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Recommended Plan for the Continued Restructuring and Privatization of the Russian Power Industry

The Joint Russian-American Project on the Restructuring, Privatization and Investment Promotion of the Russian Power Industry

A cooperative program
of the U S Agency for International Development,
Russian Ministry of Fuels and Industry, and the
Russian Joint Stock Company of Power Engineering
and Electrification (RAO EES Rossii)

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This report is the result of a cooperative program of the U S Agency for International Development and the Russian Joint Stock Company of Power Engineering and Electrification (RAO EES Rossii) The report is intended to assist in establishing a framework for industry reform and a market-based structure for the Russian Power sector by identifying major issues and proposing a draft plan for consideration by the Government of Russia, power industry entities and interested international organizations In this respect, we approve the report towards these ends and hope that it will contribute to the formulation and implementation of sound restructuring and privatization policies in the Russian power industry

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B

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INTRODUCTION AND PROJECT BACKGROUND

In December 1993 the U S Agency for International Development (USAID), the Russian Ministry of Fuels and Energy (MFE) and the Russian Joint Stock Company of Power Engineering and Electrification (RAO EES Rossii) initiated a program for the restructuring and continuing privatization of the Russian power industry Work on this project is continuing

The project has several purposes

- provide technical assistance to the electric power sector in restructuring and privatization, and in particular assist RAO EES Rossii and the MFE in developing a market-based structure that fits the needs of Russia
- provide advice on appropriate legislation and regulatory institutions for a privatized, market-based electric power sector
- assist with the development of appropriate financial systems for privatized enterprises
- provide advice and the experience necessary to enable the privatized enterprises of the Russian power system to raise investment capital
- define and create needed training programs to assist the restructuring and privatization process

Work on the project has been accomplished through five working groups, each of which was co-chaired by a Russian electric power expert and an American expert Each working group shared its results with the others at strategic points in the project The working groups covered five key areas

- ***Structure and Pricing*** -- design of an appropriate structure and operating mechanism for a privatized, market-based Russian electric power sector that maintains the reliability of energy supply to customers and, simultaneously, introduces competition wherever possible, and the development of an efficient and competitive wholesale market

- ***Regulation and Legislation*** -- identification of legislation needed to establish and operate the structure and the regulatory system required to support it, including the establishment of regulatory bodies and the creation of a legal base for this regulatory system

- ***Securities and Finance*** -- development of financial management systems for a privatized power sector

- ***Investment Promotion*** -- identification of a strategy for attracting investments to ensure the required rates of growth of the Russian power sector, and the development of processes and tools for defining projects and attracting international and domestic investment funds

- ***Training*** -- design and implementation of training programs to transfer information and techniques critical to the restructuring and privatization program

It is not the purpose of this report to present the extensive results of the working groups' analyses That work may be appreciated by a review of the many work products of each group Rather, the purposes of this report are

- to give a brief description of the Russian power sector in the centralized management period

- to present the vision developed by the project team for how the final Russian power system should be structured, owned, operated and regulated

- to present a transition plan which identifies the key requirements for putting the desired structure in place, describes the measures that have already been implemented, and emphasizes the issues that must be resolved in that process

To accomplish these purposes, Messrs N Boyko and V Kuzmin of RAO EES Rossii, and Mr S Bowden of Hagler Bailly, were assigned to prepare this joint report It is hoped that this report will find strong support within RAO EES Rossii and the MFE, more broadly within the power industry and the Russian Government, and within USAID

This report, approved by Prof Anatolii F Djakov, President, RAO EES Rossii and Mr George, Chief, Regional Office of Energy and Technology, U S Agency for International Development/Moscow will be distributed to the following organizations

- State Duma of the Russian Federation

- Ministry of Economy
- Federal Energy Commission
- Ministry of Fuel and Energy
- Ministry of Finance
- Antimonopoly Committee
- State Property Committee

RAO EES Rossii and USAID will sponsor seminars for these organizations to answer questions and explain the recommendations contained in this report

EXECUTIVE SUMMARY

In December 1993 the U S Agency for International Development (USAID), the Russian Ministry of Fuels and Energy (MFE), and the Russian Joint Stock Company of Power Engineering and Electrification (RAO EES Rossii) initiated a program for the restructuring and continuing privatization of the Russian power industry This ongoing program focuses on

- designing the structure and methods of operation for a privatized, market-based Russian electric power sector including a competitive wholesale market
- identifying legislation to establish the legal basis and regulatory system to support the market-based industry
- developing financial management systems for a privatized power sector
- identifying a strategy for attracting investments
- training to support the restructuring and privatization program

This report has three purposes

- to give a brief description of the Russian power sector in the centralized management period before market reform
- to present the vision developed by the project team for how the final Russian power system should be structured, owned, operated and regulated
- to describe a transition plan for putting the desired structure in place

1 THE RUSSIAN POWER SECTOR BEFORE MARKET REFORM

1 1 Structure and Management of the IPS of Russia

Before market reforms began in 1991-1992, the Integrated Power System of Russia (IPS) was developed, owned, managed and operated as a fully integrated national monopoly by the Russian Government The IPS has the world's largest electric power potential organized into an integrated and coordinated system, with a capacity of 213 million kW in over 430 power plants, and power

generation of over 1 trillion kWh A third of this capacity is associated with combined heat and power plants

The IPS is composed of seven large regional power systems (depicted in Figure 1) Within these regions, 65 local electricity administrations operate in parallel (another 7 are in remote regions that are not interconnected)

The IPS provided the paradigm for planning, investment and operation of the power sector throughout the country Through a vertical state ministry-enterprise bureaucracy, centralized management practices were followed 1) electricity generation was centrally planned and allocated on a quota basis, 2) a national "price list" for electricity (which was stable over time because the government controlled all prices) provided the basis for settlements with customers and interchanges between regional systems, 3) power sector entities were "guaranteed" that their costs would be covered either through allocations of revenue or through state budget allocations, 4) any net revenues generated by power sector entities were remitted back to the central government, 5) capital requirements to provide new facilities or renovate existing facilities were provided through state budget allocations, and 6) the construction of IPS projects was based on minimizing the costs of power production and transmission for the integrated system, and not on establishing regional self-sufficiency or parity of investment among regions

When considering management improvement issues, the following key features of the Russian power industry should be taken into account

- The basic principle for developing the IPS of Russia was to locate generating facilities near fuel and hydro resources which resulted in the IPS becoming the energy supplier for 50 energy-deficit regions This condition will continue to exist into the future and must be given due consideration in plans for the industry restructuring

- 40 percent of heat power is supplied to heat power customers in Russia by combined heat and power plants (CHPs) When the AO Energos' CHPs are brought into the wholesale market, the combined operation and limited dispatch features of these facilities must be addressed

Under this management structure, the IPS was effective in providing reliable supplies of electricity throughout Russia, including power-short regions, because the central government authorities performed practically all control functions for the entire industry The IPS enabled the power sector to achieve important efficiency and reliability benefits fuel conservation through the optimization of dispatch, economies of scale through station capacity concentration up to 8,000 MW, system automatic control to secure reliability, the location of plants at sites with the most favorable economic and environmental characteristics, an efficient level of reserve capacity (less than 15%), and the redistribution of capacity and energy to 50 of the 72 electricity administrations

that were not self-sufficient in power supplies As the Russian power sector makes the transition from this centrally planned system to one that is market-based, it will be important to preserve these IPS economic and reliability benefits

1 2 Industry Changes and the IPS

Although the development and operation of the IPS under central state control was successful for several decades in providing reliable power supplies, it did not give proper incentives for management, consumption, investment or financing Indeed, changes leading up to and during the 1991-1992 period threatened the continued reliable operation of the IPS, including the following noteworthy developments

The regulation of electricity and heat prices was delegated to the regional governments due to deep cuts in government investments in the power sector in 1989-1990 and a shortage of internally generated capital, which made it impossible to support and develop the power sector without obtaining more funds from electricity consumers through higher tariffs

Powers to control generation by power plants started shifting from the federal level to the regions, which was perhaps an unavoidable consequence of the delegation of price regulation because one of the basic issues in regulating electricity and heat prices is the output by 'owned" power plants versus the amount of purchased energy This made the process of redistribution of electric power to energy-short regions more difficult

Significant price disparities began to appear among regions, due to differences in generation facilities and costs among regions, and a change in the distribution of profits (i e , profits in excess of the level planned by the state were retained by the regions and used to reduce power rates to customers)

Movements toward regional autonomy emerged, supported by the enforcement of the Law on Enterprises and Entrepreneurship and the delegation (to work collectives) of the rights to the economic management and the property of state-owned enterprises

Movements toward privatization emerged, including Presidential Decree No 721, 1 July 1992, which suggested that structural units of energy and electrification production associations and individual enterprises have the right to be reorganized into joint stock companies and be privatized This established the threat of disintegration of the regional utilities, unified zonal systems and the IPS

Requirements for non-government financing became acute, and the cessation of government budget financing of energy enterprises, combined with a high level of wear and tear on energy

equipment necessitated attracting funds from other investors This in effect required that power sector enterprises be reorganized into joint stock companies and privatized

1 3 The Beginning of Major Industry Transition

During the second half of 1992 restructuring and privatization activities in the Russian power industry accelerated and marked the beginning of the transition that is the subject of this report

Under Decree Numbers 922 and 933, the Russian State Property Committee was instructed to create a new Russian joint stock company, RAO EES Rossii, as an organization responsible for reliability for power supply at the federal level and for management of power sector enterprises The assets of the IPS were split between various power sector enterprises RAO EES Rossii maintained ownership of transmission lines 220 kV and above It also took ownership of thermal plants over 1,000 MW and hydroelectric plants over 300 MW These plants, previously operated by the local electricity administrations, were to form the basis for a national wholesale electricity market RAO EES Rossii also retained ownership and control of the Central Dispatch Office in Moscow and the seven regional dispatch offices, as well as numerous design, construction and other non-core power sector enterprises

The remaining generators stayed with the 72 joint stock companies that were formed from the former local electricity administrations (Energos) The Energos also retained the local electricity and steam distribution networks and transmission facilities lower than 220 kV The charter capital of RAO EES Rossii included, on average, a 50% interest in the Energos The nuclear power plants remained under the control of the Ministry of Atomic Energy (Minatomenergo)

2 THE REFORMED MARKET-BASED SYSTEM

Several basic restructuring and privatization goals have been adopted by the project team to guide the on-going industry transition The team has also defined the fundamental structural characteristics necessary for a market-based power industry in Russia

2 1 Goals of the Reformed Market-Based System

The market-based system envisioned for Russia is designed to accomplish the following goals

- to maintain a high level of reliability throughout Russia
- to ensure the effective operation of a national wholesale market that will promote competition and efficiency in power generation

- to ensure the most reasonable allocation throughout Russia of the benefits of the IPS generation assets created with state funds
- to ensure a competitive retail market for large customers
- to maintain an organization responsible at the federal level for ensuring the continued integrity of the IPS of Russia, taking into account the strategic role of the IPS as a technological system for ensuring reliable energy supplies in most regions of the Russian federation
- to provide conditions that will attract investment for industry growth
- to reduce the need for regulation and rely on market incentives and competition wherever possible

2 2 Overview of the Reformed Market-Based System

The contrast between the current system and the market-based system is summarized in Table 1 The structure of the market-based system that is envisioned is depicted in Figure 2 The basic features of this system are

- All generators compete in a national wholesale market to sell power
- Generators compete to be dispatched on competitive price bids, which drives efficiency in the utilization of generators and establishes a spot market for the hourly buying and selling of electricity
- Wholesale market prices to generators reflect marginal costs
- RAO EES Rossii ensures the reliable functioning of the IPS, maintaining the technological parameters (e g , frequency, voltage) and ensuring that the wholesale market maintains an adequate balance between supply and demand, including adequate reserves RAO EES Rossii operates the wholesale market, provides an integrated transmission system, performs wholesale market settlements, dispatches all generation and Energos, and owns and operates key hydro facilities as regulators of electric current frequency in the IPS needed for reliability
- RAO EES Rossii renders services on the operations and future growth of the IPS For these services, AO Energos pay RAO EES Rossii a fixed fee set by the FEC The services on operations and future growth include

- -- organizing the parallel work of electric power plants in the IPS
- -- operating the inter-regional transmission lines
- -- dispatch management
- -- technological management of the IPS
- -- forecasting and planning studies
- -- investment in facilities

Some of these services may be singled out and priced separately, e g , high voltage transmission services

- ▸ Energos, as the makers of the retail market, buy their capacity and energy requirements from the wholesale market and/or directly from new generators, generate electricity at power plants they own, and provide distribution and other services to their end-use customers The Energo generators are brought to the wholesale market as the right market conditions are established These generators either remain within the Energo, become part of a portfolio company, or function as stand-alone companies

- ▸ Large end-users may buy directly from the wholesale market and pay a "use of facilities" charge to the local system and a fixed fee to RAO EES Rossii

- ▸ The state regulation of generators is reduced after the establishment of the spot market Surplus profits are controlled for existing generators through contracts by the wholesale market operator, but new generators using more advanced technology may compete and earn profits that are not subject to regulation

- ▸ The state regulation of hydro power plants, AO Energos and RAO EES Rossii is preserved

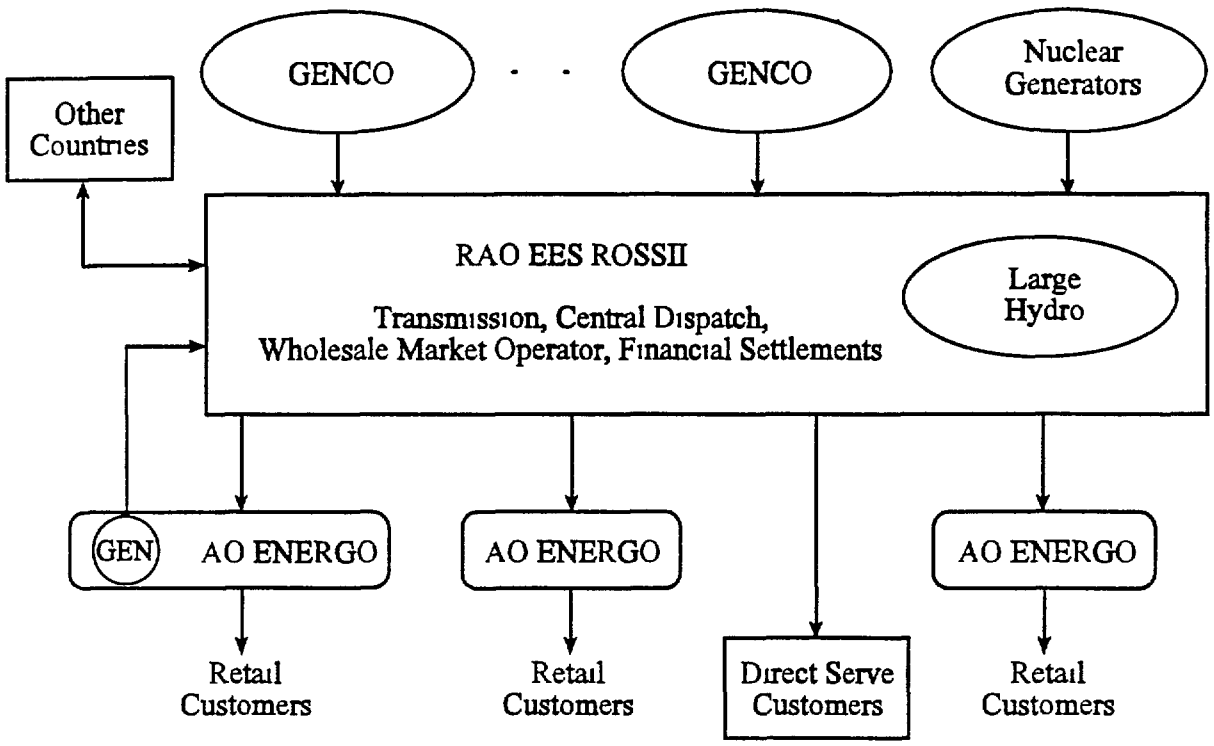
- ▸ The vertical ownership and control of functions are substantially reduced

