effective than penalties in dealing with the gas flaring issue
- Gas tax issues must not be treated the same as oil tax issues

Some References

Glossary of Selected Terms

Questions and Answers