Table 1
Summary of the Restructuring Plan

	Current System	Reformed Market-Based System
Wholesale Market		
Participation	Low Only 23 RAO EES Rossii generators and 7 nuclear units participate in the market Capacity-surplus AO Energos have monopoly power over capacity-short AO Energos	All significant generators participate in the market Monopoly market power in generation is reduced or eliminated
Dispatch	Heat rates	Hourly bids of generators
Competition	Weak	Strong
Wholesale Prices	Reflect average costs	Reflect marginal costs
Degree of Vertical Ownership Integration	High degree of vertical integration RAO EES Rossii owns 30% of generation, 100% of HV transmission, about 50% of AO Energo shares, and dispatch facilities AO Energos own over 50% of generation	Vertical integration is eliminated RAO EES Rossii implements an investment promotion program, including sale of shares of generators and AO Energos, and retains transmission and dispatch facilities AO Energos put their generation on the wholesale market (but may retain ownership of the generators)
Interconnection and Operational Integration	High degree	High degree Increased interconnections and improved central dispatch increase efficiency and maintain reliability
Generator Profits	Price regulation prevents surplus profits	Long-term contracts continue to control surplus profits for existing generators New generators may earn unregulated profits
Retail Market Competition	None	Large users can buy directly from the wholesale market and wheel across the AO Energo system
Finance and Investment	Severely limited capabilities in financing, corporate financial management, and investor relations	Access to domestic and international capital markets, well developed corporate financial management and investor regulations

Regulatory Systems	Some of the basic system established, but needs guiding legislation and staff development	Comprehensive legislation in place Regulatory system is fully functioning and relies on competition and market incentives

Figure 2
Final Sector Structure



2 3 Reliability

Maintaining a high level of power supply reliability is a paramount objective of the reformed market-based system The restructuring and privatization plan carefully reflects this requirement through establishing a system of responsibilities, planning and operating procedures, and regulations that will govern the relations among RAO EES Rossii, generators, AO Energos, end-users and regulatory bodies The objective is to ensure adequate generation and transmission facilities, the effective functioning of distribution companies (Energos), and the coordinated operation of generators, Energos and RAO EES Rossii

2 4 Generation

Under the reformed market-based system, the generation sector is transformed into a competitive structure Generation is horizontally desegregated into many competing entities so that no generator commands monopoly market control All significant existing generators (i e , those plants that are part of the IPS and operate synchronously with the IPS at 50 hertz) must compete and sell their generation through the wholesale market, these generators would

not sell directly to an end-user or an Energo New generators may contract directly with AO Energos New generators may also contract directly with a large end-user if the generator is constructed with that customer's funds or with funds obtained through financial markets A new generator constructed by RAO must contract only with the wholesale market In all cases, new generators must submit their facility to central economic dispatch and supply their energy through the wholesale market (in this case, contractual settlements between the new generator and its contracted Energo or large end-user customers would take place outside the wholesale market, and the wholesale market and the IPS would be compensated for services provided)

These arrangements submit all generators to the competitive discipline of the bidding system and promote the most efficient utilization of power generation resources

The structure of the generation sector will require further detailed development Under one scheme, AO Energo generators will be divested, and all generators, including RAO EES Rossii's, will be organized into strong, inter-regional competing companies Under another scheme, RAO EES Rossii's generators would be established as either independent entities or grouped into several portfolio companies that compete, while AO Energo generators would be reorganized as subsidiaries operated independently from the distribution business and participate in the wholesale market Under a third scheme, RAO EES Rossii and AO Energos set up joint generating companies on the basis of power plants they own Under the fourth scheme, Energos' power plants supply electricity to the wholesale market through their respective Energo Practical implementation of specific schemes will require economic substantiation and a legal basis

Under each scheme, RAO EES Rossii manages the IPS and the wholesale market, provides dispatch management, and provides transmission services through inter-regional networks By also owning generation, it would have conflicts of interest To address this issue and to attract investment, in the reformed market-based system, RAO EES Rossii will sell the shares of its generators (except for hydro facilities that are critical for peaking purposes and maintaining the reliability of the interconnected system)

To implement these sales, however, three principal conditions are necessary 1) complete resolution of the non-payments problem in the Russian economy as a whole and in the power sector, 2) a system of laws, tested in practice, regulating "privatized" generators and 3) share prices that reflect the real market value of generator assets which is accomplished through an efficient-priced market for capacity and energy that allows the generator to sell its services on a competitive basis and earn profits commensurate with the market value of these services In this way, stock prices for generators will reflect their market value Under these conditions, RAO EES Rossii's (and the Energos') generators will earn profits based on their competitiveness, have an opportunity to achieve attractive investment values, and may therefore fetch higher privatization proceeds through higher stock prices Under these

conditions, RAO EES Ross will also seek to sell its Energo shares in the stock market as an option to attract investment, and this would also eliminate another area of possible conflict of interest

2 5 Transmission

RAO EES Rossii will operate transmission (including Energo-owned transmission under contracts), manage the wholesale market-making function, coordinate system operation and provide dispatch management for parallel operation of all IPS participants RAO EES Rossii has the obligation to serve the transmission needs of wholesale market participants and to provide fair and open transmission access

2 6 Distribution and the Retail Market

The retail market is managed by AO Energos that purchase power from the wholesale market (and going forward, potentially from new generators) and sell it to end-use customers The Energo serves the customers in its service area It must also provide retail wheeling service to large customers who purchase their electricity requirements directly from the wholesale market

The Regional Electricity Commissions will determine the retail prices for electricity and heat that AO Energos may charge their customers The basic principles of retail rate regulation will be established through legislation on the operation and regulation of the power sector that will, among other objectives, promote the condition of self-financing by Energos or other participants in the wholesale market

The wholesale market settlements process will allow the differentiation of rates over time-of-day and season, with a higher price for power supply during periods of high demand This feature enables the AO Energos to introduce time-of-day retail rates to customers who can justify installing the necessary meters An Energo can also allocate an appropriate portion of its non-power cost to the peak period component of its time-of-day rates

2 7 The Wholesale Market

Under the proposed restructuring plan, there will be a "national" wholesale market governed by uniform federal legislation, with one market-maker and uniform pricing mechanisms A national wholesale market meeting these criteria does not mean a single wholesale price throughout all power supply regions Prices within a single pricing system will vary across regions, and will be determined primarily by transmission costs and constraints

Dispatch Based on Generator Bids All generators in a regional market will be dispatched by hourly bids that each generator will provide to RAO EES Rossii as the wholesale market operator, one day to one week ahead Generators will be dispatched in strict merit order The price-bid system for dispatch is a central feature of the wholesale market and is illustrated in Figure 3 Each generator (Genco) prepares its hourly bids (Rub/kWh for hour *t* at varying levels of kW generation) and submits them to Central Dispatch (through the Regional Dispatch Centers) which "stacks" the generators into a merit order according to price bids The generator with the lowest price bid is placed at the bottom of the stack, the next-lowest price bid generator is placed next, and so forth, with the generator with the highest price bid at the top of the stack Generators are then dispatched in that order, with the generator at the bottom of the stack dispatched first, and generators progressively dispatched in ascending order until there is sufficient generation to meet the customers' total loads in hour *t* This methodology ensures that the level of customer demand at any time is supplied with the lowest-cost generation

Generator Payments Under the Price-Bid System Although generators are dispatched on their price bids, they are paid each hour based on the increment of capacity with the highest price bid that operates in the hour In this way, prices paid to generators each hour reflect the marginal cost of wholesale electricity for that hour This is illustrated in Figure 4 The price bid of the marginal increment of capacity that operates in hour *t* determines the price that the wholesale market pays all generators that operate during hour *t* Because generators lower in the stack than the marginal increment bid a lower price (i e , have lower variable costs), they earn profits during hour *t* Under this regime, there will be a strong incentive for each generator to submit a bid that is equal to its variable cost If it bids a higher amount, it runs the risk of being displaced by a competitor and therefore earn less revenue If it bids less than its variable costs, it runs the risk of being dispatched at a price that would make it lose money on every kWh it produced

Contracts with Existing Generators Existing generators will participate in the wholesale market under long-term contracts signed during the transition with RAO EES Rossii The contracts will provide the owners of these generators an opportunity to earn a fair profit and to increase their profits as well if the generator can achieve high dispatch and availability and/or reduce its costs The contracting scheme will be based on two basic principles

- To the maximum extent practical, generators will be compensated through the payments achieved under the price-bid system for energy sales This is the most effective way of establishing competition and promoting efficiency in the generation function It also helps establish the appropriate price signals for new power plant construction

- Capacity payments and other payment provisions will be employed as required to otherwise "make a market" for power generators and/or acquire ancillary services (e g , spinning reserves, cold-start reserves, voltage support)

Figure 3
In the Final System All Large Generators Will Be Dispatched by Their Price Bids

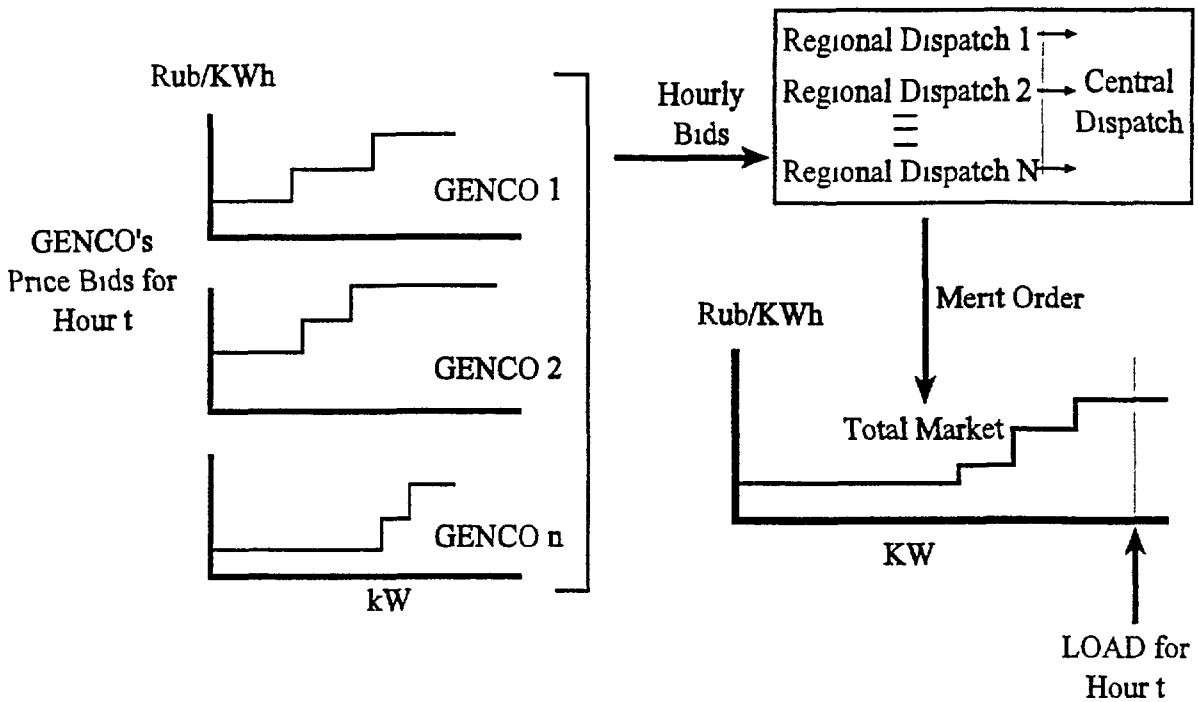
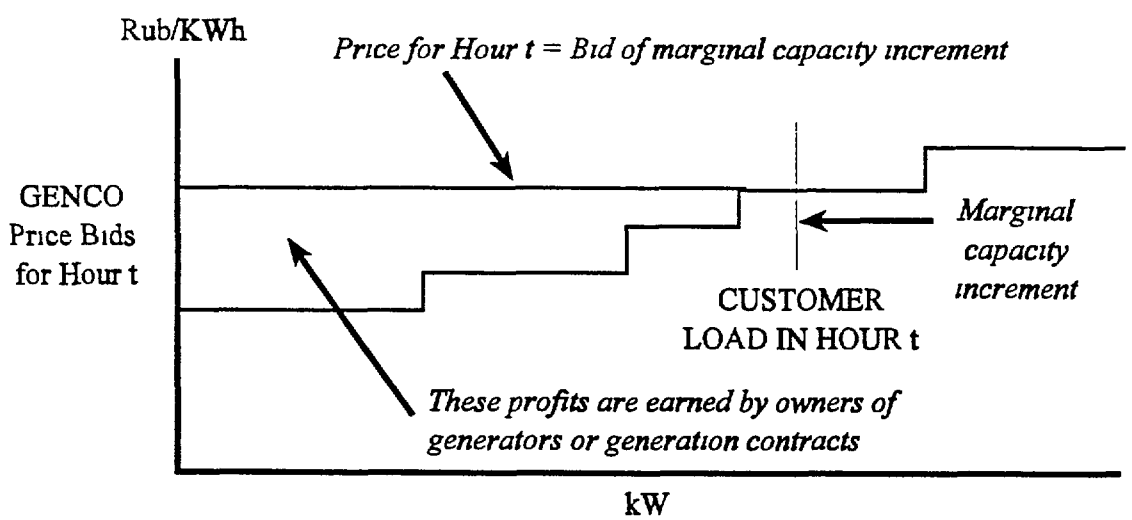


Figure 4
In the Final System All Generators Dispatched in Any Hour Will Be Paid the Price Bid of the Marginal Increment of Capacity for that Hour



Working out the details of the wholesale market pricing and contracting scheme is an ongoing and high-priority task

Contracts with New Generators Contracts with new generators will be entered into through a system of competitive relations administered by RAO EES Rossii and approved by the FEC New capacity bidders will be provided key information needed to prepare a bid, including historical and present wholesale market hourly spot prices and long-range planning studies The capacity payment required by the bidder (if any) and the generator availability parameters that the bidder is willing to guarantee will be key competitive selection criteria

Contract Purchases Outside the Wholesale Market AO Energos and large end-users may also contract for capacity and energy from new generators outside the wholesale market The generator would still be centrally dispatched and would compete in the wholesale market for energy sales (in effect creating economy-energy interchanges between the new generator and the wholesale market) Outside the workings of the wholesale market settlements, the new generator and its customer would perform settlements based on their specific contractual agreement The Energo/end-user or the new generator would purchase reserves for the capacity

Wholesale Market Contracts with Energos and Large End-Users AO Energos and large end-users will also purchase capacity and energy from the wholesale market through contracts The costs of capacity and energy will be allocated through the settlements procedures These procedures will reflect the time-of-day rise and fall of the costs of electricity as customer demand rises and falls In this way, customers are given more accurate price signals This allows a greater "elasticity of demand" (the responsiveness of the level of demand for electricity to prices), producing an increase in economic efficiency for both the consumer of electricity and for society as a whole

Wholesale Market Settlements A special system of rules and agreements is introduced to separate the settlements of wholesale market suppliers and consumers from the financial activities of RAO EES Rossii as the wholesale market maker and to establish transparency of and accessibility to information on these transactions RAO EES Rossii does not take title to energy sold through the wholesale market, pay any generator for generation, or sell to or collect from any Energo Rather, through its settlements function, RAO EES Rossii matches purchases and sales among generators and Energos, and sends monthly statements to all participants It is then the responsibility of the Energos to pay the generators according to these statements The Energos also pay RAO EES Rossii for its services of organizing the operation and development of the IPS and the wholesale market, including payment for organizing the parallel operation of IPS participants

2 8 Strategy for Growth

RAO EES Rossii holds a central position in the industry in terms of the overall industry perspective and as the operator of key functions (organization of the parallel operation of IPS participants, market making, dispatch, transmission, reliability planning) It will continue to promote the interests of the industry's enterprises in terms of laws, regulations, and other initiatives needed to attract capital, support investment values, and facilitate the efficient growth and development of the industry In its role of ensuring a reliable power supply throughout Russia, RAO EES Rossii would monitor forecasts of demand of energy requirements and trends, and ensure that a strategy and programs are in place at all times to meet these requirements with a high level of reliability

2 9 Investment

The following will be used as investment sources

- internal funds generated through depreciation allowances
- a portion of net profits of power sector enterprises
- debt financing
- share sales

Funds generated through depreciation allowances will be the first source of investment funds In the reformed market-based system, power sector entities will have access to both debt and equity markets domestically and in some cases internationally Entities will use debt and equity if these reduce overall capital costs and rates to consumers

The sale of RAO EES Rossii and Energo shares in their generators will be the priority area of attracting investment This will require bringing share prices in line with the value of generators

Share prices would be supported by the wholesale market pricing and contracting mechanisms, tariff regulation, earnings, and dividend policies so that entities can sell new shares and raise needed equity capital at a competitive cost

2 10 Regulatory System and Legislation

A proper legislative framework is required so that the regulatory system can develop and for all aspects of the reformed market-based system to be implemented This framework will be established when laws are in place on

- Fundamentals of Legal Regulation of Federal Power System (Law on Federal Power System)
- Licensing the Operation of Electricity Supply Companies
- Federal Wholesale Market for Capacity and Energy
- State Regulation of Tariffs in the Power Sector
- Relations Between Energy Suppliers and Customers
- Technological Administration (Dispatch)
- Use of Water Resources in the Generation of Electricity and Heat
- State Technical Supervision of Electricity Supply Companies
- Law on Responsibilities for Non-payment and Late-payment of Electricity Bills of Electricity and Heat Consumer

3 THE RUSSIAN POWER SECTOR'S TRANSITION TO THE REFORMED MARKET-BASED SYSTEM

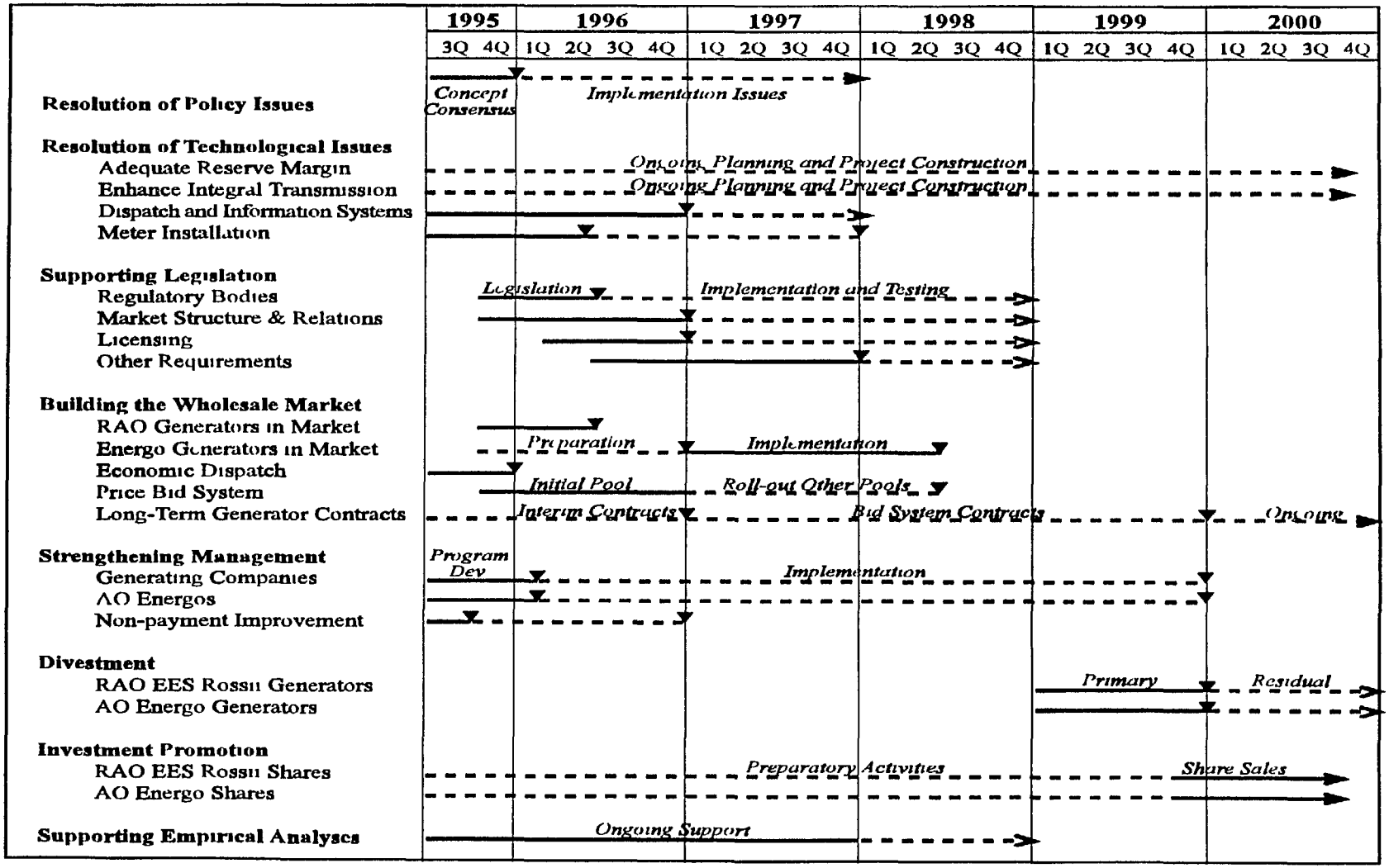
A period of transition is necessary to put the unprecedented changes in the Russian power sector into effect The transition is complicated by the continuing evolution of the basic political structure of Russian society, and by a host of economic problems, including lack of experience with a market-based economy, high inflation, structural and pricing problems in the fuels industries, lack of capital markets, inadequate commercial law, and an inadequate legal basis for operating and regulating the industry As a result, a transition period of five to seven years may be required A preliminary schedule is depicted in Figure 5

3 1 Management and Ownership Structure

A new ownership management structure which meets market challenges has emerged in the power sector and is unlikely to change drastically in the future

In the transition, the management structure of the industry will undergo evolutionary change, and power facilities that belong to the state will be sold to private investors The transfer to RAO EES Rossii of the remaining power plants subject to PD No 923 will be completed, RAO will begin the sale of its ownership in generation to private investors, and the Energos will also begin the sale of their generator ownership All generators will then compete in the

Figure 5
Preliminary Schedule for Key Activities – Phase 2



wholesale market without ownership and other control or influence by either RAO EES Rossii or the AO Energos

The restructuring and privatization plan seeks to accomplish this transformation by resolving the issues surrounding market structure, pricing and contracting, and by creating an appropriate investment and operating environment

- A power pricing and contracting system will be implemented that gives cost-competitive generators an opportunity to earn profits to reward current investors and to attract new investors for the upgrading and expansion of power facilities
- Legislation will be enacted and tested to comprehensively govern the wholesale market as well as other areas
- The restructuring of power plants into holding companies prior to the sale of their shares will be carefully evaluated for its potential to enhance competition, financial viability and share values
- Power plants will be commercialized and personnel trained to successfully operate in a competitive market environment independent of RAO EES Rossii and the AO Energos

To bring power plants to the wholesale market, a special presidential decree will be sought and its provisions sealed in law It will be necessary to enlist support from the Russian Government, the administration of the Russian President, and the legislative bodies for the comprehensive restructuring and privatization program

AO Energo power plants would be brought to the wholesale market in stages In the first stage, the Energo will transform its power plants into subsidiary power producers, obliging them to sell power on the wholesale market on a competitive basis At the next stage (as an appropriate environment is created), the shares of these power plants may be sold either on the stock market or to portfolio companies, in the interests of the Energos' shareholders

3 2 Redistribution of Authorities and Responsibility for Reliability

The state's responsibility for ensuring power supply reliability will be replaced in the transition by a market and regulatory structure This structure will be based on the legal and property responsibility of commercial power entities, including power plants that generate electricity, Energos that are responsible for power deliveries and power supply to individual consumers, RAO EES Rossii, and the federal and local government and management bodies Defining and

recording in legislation the distribution of responsibility for power supply among all members of the new structure, testing this new structure in practice, and creating a new system for planning and coordinating the work of power facilities are important tasks during the transition

3 3 Establishing the Wholesale Market

A national wholesale electricity market, with economically free entities operating in it, will be created Key steps include

- developing methodological foundations for the functioning of the wholesale market
- adopting legal and normative documents that establish working procedures for the wholesale market
- implementing measures to prepare wholesale market participants (e g , expanding the breadth of the market by bringing all electricity producers to the wholesale market, defining the status and responsibility of regional power companies, mastering the market-making functions)
- implementing new methods of price formation and dispatch built as much as possible on the price bid system
- implementing new methods of settlements among wholesale market participants
- resolution of technological issues, including provision of adequate reserves, enhancement of interzonal transmission capacity, development of an automated dispatch and information system, and installation of meters

These activities will center on the timely implementation of the wholesale market's structure and generator price bid system in an initial market area, and then rolling the implementation out to other areas

3 4 Making the Retail Market More Competitive and Efficient

The retail market will undergo further development, in particular

- Programs will be implemented to speed the commercialization of AO Energos and to train Energo management in financial management, capital markets, investment promotion, and shareholder relations

- AO Energos will put in place policies and rates to allow large customers to contract directly with the wholesale market for power supplies and to pay the Energo a use-of-facilities charge for moving their power across the local network Through the wholesale market's prices, the Energo will be able to efficiently implement time-of-day rates for any customer that can justify installing the necessary meters

- AO Energos that own and operate transmission facilities that the wholesale market operator also needs to move bulk power supplies will make these facilities available through transmission wheeling tariffs

- With more accurate price signals from the wholesale market (time-of-day costs, demand and energy costs, hourly spot market prices), the Energo can design and implement more accurate rates for its customers to promote the efficient use of electricity The wholesale market also provides a convenient measure of the value of saved energy and capacity, which can provide the justification for a range of Energo-sponsored energy efficiency and load management measures

3 5 Finance and Investment

Attracting domestic and foreign capital to finance the rehabilitation and expansion of Russia's electric power industry is an essential goal that is reflected throughout the restructuring and privatization plan In addition, certain high-priority transition-stage initiatives have been identified that are within the purview of RAO EES Rossii, regulators and industry enterprises

- a fast-track program to improve the customer non-payment and receivables management performance of Energos

- a task force (RAO EES Rossii, FEC, Energos, RECs) to jointly evaluate regulatory impacts on finance and investment, and to develop policy recommendations in key areas including allowed profits on regulated activities, dividends, capital structures and use of debt, and depreciation allowances to improve investment returns and internal cash flow

- initiatives to improve accounting and financial disclosure adopting a uniform system of accounts (USOA) for deployment throughout the power sector, and

preparing a comprehensive RAO EES Rossii prospectus to support financing and investment promotion activities

- investment promotion to attract foreign and domestic investment, including sales of RAO EES Rossii common stock, sale of generators, sale of Energo shares, and investment in specific projects

- financial training for RAO EES Rossii, Energos and generators on capital budgeting and financial planning, accounting principles and practices, financial strategies for securing debt and equity, and corporate financial policies

3 6 Legal and Legislation

The transition requires that a legislative basis be established for the structure, operation and regulation of the power sector This legislation would build on the current federal-regional framework through establishing authorities, policies, and legal bases The most critical legislative acts that are needed as soon as possible in the transition are

- ***Fundamentals of Legal Regulation of Federal Power System (Law on Federal Power System),*** to define the Federal Power System, in accordance with Article 71 of the Constitution, that is within the jurisdiction of the Russian Federation and which, in accordance with Article 76, is governed by federal laws valid throughout the Federation

- ***Legal Basis for Tariff Regulation,*** which has been addressed through the new (March 1995) Law on State Regulation of Electricity and Heat Tariffs, to set the principles for state regulation of electricity and heat tariffs throughout Russia, ensure the rights of the Subjects of the Federation to set rates for customers in their area, ensure customers the transparency of and access to the rate-making process, balance the interests between electricity supplying organizations and customers, provide the required legal basis for the FEC's activities, and enable affected parties to lodge complaints against the FEC

- ***Regulation of the Wholesale Market,*** to establish the legal principles for the operation of the wholesale market, the basic structural, operating and pricing framework of the wholesale market, and the requirement for all generators to participate It would apply nationally, preempt any regional laws and regulations affecting wholesale market structure and pricing, and provide policy directives and empower the FEC on a broad range of wholesale market issues, and require the effective separation of the generation business from distribution under guidelines and conditions set and enforced by the FEC

- ***Rules and Procedures for Licensing and Enforcement,*** to establish the legal principles by which market sector participants will be authorized to operate and the legal basis for the content of licenses for all entities in the sector
- ***Regulation of the Retail Market,*** to govern the relations between suppliers and consumers of electric power and specify the civil code
- ***Uniform Dispatch of the IPS,*** to regulate the relations between all wholesale market participants with respect to central dispatch
- ***Law on Responsibilities for Non-payment and Late-payment of Electricity Bills of Electricity and Heat Consumer***

3 7 Training

During the transition period, power sector personnel will be trained on working under new market conditions Modern methods of personnel training will be introduced in concert with the working out of the regulation methods and the introduction of a new system of market relations IIE and IDEA, working with RAO EES Rossii and the restructuring team, have developed a training plan based on the priorities of the transition stage This includes working with RAO EES Rossii or an organization designated by it to carry the training effort to regional organizations

CHAPTER 1
THE RUSSIAN POWER SECTOR BEFORE REFORM

This chapter presents an overview of Russia's Integrated Power System (IPS) and gives a brief description of the state of the Russian power sector until 1992, which saw the beginning of the dramatic changes that have continued into the present Section 1 2 describes the development and operation of the IPS under central state control, which existed until roughly 1991-1992 Section 1 3 reviews the factors introduced into the IPS in the period 1991-1992 that caused significant strains in its smooth functioning Section 1 4 briefly reviews the restructuring of the power sector in late 1992, which led to the formation of RAO EES Rossii and essentially marks the beginning of the major transition that continues today The goals of this transition and the transition process itself are the primary subjects of this report (Chapters 2 and 3, respectively)

1 1 OVERVIEW OF THE IPS OF RUSSIA

The IPS has the world's largest electric power potential organized into an integrated and coordinated system Its installed capacity is 213 million kW, and its power generation amounts to over 1,068 trillion kWh

The IPS (not including the Far East Region, which is only weakly linked to the IPS) spans 9,000 km west to east and six time zones It is composed of seven large regional power systems or power zones the North-West, Center, Middle Volga, North Caucasus, Urals, Siberia and the Far East (see Figure 1 in the Executive Summary) Before the breakup of the USSR, interconnected regions included the power systems of Kazakhstan, Ukraine, Transcaucasus, Central Asia, and the Baltic States

Within these zones, 65 local electricity administrations (regional utilities) work in parallel in the IPS, the remaining 7 local electricity administrations are in remote regions and are not connected by transmission lines to the IPS Before market reform, these local organizations were referred to as "energy and electrification associations" (EEPAs) They later became the present AO Energos The zones are interconnected to form the IPS These interconnections and the power transfer capability are also depicted in Figure 1

As a result of the breakup of the USSR, several regions of Russia are interconnected only through the power systems of other regions the North Caucasus regional power system is linked to the Center regional power system through an intertie with the power system of Ukraine In addition, Kaliningrad and the Pskov oblast are no longer directly linked to the

North-West regional system and must transfer power through the Baltic States The Far East is only weakly connected to the IPS

The zonal interconnections are primarily for reliability and supplying electric power to energy-short regions (e g , to the North Caucasus which has experienced severe capacity shortages) Inter-regional transmission has been important in managing peak demand and allowing for a system reserve margin below 15%

1 2 THE IPS UNDER CENTRAL STATE CONTROL (TO 1991)

Before the beginnings of market reforms, Russia's power system was developed, owned, managed and operated as a national monopoly by the Government of Russia Generation, transmission and distribution were fully integrated Vertical integration went even deeper design, engineering, construction, equipment and other power-related enterprises were included in the power sector's organization

Under central state control, dispatch was coordinated centrally All property was owned by the state Prices were administered centrally and electricity was allocated under a system of quotas Planning was also centralized Financing was provided through a combination of state budget allocations and internally generated funds which, in effect, belonged to the government As such, the IPS provided the paradigm for planning, investment and operation in the Russian power sector throughout the country

1 2 1 Efficiency and Reliability

The IPS enables the power sector to achieve important efficiency and reliability benefits

By 1991 Russia's IPS had combined 70 regional power systems, including over 430 power plants, for parallel operation This parallel operation of power enterprises makes it possible to gain several key efficiencies, including

- fuel conservation as a result of the optimization of dispatch,
- unit capacity concentration up 800 million kW (labor, fuel and other savings), which is impossible under autonomous regional operation,
- introduction of system automatic control securing the reliability of the IPS,
- reduction of ecological load i e , the IPS allows an individual Subject of the Russian Federation to secure power outside its area if this is more economical and environmentally efficient

- optimization of reserves across regions, which produces economic savings and reductions in capital requirements, a key issue in the Russian power sector

- co-ordinated functioning of the IPS, making it possible to provide reliable power supply to customers almost across entire Russia with an efficient level of reserve capacity, e g , in the range of 13% to 15% International experience has shown that autonomous operation of smaller power systems requires higher reserve margins

The IPS has another important economic and reliability affect During the development of the IPS under central management, 50 out of 70 regional power-supplying entities turned out to be capacity and energy short In the absence of the IPS which accomplishes the redistribution of capacity and energy produced by all power plants, individual energy-deficient regions can suffer from the shortage of capacity reserves This has become an important market and policy issue in the present transition

The dispatch function performed by the IPS prior to market reform was another important area of economy and reliability

The hierarchy of the dispatch management system of the IPS of the USSR was comprised of three principal offices the Central Dispatch Office, Unified (Zonal) Dispatch Offices, and Unified Dispatch Services of the local electricity administrations Below in the chain of command were power plant management offices and local distribution offices

The Central Dispatch Office was established in the early 1970s in Moscow It controlled the parallel operation of the power systems to provide a reliable and economical electricity supply Central Dispatch Office dispatchers controlled the operational capacity of the zonal power systems, their reserve capacity, electrical couplings between the zones, exports, as well as the most important couplings within the zones It controlled the operation of generating units that played an important role in zonal reliability and economy of power supply In the case of a temporary energy or capacity shortage in the IPS, the need for load shedding was determined by the Central Dispatch Office, in conjunction with Minenergo (the Ministry of Power and Electrification)

The Unified Dispatch Offices were based in each of the unified, or zonal, power systems (9 for the USSR as a whole, 7 presently) The Unified Dispatch Services operated at the local energy system level Dispatchers from these offices were charged with responsibility to maintain a given frequency within their system and system balance

The dispatch offices (Central Dispatch Office, Unified Dispatch Offices, and Unified Dispatch Services) played important roles in both long and short-term planning of the power system,

including making projections of energy consumption patterns and daily load diagrams, management of fuel resources, and scheduling of repairs and maintenance

As the Russian power sector makes the transition to a market-based system, the economic and reliability benefits made possible through the IPS -- integration and coordination in planning, investment and operation -- should be preserved to the maximum extent possible Otherwise, the sector may see several adverse affects

- the reliability of power supply over many parts of Russia may decline,
- capacity and energy-short entities may see power costs that are inconsistent with the conditions under which the IPS was developed and financed
- Overall, the power industry will be less efficient and will present its customers with higher rates than necessary

1 2 2 Generation Facilities

The development of Russian's power generation industry was geared to creating the IPS Between the sixties and the eighties the Russian power sector enjoyed a stable period of development High capacity (300-1,200 MW) super critical steam units were commissioned, and large hydro plants were built on several river systems Nuclear power plants with a unit reactor capacity of 440-1,000 MW and later 1,500 MW were constructed These generators were integrated through high-capacity 500 and 750 and later 1,150 kV a c power transmission lines to form the IPS and combine for parallel operation 70 regional power systems which earlier operated autonomously

The backbone of the Russian power sector was created by thermal power plants which account for over 60 percent of the power sector's installed capacity Hydro power plants and nuclear plants accounted for 20% and 10% of installed capacity, respectively The remaining 9% were provided by the power plants that belonged to other Ministries and were not included in the IPS of Russia

Although there are over 400 electric power plants with a total capacity of more than 5 MW in Russia, capacity is concentrated at big power plants with multi-units

Table 1 1 shows electric installed capacity for Russia (including capacities that are not a part of the power sector)

Table 1 1
Russian Installed Capacity
(including outside capacities) Thousand MW
(1000 MW)

	1980	1085	1990	1993
Total	165	196	213	213
Hydro	35	42	43	43
Nuclear	9	17	20	21
Fossil-fired	121	137	150	149

Power generation shows an ecologically favorable fuel mix, in which the share of natural gas is over 50 percent The fuel mix for generation is shown if Table 1 2

Table 1 2
Fuel Mix of Electricity Generation in Russia
Billion kWh

	1980	1985	1990	1991	1992	1993
Total	805	962	1082	1068	1009	977
Hydro	129	160	167	168	173	175
Nuclear	54	99	118	120	120	119
Fossil-fired	622	703	797	780	716	662

It can be noted from Table 1 2 that in the first half of the eighties power generation increased on average by 3 65% a year In the second half, the growth slowed to 2 4% a year In 1991, for the first time over the post-war period, generation started to decline, a trend that continues presently In 1993 electricity generation dropped by 12% against 1990 Table 1 2 shows that the 1993 decline occurred only at fossil-fired power plants where it amounted to 17% as compared with 1990

Combined power and heat production or CHPs constitute the greater part (50%) of fossil-fuel plants These plants in cooperation with regional boilers send used heat through the

distribution network to industrial, residential and other users The use of these plants allowed reducing the fuel rate at electric power plants

Russia has very few fossil-fired peaking power plants the capacity of gas turbines is only slightly over 1 GW Although it is expected that in the future gas-steam (combined cycle) turbines will play a key role as additional capacities, today there are no such units in Russia

Hydro power plants play a crucial role in several regions In particular, hydro plants provide 50% of all generating capacities in Siberia's power sector and in the Middle Volga region, hydropower account for 25% of all power produced

1 2.3 Management of the Power System

Before 1992 the state was the sole owner of the Russian power sector On behalf of the state the property was managed by the Ministry of Power and Electrification (now MFE) As a result, a vertical "ministry -- enterprise" scheme of state management was established, based on the fact that all the property of power sector entities was under the jurisdiction of the Ministry which transferred some of the rights for property management to specific state enterprises

The core of the management system was 70 energy and electrification associations These EEPAs, which had the status as legal entities, fulfilled the distribution functions and included all electric power plants of the Russian IPS, power and heat transmission and distribution subdivisions as well as energy equipment repair and construction subdivisions The Ministry operated several tens of large repair and construction enterprises and other ancillary facilities

The IPS was effective at providing reliable supplies of electricity throughout Russia, including power-short regions, under this management approach mainly because the central government authorities performed practically all control functions for the entire industry The government established the basis for both the current operation of the industry and its future growth and development

There were six features to the management structure that are particularly worth noting Of these, five are inimical to a market-based economy Only one, dealing with expansion decisions, has a role in an efficient market-based industry These management practices are briefly reviewed below

1 Use of Electricity Quotas

Under the centrally planned and managed economy, electricity generation was planned in advance and allocated to users on a quota basis

2 Central Price List

A national price list for electricity was issued periodically All retail electricity and heat consumers were subdivided into several groups Settlements with consumers were performed in compliance with tariffs based on the price-list for a corresponding consumer group The residential and agricultural sectors enjoyed reduced rates The rates for power exchanges between neighboring grids were also set on the basis of the price list

The prices tended to be stable over long periods since the government also controlled the prices of the inputs for electricity production

3 Minimum Level of Revenues Guaranteed for Each Entity

Entities in the power sector were provided with a plan that would cover their costs and produce some amount of internal funds If an entity was not meeting its plan, the government would redistribute revenues within the region or even across regions If an entity still fell short of plan, its shortfall was made up from government budget funds

4 Revenues Confiscation

Any net revenues generated by a power sector entity were remitted to the central government, with the exception of a portion which, with the government's permission, could be used by the entity

5 Financing Requirements Provided by State Budget Allocations

Capital requirements to provide new facilities or renovate existing facilities were provided through state budget allocations

6 Capacity Expansion Decisions

The construction of IPS projects was based on engineering calculations aimed at minimizing costs of power production and transmission for the integrated system and locating power plants in the regions where power production was the cheapest for the country as a whole Each power plant was designed to work in integration with the IPS In the same way, the high-voltage transmission lines were designed and constructed to transmit the generated power based on a system-wide approach

Thus, the location and capacities of generators and transmission facilities were determined not by the amount of financing available in a particular region, nor by the balance of power supply and demand within a region, nor on the balance between regions, but by objective factors (e g , availability of fuel, hydro resources, construction facilities, etc) and subjective ones (the initiative of central or regional control authorities) Thus, the general criterion for construction substantiation was efficiency of production

As a result, state funds invested in energy companies were not distributed uniformly among regions of the country For example, based on 1993 data, the ratio of the cost of the assets of regional energy supply entities to the electricity consumption in the same region is 798 65 rub/kWh in Pskovenergo, 685 77 rub/kWh in and only 106 3 rub/kWh in Kalugaenergo, i e , there is a 6-7 times difference

When considering management improvement issues, the following key features of the Russian power industry should be taken into account

- The basic principle for developing the IPS of Russia was to locate generating facilities near fuel and hydro resources which resulted in the IPS becoming the energy supplier for 50 energy-deficit regions This condition will continue to exist into the future and must be given due consideration in plans for the industry restructuring

- 40 percent of heat power is supplied to heat power customers in Russia by combined heat and power plants (CHPs) When the AO Energos' CHPs are brought into the wholesale market, the combined operation and limited dispatch features of these facilities must be addressed

1 3 INDUSTRY CHANGES THAT THREATENED THE FUNCTIONING OF THE IPS

The development and operation of the IPS under central state control over several decades was successful in providing reliable supplies of power throughout Russia It was also convenient for consumers because of low and stable rates

But it did not give proper incentives The state-administered electricity and heat prices had very small economic impact on the operation of power supply entities The practice of centralized financing (not linked to the results of the entity's operation) and amendment of plans and redistribution of revenues so that all costs were always covered sapped incentives for efficiency and superior performance

This state management structure is not of course responsive to the market reforms now making their presence in the sector Indeed, changes in the 1991-19922 period threatened the continued reliable operation of the IPS In particular, there were six noteworthy industry developments

1 Delegation of Electricity and Heat Price Regulation to the Regions

In 1989-1990, enterprises throughout Russia were increasingly required to self-finance This requirement in the power sector sharply revealed the shortcomings of the national price list and the associated methods of settlements with customers Deep cuts in government investments in the power sector and a shortage of internally generated capital made it impossible to support and further develop the power sector without obtaining more funds from electricity consumers through higher tariffs

In 1991 under Governmental Decree No 55 "On liberalization measures" an attempt was made to keep fuel prices low, including prices for electricity and heat, through price list adjustment mechanisms But this attempt failed

As an outgrowth of these problems, the electricity and heat price list was abolished and the control of heat and power tariffs by local regional government bodies was introduced The new mechanism of setting and controlling electricity and heat tariffs was based recovering normative costs of power production and transmission, including an investment component and an adopted list of expenditure

2 Powers to Control Generator Output

The introduction of regional government regulation of electricity and heat prices was accompanied by changes in the management of power production within the regions Formerly, all issues related to the regulation of power output and generation dispatch were under the jurisdiction of the Russian Federation But with the regulation of tariffs for electricity and heat by local governments, the management of electricity generation began to shift to the jurisdiction of regional governments as well This may have been unavoidable since one of the basic issues in regulating electricity and heat prices is the output by "owned" power plants and the amount of purchased energy This also made the process of redistributing electric power to energy-short regions more difficult

Thus, regional government regulation of electricity and heat tariffs initiated qualitative changes in the economic relationships within the regional power systems and between the regional systems and the IPS

3 Price Disparities Across Regions

With the abandonment of the state price list for electric and heat power and the introduction of regional government regulation of electricity and heat prices, prices to customers started to differ significantly by region Key factors accounting for these differences include the uneven placement of generating capacities in the regions, varying efficiency of generating facilities located in different regions, and differences in the fuel mix and the investment component of the tariffs

Under state ownership and centrally set prices for the majority of goods and services, the differentiation of electricity prices by region did not raise much concern However, in 1992 the situation changed radically due to the liberalization of prices and the emergence of private entrepreneurs Under the "nation-wide price list" the profits of power entity operations went to the state budget which in turn provided investment funds for the sector But with free pricing and private enterprising, profits became directed to separate groups of customers and owners of generating assets As noted above, these generating assets were distributed unevenly among regions and enterprises

4 Movements Toward Regional Autonomy

In concert with the general trend in the country in 1990-1992 towards decentralized management and the enhancement of the role of work collectives and regional governments, workers of electric power plants and distribution networks started a drive for leaving the energy and electrification production associations and toward more autonomous operation

This trend was supported by the enforcement of the Law on Enterprises and Entrepreneurship and delegation (to work collectives) of the rights to the economic management and the property of state-owned enterprises Ministries, as state management bodies, were divested of their former right to directly manage the property of sectoral enterprises

5 Movements Toward Privatization

Presidential Decree No 721, 1 July 1992, "On Organizational Measures for Transforming State-Owned Enterprises and Voluntary State Enterprise Associations into Joint Stock Companies" suggested that structural units of energy and electrification production associations and individual enterprises have the right to be

reorganized into joint stock companies and be privatized This established the potential for disintegration of the zonal power systems as well as the IPS

6 Cessation of State Funding for the Sector

The cessation of government budget financing of the energy enterprises, combined with a high level of wear and tear of energy equipment, necessitated attracting funds from other investors This in effect required that power sector enterprises be reorganized into joint stock companies and privatized

As a result of these industry changes and trends, the electric power sector in 1992 faced a need to accelerate its transformation in order to preserve reliability throughout Russia, establish an orderly transition to a market-bases industry, and continue to reap the benefits of the IPS that has been developed over ten past decades In this transformation, it is also clear that in order to increase production efficiency and reduce the cost of electric power, it was necessary to create conditions for competition in electric power generation

1 4 THE BEGINNING OF MAJOR CHANGE AND LONG-TERM INDUSTRY TRANSITION

During the second half of 1992, restructuring and privatization activities in the Russian power industry accelerated and mark the beginning of the transition that is the subject of this report

Under Presidential Decrees Number 922 and 933, the Russian State Property Committee was instructed to create a new Russian joint stock company RAO "EES Rossii" as an organization responsible for power supply reliability at the federal level and for management of power sector enterprises The assets of the IPS were split between various enterprises RAO maintained ownership of transmission lines 220 kV and above RAO also took ownership of thermal plants over 1000 MW and hydroelectric plants over 300 MW These plants, previously operated by the local electricity administrations, were to form the basis for a national wholesale electricity market RAO also retained ownership and control of the Central Dispatch Office in Moscow and the seven regional dispatch offices, as well as numerous design, construction and other non-core power sector enterprises

The remaining generators stayed with the 72 joint stock companies that were formed from the former local electricity administrations ("AO Energos" or "energos") The energos also retained the local electricity and steam distribution networks and transmission facilities lower than 220 kV

The nuclear power plants remain under the control of the Ministry of Atomic Energy (Minatomenergo)

CHAPTER 2
THE REFORMED MARKET-BASED SYSTEM

The Russian power industry has been in major transition since 1992, and the precise details of what the reformed market-based system will be at the end of this transition are not known with certainty Nonetheless, it is necessary to specify, at least in general terms, the basic restructuring and privatization goals to guide this transition It is also necessary to describe the basic dimensions of the industry and market structure that are sought in the market-based system These dimensions will help ensure a better organized and more effective implementation of the restructuring in a system as large as the Russian power sector

2 1 GOALS OF THE REFORMED MARKET-BASED SYSTEM

The market-based system envisioned for Russia is designed to accomplish the following goals

- To maintain a high level of power supply reliability over the entire territory of Russia, in all parts of the integrated system
- To ensure the effective operation of a national wholesale market that will promote competition and efficiency in power generation and, after the adoption of the legislative basis and the regulatory system and their testing during the transition period, substantially reduce vertical ownership and control of generation, transmission and distribution while maintaining the operational integration of the system
- To ensure the most reasonable allocation throughout Russia of the benefits of the generation assets created during the centralized management period with state budget funds, protect customers from severe rate increases, and control existing generators' surplus profits
- To ensure the operation of an open and competitive retail market for large customers
- To maintain an organization responsible at the federal level for ensuring the continued integrity of the IPS of Russia, taking into account the strategic role of the IPS as a technological system for ensuring reliable energy supplies in most regions of the Russian federation

- To provide the right conditions to attract investment for industry growth primarily those for attracting private investments through a competitive stock and bond market

- To reduce the need for costly and burdensome regulation, and rely instead on market incentives and competition wherever possible

2 2 OVERVIEW OF THE REFORMED MARKET-BASED SYSTEM

The contrast between the current system and the market-based system is summarized in Table 2-1 The structure of the market-based system that is envisioned is depicted in Figure 2-1

The basic features of this system are

- A national wholesale market for capacity and energy includes all significant generators Generators compete to be dispatched on competitive price bids, which drives efficiency in the utilization of generators and establishes a spot market for the hourly buying and selling of electricity

- Wholesale market prices to generators reflect marginal costs

- State regulation of generators is reduced or eliminated, whereas state regulation of AO Energos and RAO EES Rossii is preserved (by RECs and FEC, respectively)

- Vertical ownership and control of functions are substantially reduced

- Surplus profits are controlled for existing generators, but new generators may compete and earn profits not subject to regulation

- Many generation companies compete to sell capacity and energy through the wholesale market This competition takes two forms obtaining a capacity and energy power sales contract with the wholesale market, and being dispatched on the basis of lowest generator price bids

- RAO EES Rossii ensures the reliable functioning of the IPS, maintaining the technological parameters (e g , frequency, voltage) and ensuring that the wholesale market maintains an adequate balance between supply and demand, including adequate reserves RAO EES Rossii operates the wholesale market, provides an integrated transmission system, performs wholesale market settlements, dispatches all generation and Energos, and owns and operates key

hydro facilities as regulators of electric current frequency in the IPS needed for reliability

- Energos, as the makers of the retail market, buy their capacity and energy requirements from the wholesale market and/or directly from new generators, generate electricity at power plants they own, and provide distribution and other services to their end-use customers The Energo generators are brought to the wholesale market as the right market conditions are established These generators either remain within the Energo, become part of a portfolio company, or function as stand-alone companies

- Large end-users may buy directly from the wholesale market and pay a "use of facilities" charge to the local system and a fixed fee to RAO EES Rossii

The following sections review the principal features of the reformed market-based system

2 3 RELIABILITY

Maintaining a high level of power supply reliability throughout Russia and in all parts of the Integrated Power System is a paramount objective The restructuring and privatization plan carefully reflects this requirement

There are four key components of reliability

- adequacy of generation capacity
- adequacy of transmission facilities
- effective functioning of distribution companies (AO Energos)
- coordinated operation of generators (supplying power to the wholesale market), regional AO Energos and RAO EES Rossii

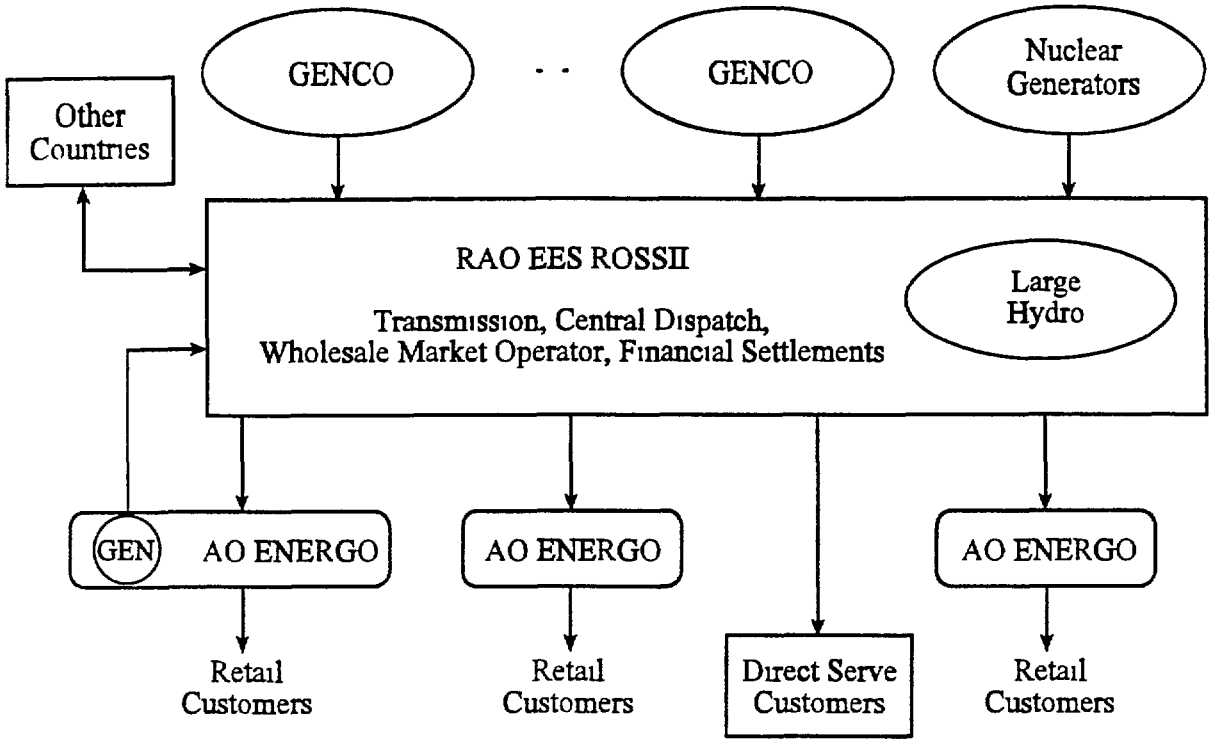
2 3 1 Generation Adequacy

The AO Energo has the obligation to provide reliable and economical power supplies to its customers Under this obligation, the AO Energo must contract for sufficient capacity with the wholesale market and, going forward, possibly with new generators as well to meet capacity requirements If the AO Energo contracts directly with new generators, it would also be required to provide reserves on that capacity These reserves may also be purchased from the wholesale market

Table 2-1
Summary of the Restructuring Plan

	Current System	Reformed Market-Based System
Wholesale Market		
Participation	• Low Only 23 RAO EES Rossii generators and 7 nuclear units participate in the market Capacity-surplus AO Energos have monopoly power over capacity-short AO Energos	• All significant generators participate in the market Monopoly market power in generation is reduced or eliminated
Dispatch	• Heat rates	• Hourly bids of generators
Competition	• Weak	• Strong
Wholesale Prices	• Reflect average costs	• Reflect marginal costs
Degree of Vertical Ownership Integration	• High degree of vertical integration • RAO EES Rossii owns 30% of generation, 100% of HV transmission, about 50% of AO Energo shares, and dispatch facilities • AO Energos own over 50% of generation	• Vertical integration is eliminated • RAO EES Rossii implements an investment promotion program, including sale of shares of generators and AO Energos, and retains transmission and dispatch facilities • AO Energos put their generation on the wholesale market (but may retain ownership of the generators)
Interconnection and Operational Integration	High degree	High degree Increased interconnections and improved central dispatch improve efficiency and maintain reliability
Generator Profits	Price regulation prevents surplus profits	Long-term contracts continue to control surplus profits for existing generators New generators may earn unregulated profits
Retail Market Competition	None	Large users can buy directly from the wholesale market and wheel across the AO Energo system
Finance and Investment	Severely limited capabilities in financing, corporate financial management, and investor relations	Access to domestic and international capital markets, well developed corporate financial management and investor regulations
Regulatory Systems	Some of the basic system established, but needs guiding legislation and staff development	Comprehensive legislation in place Regulatory system is fully functioning and relies on competition and market incentives

Figure 2-1
Final Sector Structure



As the "market maker," RAO EES Rossii is obligated to contract for this capacity for the wholesale market participants This contracting will be carried out through a competitive bidding process approved by the FEC RAO EES Rossii also has the obligation to make demand forecasts and to ensure the required capacity increase at the wholesale market

An AO Energo would build capacity for its own account if the wholesale market or independent generating companies do not offer a more economical source of power supply Likewise, RAO EES Rossii would build generation if its competitive procurement programs fail to elicit more economical sources for the wholesale market A tenet of this restructuring and privatization plan is that independent and efficient power generating companies will be able to meet wholesale market requirements

2 3 2 Transmission Adequacy

RAO EES Rossii has the obligation to provide reliable transmission services to meet the requirements of the wholesale market To meet this obligation, it carries out transmission and

power flow studies integrating these with generation supply planning activities RAO EES Rossii will build new facilities or contract for them with private developers, including the regional interconnections needed for reliability or bulk power interchanges among regions

2 3 3 Integrated Operations of Wholesale Market Participants

To ensure the efficient operation of all wholesale market participants, RAO EES Rossii coordinates their activities along three dimensions

Long- and Short-Term Planning of Sales to and from the Wholesale Market (Putting together Balances of Electric Energy and Capacity) On a regular cycle, each power plant participating in the wholesale market and each AO Energo will provide its resource plan to RAO EES Rossii, the operator of the wholesale market This plan would include its energy and demand forecasts and generation supply plan, including the direct acquisition of generation (if any) and requirements to be purchased from the wholesale market

RAO EES Rossii assembles the generator and Energo plans into a system-wide plan accounting for demand diversities among regions and verifies the reasonableness of the Energo forecasts with its own independently developed forecasts There will be ongoing iteration with the AO Energos to adjust plans based on RAO EES Rossii's broader industry analysis and transmission planning requirements On the basis of the planning cycle results, RAO EES Rossii develops a schedule of capacity requirements by region and optimal site locations (balance of electric power and capacity) This balance of power and capacity serves as the basis for contracting and establishing tariffs for retail customers of each Energo

Operative Management and Dispatch of All Enterprises Supplying Power and Capacity and the AO Energos For this purpose RAO EES Rossii, through its Central Dispatch Office and regional dispatch centers, operates the system of dispatching all entities in the IPS In this role, RAO EES Rossii will set spinning reserve requirements and balance loads to maintain reliability and stability

Ensuring Observation of Provisions of the Effective Laws Pertaining To, and Obligations Arising From, Contracts and Dispatch Requirements During the transition period, RAO EES Rossii performed this function primarily through its right to ownership of blocks of shares In the reformed market-based system, it performs the function through a system of licensing operations of the wholesale market participants (established and regulated by the FEC) and contract terms

2 3 4 Distribution Reliability

In addition to contracts for adequate generation capacity, each AO Energo is required to maintain adequate distribution facilities and follow prudent operation and maintenance practices The Energo must also adequately maintain any transmission facility it owns The performance of these obligations is subject to the oversight of the Energo's REC, which is guided by standards established in principle by legislation and administered through the REC

The Energo's transmission operations will be subject to further oversight by RAO EES Rossii, which must coordinate and control the use of transmission for wholesale market operations Transmission rights and obligations will be spelled out in contracts between the Energo and RAO EES Rossii These contracts will specify inspection and other rights and related sanctions for dealing with a failure to meet contractual obligations

2 4 GENERATION

Under the reformed market-based system, the generation sector is transformed into a competitive structure Generation is horizontally desegregated into many competing entities so that no generator commands monopoly market control All significant existing generators (i e , those plants that are part of the IPS and operate synchronously with the IPS at 50 hertz) must compete and sell their generation through the wholesale market, these generators would not sell directly to an end-user or an Energo New generators may contract directly with AO Energos New generators may also contract directly with a large end-user if the generator is constructed with that customer's funds or with funds obtained through financial markets A new generator constructed by RAO must contract only with the wholesale market In all cases, new generators must submit their facility to central economic dispatch and supply their energy through the wholesale market (in this case, contractual settlements between the new generator and its contracted Energo or large end-user customers would take place outside the wholesale market, and the wholesale market and the IPS would be compensated for services provided)

These arrangements submit all generators to the competitive discipline of the bidding system and promote the most efficient utilization of power generation resources

The structure of the generation sector will require further development Four alternative schemes can be considered

- Under the first (and preferred) scheme, Energo generators are divested, and all generators, including RAO EES Rossii's, are organized into strong, inter-regional competing companies This approach eliminates vertical integration distribution, generation and transmission are each unbundled into separate

entities with separate ownership and control This approach simplifies regulation and creates the most competitive and viable generation sector

- The second scheme is that RAO EES Rossii's generators are established as either independent entities or are grouped into several portfolio companies that compete Energo generators are reorganized as Energo subsidiaries, are operated independently from the distribution business, and participate in the wholesale market These Energo generators could voluntarily become a part of a portfolio company, subject to the requirement that a competitive balance is maintained in the affected market area

- Under a third scheme, RAO EES Rossii and AO Energos set up joint generating companies on the basis of power plants they own

- Under the fourth scheme, Energos' power plants supply electricity to the wholesale market through their respective Energo

Under each scheme, RAO EES Rossii's continued ownership of significant generators is problematic RAO EES Rossii manages the wholesale market, dispatches and operates the integrated system, and provides transmission services Each of these is a monopoly function By also owning generation, RAO EES Rossii would have conflicts of interests In addition to addressing these conflicts through regulation, in the reformed market-based system, RAO EES Rossii will seek to sell the shares of its generators in the stock market (except for hydro facilities that are critical for peaking purposes and maintaining the reliability of the interconnected system)

The sale of RAO EES Rossii's power plants in the stock market helps to resolve the problems of its conflicting interests and attracting investment To implement these sales, however, the following conditions are necessary 1) resolution of the non-payments problem in the economy and power sector, 2) a practically tested system of laws regulating "privatized" generators and 3) a stock price that reflects the value of generator assets, which is achieved through an efficient-priced market for capacity and energy that allows the generator to sell capacity and energy services on a competitive basis, and earn profits commensurate with the market value of these services In this way, stock prices for generators will reflect their market value

Before the generators' stock can be sold, an overall approach must be developed for the generation sector, and an acceptable investment climate must be established This involves enacting the fundamental legislation that lays down the principles on which the power industry will operate and will be regulated It requires a stable regulatory environment that supports investment in the sector In this way, RAO EES Rossii's (and the AO Energos') generators will earn reasonable returns, represent reasonable investment values, and fetch government higher privatization proceeds through higher stock prices

Under these conditions RAO EES Rossii will also seek to sell AO Energos' shares in the stock market as an option to attract investment, thus eliminating another area of possible conflict of interest

2 5 TRANSMISSION

RAO EES Rossii operates transmission and manages the wholesale market-making function and system operations and dispatch It has the obligation to serve the transmission needs of wholesale market participants and to provide fair and open transmission access

Some of the AO Energos also own and operate transmission facilities that are part of the bulk power supply system These facilities will be made available for use by RAO EES Rossii as the wholesale market operator Compensation for the use of these facilities will be governed by the AO Energos' transmission wheeling tariffs approved by the FEC

2 6 DISTRIBUTION AND THE RETAIL MARKET

The retail market is managed by AO Energos (distribution enterprises) that purchase power from the wholesale market (and going forward, potentially from new generators), and sell power to end-use customers

The Energo serves customers in its service area It is also obligated to provide retail wheeling service to large customers who purchase their electricity requirements directly from the wholesale market

The RECs will determine the retail prices for electricity and heat that AO Energos may charge their customers The basic principles of retail rate regulation are established through legislation on the operation and regulation of the power sector that also promotes self-financing capability

The wholesale market simplifies retail rate-making for power supply costs The power supply component of the retail rate is established by the Energo's purchases from the wholesale market and, where applicable, other contract purchases The Energo would be allowed full cost recovery on its power purchases, but no additional profit The Energo is allowed to add its transmission and distribution costs and a regulated level of profits for these facilities to its power purchase costs Each of these non-power costs and profits are regulated by the REC

The wholesale market settlements process will allow the differentiation of rates over time-of-day and season, with a higher price for power supply during periods of high demand This feature enables the Energo to introduce time-of-day retail rates to large customers, who can

justify installing the necessary meters The Energo can allocate an appropriate portion of its transmission and distribution costs to the peak period component of its time-of-day rates

These improved rate designs will assist the Energo and its customers in more accurately evaluating the costs and benefits of energy efficiency investments

2 7 WHOLESALE MARKET

Under the proposed restructuring plan, there will be a "national" wholesale market Three features define the wholesale market as being national

1 The wholesale market's structure, operations and regulation throughout Russia are governed by uniform federal legislation Although regional laws might address other aspects of the power industry (including, for example, the prudence of Energo contracts with the wholesale market entities or other power suppliers), there will be no regional laws as such on the wholesale market

2 There will be one market-maker on the wholesale market

3 Uniform pricing mechanisms will be followed throughout the wholesale market

It is important to note that a national wholesale market meeting these criteria does not mean a single wholesale price throughout all power supply regions Prices within a single pricing system may, and will, vary across regions (which are determined primarily by transmission costs and constraints)

In the reformed market-based system all existing and new generators compete day-to-day, hour-to-hour to sell energy to the wholesale market on the basis of lowest-price bids Existing generators also compete to sell capacity to the wholesale market New generators may compete to sell capacity to the wholesale market or directly to AO Energos and large end-users

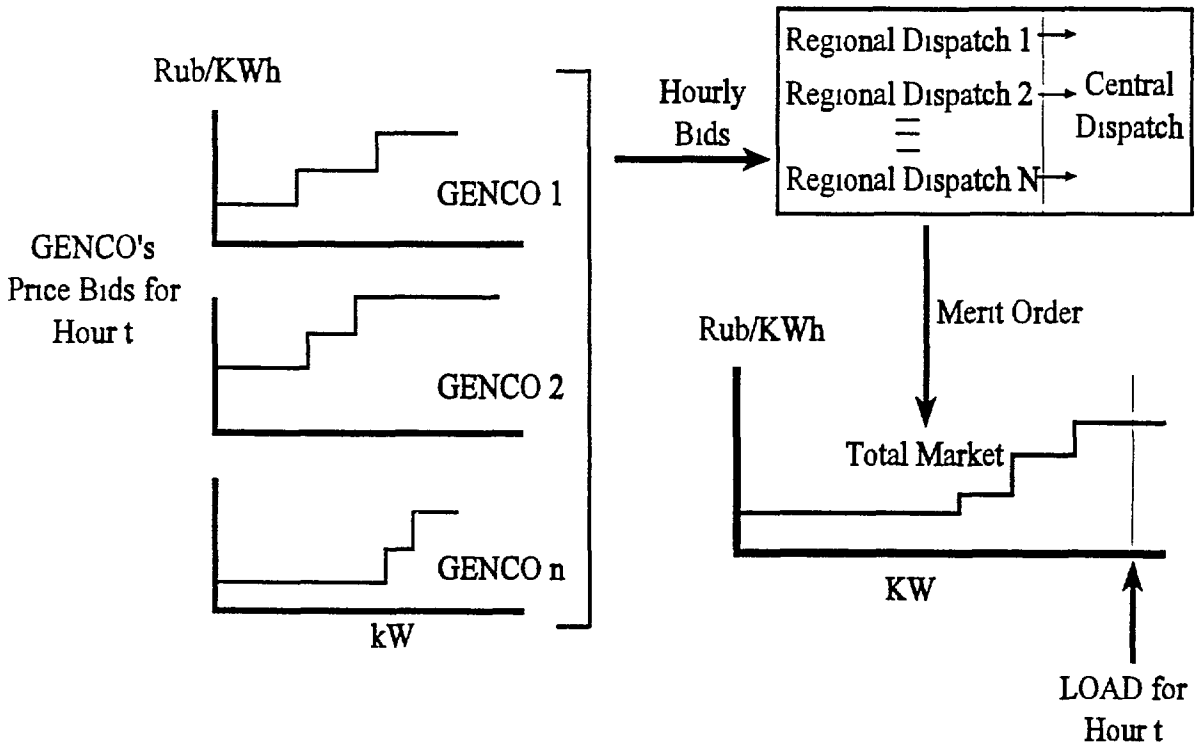
2 7 1 Dispatch Based on Generator Bids

All generators will be dispatched by hourly bids that each generator will provide to RAO EES Rossii as the wholesale market operator one day to one week ahead Generators will be dispatched in strict merit order The generator with the lowest bid will be dispatched first, the generator with the next-lowest bid will be dispatched next, and this continues to

progressively expensive bids until sufficient power is being generated to meet the power demands of customers Through the wholesale market, generators may be dispatched across regions, based on available transmission interconnection capacity and the comparison of marginal bids across regions This methodology ensures that the level of customer demand at any time is supplied with the lowest-cost generation

The hourly generator price-bid system for dispatch is a central feature of the wholesale market and is illustrated in Figure 2-2 Each generator (Genco) prepares its hourly bids (Rub/kWh for hour *t* at varying levels of kW generation) As discussed below, the Genco is strongly motivated to make its bid equal to true variable costs The bids are submitted to Central Dispatch (through the Regional Dispatch Centers) which "stacks" the generators into a merit order, according to their price bids The generator with the lowest-price bid is placed

Figure 2-2
In the Final System All Large Generators Will Be Dispatched by Their Price Bids

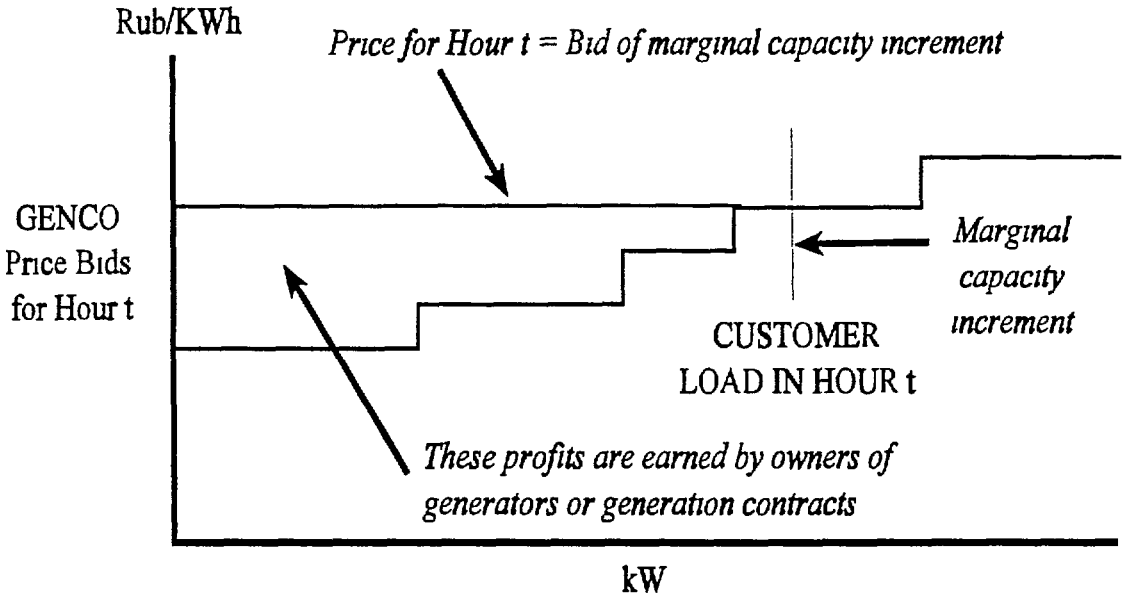


at the bottom of the stack, the next-lowest price bid generator is placed next, and so forth, with the generator with the highest price bid at the top of the stack Generators are then dispatched in that order, with the generator at the bottom of the stack dispatched first, and generators progressively dispatched in ascending order until there is sufficient generation to meet the customers' total loads in hour *t*

2 7 2 Generator Payments Under Price-Bid System

Although generators are dispatched on their price bids, they are paid each hour based on the increment of capacity with the highest-price bid that operates in the hour In this way, prices paid to generators each hour reflect the marginal cost of wholesale electricity for that hour This is illustrated in Figure 2-3 The price bid of the marginal increment of capacity that operates in hour *t* determines the price that the wholesale market pays all generators that operate during hour *t* Since generators lower in the stack than the marginal increment bid a

Figure 2-3
In the Final System All Generators Dispatched in Any Hour Will Be Paid the Price Bid of the Marginal Increment of Capacity for that Hour



lower price (i e , have lower variable costs), they earn profits during hour *t*

Under this regime, there will be a strong incentive for each generator to submit a bid that is equal to its variable cost If it bids a higher amount, it runs the risk of being displaced in the dispatch order by a competitor that bids less If it is displaced, it will run less (or not at all), thereby earning less revenue If it bids an amount less than its variable costs, it runs the risk of

being dispatched at a price for its power that would make it lose money on every kWh it produced

2 7 3 Contracts with Existing Generators

Existing generators will participate in the wholesale market under long-term contracts signed with RAO EES Rossii There is an element of competition in securing these contracts RAO EES Rossii is obligated to attract enough, and only enough, power to meet the needs of the wholesale market RAO EES Rossii is also obligated to seek out the most economical power Not all existing generators will be able to secure a contract as a result

The contracts will provide the owners of these existing generators an opportunity to earn a fair profit and to increase their profits as well if the generator can achieve high dispatch and availability and/or reduce its costs

The wholesale market power contracting scheme will be based on two basic principles

1 To the maximum extent practical, generators will be compensated through the payments achieved under the price-bid system for energy sales This is the most effective way of establishing competition and promoting efficiency in the generation function It also helps establish the appropriate price signals for the construction of new power plants

2 Capacity payments and other payment provisions will be employed as required to otherwise "make a market" for power generators and/or acquire ancillary services (e g , spinning reserves, cold-start reserves, voltage support)

Working out the details of the wholesale market contracting scheme is an ongoing and high-priority task Some preliminary insights are discussed below

Wholesale Market Contracts with Existing Hydro Plants Preliminary analyses indicate that hydro plants would generally earn excessive profits under the price-bid system This is not surprising since the variable cost of generation is virtually zero In this case, a more workable contracting scheme is a conventional fixed-payment contract to cover the hydro generator's fixed and operating costs and return on investment This contracting scheme is also more appropriate given the manner in which the hydro facilities are used to meet peak loads and maintain reliability It may be appropriate to build into the contracts certain management incentives for efficient performance, but these would be outside the workings of the price-bid system

Wholesale Market Contracts with Existing Nuclear Plants Preliminary analyses indicate that nuclear plants might fare reasonably well under the price-bid system In fact, it is plausible that contracts with nuclear plants might be limited to revenues earned through the price-bid system This would provide a strong incentive for nuclear plants to achieve high availability and dispatch, and reduce their "fixed" cost to improve profitability even further This potential will, of course, require a much more detailed and careful evaluation

Wholesale Market Contracts with Existing Thermal Plants Preliminary analyses indicate that most thermal plants may not fare as well if their revenue is limited to what they can earn through the price-bid system This implies that "capacity" payments will be required to make a market for these plants The required capacity payment would vary by plant technology and fuel type A highly efficient baseload plant might earn substantial revenue through the price-bid system and require a smaller capacity payment relative to a less-efficient plant that is relegated to cycling or emergency use

One approach to setting these capacity payments would be to establish normative capacity costs and availability factors by technology and fuel category Alternatively, each plant could be evaluated individually

Under either approach, a careful analysis of the price-bid system and its effect on capacity contracting will be required as a basis for formulating a detailed and workable wholesale market contracting scheme

2 7 4 Contracts with New Generators

Contracts with new generators will be entered into through a system of competitive relations administered by RAO EES Rossii and approved by the FEC New capacity bidders will be provided key information needed to prepare a bid, including historical and present wholesale market hourly spot prices The capacity payment required by the bidder (if any), projected energy cost and the availability parameters that the bidder is willing to guarantee will be key competitive selection criteria

2 7 5 Contract Purchases Outside the Wholesale Market

AO Energos and large end-users may also contract for capacity and energy from new generators outside the wholesale market Two conditions apply to these transactions

- The generator would still be centrally dispatched and would compete in the wholesale market for energy sales This is efficient and creates economy-energy interchanges between the generator and the wholesale market These

energy-only transactions are processed through the wholesale market settlement procedures like other sales Outside the workings of the wholesale market settlements, the generator and its customer(s) would perform other settlements based on their specific contractual agreement

- The Energo/end-user or the generator would purchase reserves for the capacity, either from the wholesale market or from independent generators

2 7 6 Wholesale Market Contracts with AO Energos and Large End-Users

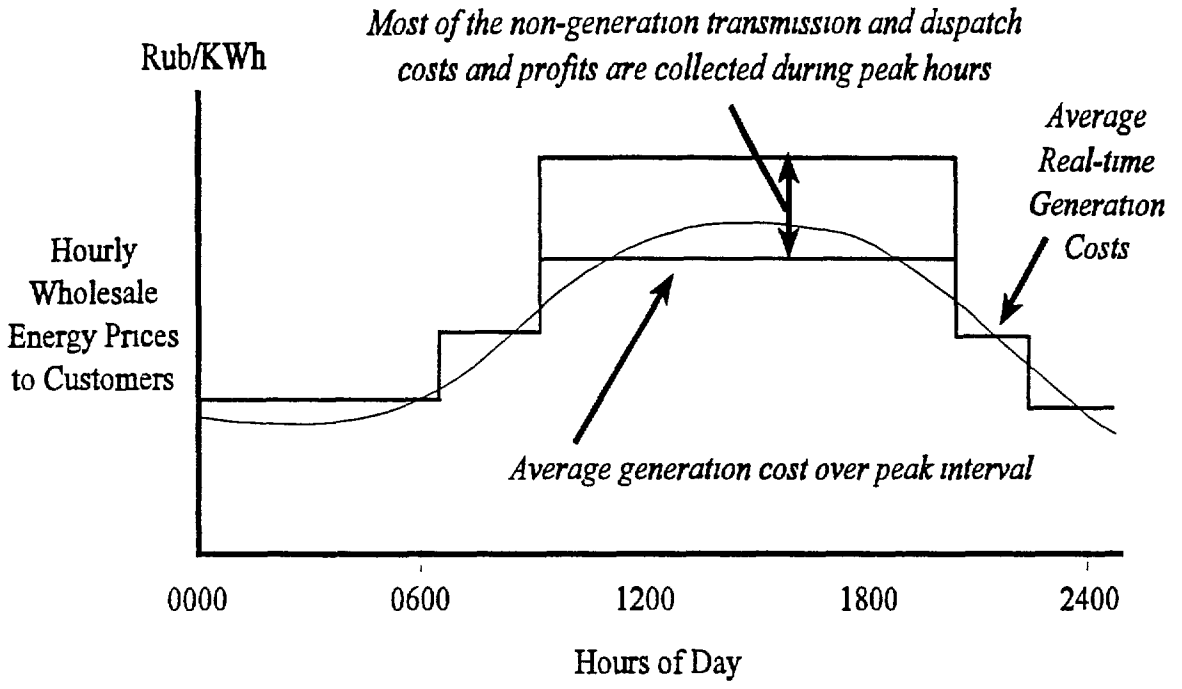
AO Energos, and large end-users that participate in the wholesale market, will also purchase capacity and energy from the wholesale market through contracts The costs of capacity and energy will be allocated through the settlement procedures These procedures will reflect the time-of-day rise and fall of the costs of electricity as customer demand rises and falls In this way, customers are given more accurate price signals This allows a greater "elasticity of demand" (the responsiveness of the level of demand for electricity to prices) This produces an increase in economic efficiency for both the consumer of electricity and for society as a whole The time-of-day wholesale market energy prices to buyers is illustrated in Figure 2-4

Daily cost variations are approximated in a "stepped" structure of two or more price levels A "base-load" price would apply in periods when customer demand is low and therefore generating costs are low (e g , from 10 00 o'clock at night until 6 00 o'clock in the morning) A "peak-load" price would apply in periods when customer demand is highest and therefore generating costs are highest One or more "shoulder" prices might also apply in intermediate periods A higher amount of non-generation costs (for transmission and dispatch) would also be collected during the peak-load period since these costs are also greatest at periods of greatest demand

A similar time-of-day pricing approach would be followed for recovering capacity costs Because capacity costs are also higher at periods of greatest demand, a higher proportion of these costs would also be collected during the peak period

Time-of-day pricing would apply to both AO Energos and large end-users purchasing directly from the wholesale market For the Energo, time-of-day pricing for its customers will be most appropriate for its larger industrial customers Since the wholesale market pricing differentiates the Energo's power costs by time of day, designing the time-of-day rate at the retail level is simplified In designing its time-of-day retail rates, the Energo could also allocate a higher proportion of its own transmission and distribution costs and profit allowances to the peak period

Figure 2-4
Wholesale Prices to Customers Will Track Costs Over Time



2 7 7 Wholesale Market Settlements

A special system of rules and agreements is introduced to separate the settlements of wholesale market suppliers and consumers from the financial activities of RAO EES Rossii as the wholesale market maker and to establish transparency of and accessibility to information on these transactions

RAO EES Rossii does not take title to energy sold through the wholesale market, pay any generator for generation, or sell to or collect from any Energo Rather, through its settlements function, RAO EES Rossii matches purchases and sales among generators and Energos, and sends monthly statements to all participants It is then the responsibility of the Energos to pay the generators according to these statements

The Energos also pay RAO EES Rossii for its services of organizing the operation and development of the IPS and the wholesale market, including payment for organizing the parallel operation of IPS participants

2 8 STRATEGY FOR GROWTH

RAO EES Rossii holds a central position in the industry in terms of the overall industry perspective and as the operator of key functions (organization of the parallel operation of IPS participants, market making dispatch, transmission, reliability planning) It will continue to promote the interests of the industry's enterprises in terms of laws, regulations, and other initiatives needed to attract capital, support investment values, and facilitate the efficient growth and development of the industry In its role of ensuring a reliable power supply throughout Russia, RAO EES Rossii would monitor forecasts of demand of energy requirements and trends, and ensure that a strategy and programs are in place at all times to meet these requirements with a high level of reliability

2 9 INVESTMENT

All government subsidies are eliminated in the market-based system

The following will be used as investment sources

- internal funds generated through depreciation allowances
- a portion of net profits of power sector enterprises
- debt financing
- share sales

Funds generated through depreciation allowances will be the first source of investment funds In the reformed market-based system, power sector entities will have access to both debt and equity markets domestically and in some cases internationally Entities will use debt and equity if these reduce overall capital costs and rates to consumers

The sale of RAO EES Rossii and Energo shares in their generators will be the priority area of attracting investment This will require bringing share prices in line with the value of generators

Share prices would be supported by the wholesale market pricing and contracting mechanisms, tariff regulation, earnings, and dividend policies so that entities can sell new shares and raise needed equity capital at a competitive cost

2 10 REGULATORY SYSTEM AND LEGISLATION

The market-based system relies substantially on the present regulatory structure of the FEC and RECs These institutions must develop improved staff expertise More reliance on the use of contracts and market competition and incentives is envisioned This shifts the regulatory focus, especially in the generation sector, toward ensuring competitive behavior as opposed to regulating costs and profits Authority would be vested with the FEC to administer a system of licenses that spells out the rights and obligations of wholesale market participants

A proper legislative framework is required so that the regulatory system can develop and for all aspects of the reformed market-based system to be implemented This framework will be established when laws are in place on

- Fundamentals of Legal Regulation of Federal Power System (Law on Federal Power System)
- Licensing the Operation of Electricity Supply Companies
- Federal Wholesale Market for Capacity and Energy
- State Regulation of Tariffs in the Power Sector
- Relations Between Energy Suppliers and Customers
- Technological Administration (Dispatch)
- Use of Water Resources in the Generation of Electricity and Heat
- State Technical Supervision of Electricity Supply Companies
- Law on Responsibilities for Non-payment and Late-payment of Electricity Bills of Electricity and Heat Consumer

CHAPTER 3
THE RUSSIAN POWER SECTOR'S TRANSITION TO THE REFORMED MARKET-BASED SYSTEM

This chapter describes the transition period needed for transforming Russia's electric power sector, and for creating a market-based structure that is fully adapted to the market-oriented relations described in Chapter 2

The structural transformation of the power sector and the introduction of market mechanisms in the industry began with Russia's adoption of the system of state regulation of tariffs for electric and thermal energy, and the beginning of the privatization of state-owned power facilities in 1991-1992 Those two major undertakings marked the start of the transition period

Chapter 1 provided a short description of the Russian electric power sector's situation before the deep transformations began The current chapter deals with the main components of the transition period and of the modernization of the power sector that began in 1991-1992 It analyzes what has been accomplished within the framework of the reform measures taken between 1991-1992 and what remains to be done in the near future

3 1 NECESSITY AND GOALS OF TRANSITION PERIOD

The main goal of the transition period is the implementation of practical organizing and technical measures that will make it possible to radically alter the economic relations in Russia's power sector and to change to the relations set forth for the reformed market-based system described in Chapter 2

The transition period is necessary, because unprecedented transformations in the Russian power sector are planned to be effected within several years It is essential that the sector's methods of centralized state management be changed to market-oriented economic relations, so that the sector will reach maximum efficiency while retaining its traditional high reliability of power supply

Numerous macroeconomic, political and sectoral problems are now influencing the duration and effectiveness of the transition period measures These problems should be resolved to ensure the effective functioning of the reformed power sector

It is difficult to say how long the transition period will take In view of the fact that Russia has almost no experience of working in a market-oriented economy, that its economic and political situation is not stable, and that the Russian power sector is large and complex (being one of the world's largest power systems spanning 11 time zones), the sector should be reformed at a moderate pace A period of five to seven years is perhaps the optimum time for the transition

3.2 SUMMARY OF THE SUBSTANCE OF THE TRANSITION PERIOD

During the transition period, the Russian power sector will be transformed under the control of federal authorities along the following lines

1 The management structure of the industry will be changed, and power facilities will change hands It will be necessary to sell the power sector's state-owned property to private investors in order to enhance the effectiveness of investments Furthermore, it will be necessary to form a new management structure for the sector and to ensure its effective functioning

2 The system of ensuring power supply reliability, which is currently based on the state's responsibility to provide reliable power supplies, will be replaced by a system that ensures an equally high level of reliability, but is based on the legal and property responsibility of commercial power structures There, responsibilities start with power plants that generate electricity and Energos which are responsible for power deliveries and power supply to individual consumers, and also encompasses the responsibilities of RAO EES Rossii and the federal and local government and management bodies In this regard, working out and recording in the legislation the distribution of responsibility for power supply among all members of the sector's new structure, testing this new system, and creating a new system of planning and coordinating the work of power facilities, adjusted to the rights and obligations of the new structures of the power sector, are important tasks for the transition period

At the initial stage of the transition period, ensuring the reliability of power supply will be based on the property management of RAO EES Rossii In the future, along with the expansion and upgrading of the legal basis, legal regulation will be strengthened, while property management will be reduced

3 A national wholesale electricity (energy and capacity) market, with economically free entities operating in it, will almost have to be created anew in Russia during the transition period The main steps aimed at creating the wholesale market include

- developing methodological foundations for the functioning of the wholesale market (one of the elements of this joint Russian/American project)
- drafting and adopting legal and normative documents to establish the working procedures for the wholesale market
- developing practical measures to prepare future participants in the wholesale market (e g , bringing electricity producers to the wholesale market, defining the status and responsibility of regional power companies, mastering functions of the wholesale market organizer)
- working out and introducing new methods for price formation and dispatch regulation in the Integrated Power System
- working out and introducing new methods for keeping account of electricity and capacity, and a new system of payment transactions for the delivery and receipt of electricity
- resolution of technological issues, including provision of adequate reserves, enhancement of interzonal transmission capacity, development of an automated dispatch and information system, and installation of meters

4 The retail market for electricity and capacity will be further developed, with more individual consumers being brought to the wholesale market, and differentiated tariffs for electric and thermal energy (e g , depending on the season, time of the day, and other parameters) introduced

5 The full self-financing of all power sector enterprises will be ensured, including financial support for the development of the power sector At present the creation of economic and political conditions for attracting additional investments to the power sector is a priority

6 The system of state regulation of tariffs for electric and thermal energy, created in 1991, requires further development The organizing structure of regulating authorities and their work methods will be improved, including more reliance on market forces for setting prices for electric and thermal energy and reduction in the scope of regulation of tariffs for power and heat generators (if corresponding legal conditions are created, and a well developed stock market is formed)

7 The "legal vacuum" in energy regulation will be filled during the transition period Special normative acts regulating power sector enterprises under new market-oriented conditions will be drawn up, adopted, tested and put into effect Gradually effecting the main legislative acts regulating relations in the power sector is an indispensable condition for reducing state regulation and the influence of RAO EES Rossii on the work of power sector enterprises, including the power plants that were removed from AO Energos

8 Power sector personnel will be trained for working in new market conditions With this in view, modern methods of personnel training will be introduced in concert with working out regulation methods and introducing a new system of market relations

A preliminary, indicative schedule for key activities and events for the remaining transition is depicted in Figure 3 1

Figure 3 1

Preliminary Schedule for Key Activities

(This will be the same as Figure 5 in Executive Summary)

3 3 EXTERNAL CONDITIONS ACCOMPANYING TRANSFORMATION

External conditions of power sector reform are one of the key factors influencing the effectiveness and duration of the transition period There is no need to give detailed coverage of the Russian political and economic situation, within the framework of this report It will suffice to briefly discuss the main problems influencing the reform measures to be taken during the transition period

3 3 1 Political Problems

Political problems in Russia will affect the pace of the transition, including

- The power sector is being reformed in a complicated political situation, including the formation of a new political structure for Russian society The new political structure is being formed under conditions where political forces with different and often incompatible ideas (ranging from the return to the socialist past to the forced march towards a market-based future) are creating tension in the political sphere By all appearances, no coalition is strong enough to impose its will on others This means that time is needed to reach political compromises

- In order to change to a market-based structure (set forth in Chapter 2), a package of legal acts should be adopted that will regulate specific relations taking shape in the power sector This legal basis can only be created, on the condition that the political forces, specifically deputies to the State Duma, reach a compromise on the draft laws under discussion This will also take time

- Moreover, there are problems of a political character affecting the power sector, and its reform will probably be a difficult undertaking if they cannot be solved Among the most important of these are

  a) How will the Russian Federation and its subjects divide the responsibilities and rights in legally regulating power sector relations specifically, who will create a legal basis for the functioning of electric and thermal energy producers? During the implementation of the reforms in Russia, much attention is being devoted to decision-making on the regional level On the other hand, the reform process includes certain elements of coordination and regulation at the federal level, which is a decisive factor for ensuring the reliability of power supply and developing competition As a result, new political feelings may

clash with plans to implement the reforms Resolving these clashes will also call for broader political processes

b) How will the results of the functioning of power plants built earlier with money allocated from the national budget be divided? An answer to this question also calls for general political decisions, because the level of tariffs for electric and thermal energy in various regions of Russia (and consequently, the economic efficiency of consumers production in those regions, especially those with energy-intensive enterprises, depend directly on the way this problem is resolved

c) Will a single all-Russia wholesale market be created, or will regional electricity and capacity markets be needed? An answer to this question depends in part on political solutions because it affects the rights of the Russian Federation and its subjects in the sphere of regulating the generation and transmission of electric energy

3 3 2 Economic Problems and Conditions

Economic problems and conditions will also affect the pace of the transition, including

- Russia has practically no experience in developing and managing a market-based economy The transition from the economic model (which was oriented towards the centrally managed military-industrial complex) to a market-based economy (in which the emphasis is laid on the production of consumer goods) revealed the disparity between old management methods and the changed situation The process of replacing old management methods that suited the command-administrative system, with the new ones intended for working in conditions of competition and a more decentralized economic model, is underway in the Russian economy

- Economic instability, hyperinflation, the decline in economic activity and, as a consequence, the reduction of energy consumption create a situation which is difficult for economic transformation The non-payments crisis is part of the economic problem This crisis broke out simultaneously with the beginning of radical economic transformations in Russia and is still continuing Because of this crisis, enterprises including those of the power sector, do not have enough cash to finance their most urgent needs and implement the most necessary projects (for instance, on January 1, 1995, the debt of energy consumers to power sector enterprises amounted to 15 trillion rubles, or 39 % of the value of supplied products)

- The power sector depends a great deal on the functioning of fuel industries in which there is currently neither competition nor effective management Power sector reforms may be implemented much more rapidly and effectively if market relations and the corresponding regulation system are introduced more actively in the fuel industries

- Capital markets are only now being created in Russia At present most enterprises have almost no experience in cooperating with external investors and financial institutions, no experience in the corporate management of finances, and no adequate and unified accounting system

- Russia has no tradition of commercial law Neither does it have a system of reliable legal support for the fulfillment of commercial contracts This is a very serious problem because numerous contracts, different in form and content, will be concluded both during the transition period and at the reformed market-based stage

- A system of legal regulation for the Russian economy is in an embryonic state The process of creating new regulatory institutions and the working out of normative legal acts of a general character to regulate relations between economic entities is underway

- Numerous new laws, decrees of the Russian President, resolutions of the Russian Government and other legal acts are being adopted Their adoption must be accompanied by the solving of numerous controversial problems, and it will take time to work out compromise decisions and give these decisions a legal basis

3 4 CHANGING THE OWNERSHIP STRUCTURE AND REDISTRIBUTING AUTHORITY IN THE POWER SECTOR

During the transition stage, the power property that earlier belonged to the state is to be handed over to private investors in order to make property and investment more efficient Moreover, it is essential to form an efficient management structure for the industry

To set up a competitive management structure and attract investment, it is feasible by the end of the transition stage to lessen the vertical property integration of the Integrated Power System (IPS) To further this goal, the shares of all power plants built earlier by the state should be systematically sold to private investors Within the new ownership structure, the authority for managing and organizing production and the responsibility for power supply at various levels of the sector's management structure will be revised and changed

3 4 1 Changes in the Ownership Structure Between 1991 and 1992

In contrast to the situation which developed prior to 1992 (when the centrally-controlled power sector was owned by the state), the entire sector is currently composed of joint-stock companies Most of the shares of these companies have been sold to private investors State property has changed hands in the power sector now the state holds only RAO EES Rossii shares In all other power companies it holds practically none This resulted in reduced state control over Russia's power enterprises

A considerable number of power enterprise shares is in the hands of RAO EES Rossii which, as part of the new federal management structure, is responsible for the reliable and efficient functioning of the IPS

Russia launched its privatization campaign in 1991, following the Russian President's Decree on Privatization and the development of annual privatization programs These programs were devised and carried out under the direct guidance of the State Property Committee They were aimed at transforming state-owned enterprises into joint-stock companies, with a certain number of these companies' shares being handed over to the companies' workers

The power sector launched the privatization drive following three Presidential Decrees Decree No 922, dated August 14, 1992, Decree No 923, dated August 15, 1992, and Decree No 1334, dated November 5, 1992 In addition to new property relations, these decrees envisaged the establishment of a new organizational management structure for the power sector

A qualitatively new ownership management structure, which has been taking hold since 1992 in the power sector, is currently characterized by the following

1 In December 1992, the Russian joint-stock company for electric power development, RAO EES Rossii, was set up at the federal level Its main function is to ensure the reliable performance of the IPS The State Property Committee gave to RAO EES Rossii the property of the IPS' networks with a voltage of 220 kV and above, the Central Dispatch and regional dispatch centers' assets, the property of large hydroelectric power plants with a capacity of over 300 MW and state-owned regional power plants with a capacity of over 1,000 MW that were earlier part of the regional power supply organizations, the controlling block of shares of the 72 regional joint-stock companies for electric power development (AO Energos), and other auxiliary joint-stock power companies (some 400 enterprises)

RAO EES Rossii's charter capital was formed in August 1994, when it reached the size as determined by the Charter

Between 1993 and 1995, qualitative changes occurred in the composition of the RAO EES Rossii stockholders When the company was established, all shares were in the state hands However, by February 1, 1995, the state's share in the RAO EES Rossii reached 60% The remaining 40% was sold to labor collectives of power enterprises and other private investors Nearly 400 organizations and some 200,000 people hold shares in the company

The Russian President's decree of November 5, 1992 imposed certain restrictions on RAO EES Rossii shares

- The Russian Government will hold 50% of its shares within the next three years (i e , up to November 1995)
- Thirty percent of voting shares, which are in the state hands, will go the regional property management committees in proportion to the energy consumed by the region

2 Seventy-one joint-stock companies for electric power development (AO Energos) were set up on the basis of 70 power production amalgamations which existed in Russia The legal status of these amalgamations and Tatenergo remains unchanged

By the time this report was prepared 50% of the AO Energos' shares have been sold to private investors As a rule, half of the Energos' shares belong to RAO EES Rossii

3 Twenty-five of the large power plants privatized in accordance with the Russian President's Decree No 923 of August 15, 1992 achieved the status of legal entities and became independent players on the federal wholesale electricity and capacity market Nine power plants were leased by the regional AO Energos from RAO EES Rossii Attempts to withdraw the other power plants from the integrated AO Energos and make them into players on the wholesale market have so far failed

The shares of the majority of power stations which act independently on the wholesale market are in the hands of RAO EES Rossii However, 49% of the shares of the Perchora and Kostroma state-owned thermal power plants have been sold to labor collectives and other investors, with RAO EES Rossii holding the remaining shares

4 On the basis of its Central Dispatch, RAO EES Rossii has set up a subsidiary joint-stock company Regional Dispatch Centers have been incorporated in the regional integrated power systems which are part of RAO EES Rossii As a result, the entire system of day-to-day dispatch regulation, effected within the IPS is under RAO EES Rossii control

The above information on the composition of the shareholders of RAO EES Rossii, AO Energos and other enterprises shows that the role of the state in managing power sector property has changed drastically At the level of AO Energos and power plants, the state has no property influence since state entities do not own their shares except indirectly through ownership of RAO EES Rossii shares

The state exercises control over RAO EES Rossii's performance through controlling blocks of shares

- Distributing 30% of voting shares, which are in the hands of the State Property Committee, among local management bodies allows these entities to exert a strong influence on RAO EES Rossii's policy
- Seven of RAO EES Rossii's 15 member board of directors are appointed by the Russian Government, 3 represent regions, while others are elected by shareholders
- The Federal Energy Commission sets rates for electric and thermal energy supplied to and from the wholesale market, and establishes the norm for subscribers' fees which is RAO EES Rossii's basic source of financing
- In accordance with government regulations, RAO EES Rossii exercises control over the performance of the wholesale market without extracting extra profits
- The size of RAO EES Rossii's gross profit (including investment costs) and the size of its share dividends are regulated by the Federal Energy Commission All extra returns which RAO EES Rossii earns within the IPS are reinvested in the System's development

3 4 2 Changes in Ownership Structure to be Introduced by the End of the Transition Stage

It is worth noting that a new ownership management structure, which meets market challenges, has emerged in the power sector and is unlikely to undergo drastic changes in the future

Two circumstances dictate further changes in the ownership structure

1 The tasks set forth in the Russian President's decrees concerning ownership transformations in the power sector have failed to be met in full In particular not all of the 51 power plants were assigned to RAO EES Rossii, 17 remain integrated in AO Energos In addition, there are some AO Energos whose controlling block of shares has not been turned over to RAO EES Rossii or has been only partially handed over, (Irkutskenergo, Tatenergo, Novosibirskenergo) This situation has developed as a result of political constraints in a specific region or the decisions of the labor collective of a particular power enterprise

2 Creating a competitive environment for power generation calls for separating the performance of all power plants from that of RAO EES Rossii and the AO Energos The situation has become more complicated due to the completion of the voucher, "free" privatization in Russia, and the beginning of a new stage where the shareholders and their interests must be accounted for in making any changes in joint-stock companies' assets Specifically, changes in the assets of enterprises (RAO EES Rossii, AO Energos), including those necessary to promote stronger competition on the wholesale power market, must be brought about through market-based transactions As the requirement arises for separating RAO EES Rossii's and/or the AO Energos' performance from that of power plants (to eliminate conflicts of interest related to property management and power generation, transmission and supply), then the shares of these power plants should be sold on the stock market

Shares should be sold under conditions that properly account for the interests of the shareholders of RAO EES Rossii and the AO Energos, and customers as well This requires the following conditions

- Share prices of generators should reflect the true value of their assets This requires that a power plant have access to an efficiently-priced market for capacity and energy that enables it to sell capacity and energy services on a competitive basis and earn profits commensurate with the market values of the services provided In this way, the stock price of the power plant will be properly valued, and the shareholders (RAO EES Rossii, Energos, workers) will receive appropriate proceeds from the divestment of shares

- For the power plants to be economically free, a comprehensive system of regulation, established through legislation and tested in practice, should be put in place for regulating power supply entities (including RAO EES Rossii,

Energos and power generation companies), to establish competition and promote the reliable, cost-effective supply of power to customers

Measures to be carried out, prior to the end of the transition, in the area of ownership structure are discussed in the following sections

Implementing the Russian President's Decree, Dated August 15, 1992, Regarding the Transfer of Power Plants' Property and Shares to RAO EES Rossii To implement this decree, various methods will have to be used, from holding talks, to implementing coercive (administrative, judicial) measures This issue is discussed further in Section 3 5 2

Withdrawing Power Plants from RAO EES Rossii When considering the withdrawal of power plants from the integrated entities in order to create a competitive environment in power generation, it is essential to take into account two factors

1 Power plants should be made into independent economic entities (either individually or as portfolio generating companies) on the wholesale market to create an environment where the price for power supplied to the market will include profits and costs of power generation only (i e , exclude profits and the costs of power transmission and distribution)

2 The economic freedom of each power plant to prevent RAO EES Rossii and AO Energos from exerting monopolistic influence on its activity should be ensured so that all power plants compete on a level playing field

With respect to bringing RAO EES Rossii's 51 power plants to the wholesale market, the 25 plants assigned to RAO EES Rossii have become independent players on the wholesale market, 9 power plants leased by AO Energos are about to enter the wholesale market, and the remaining 17 are to be withdrawn from AO Energos and made into participants in the wholesale market

With respect to the separation of power plants' performance from that of RAO EES Rossii, the reformed market-based system provides for selling all of the RAO EES Rossii shares in thermal power plants However, RAO EES Rossii will hold all or most of the shares of hydroelectric power plants, which currently play a crucial role in the power supply and peak load periods

The need for withdrawing thermal power plants from RAO EES Rossii at a certain stage is dictated by the restructuring plan, which calls for bringing all IPS power plants to the wholesale market Under the new structure, RAO EES Rossii will continue to exercise day-to-day dispatch control within the IPS, act as the market-maker, and transmit power through

backbone networks If RAO EES Rossii retains control over large power plants under these conditions, this would lead to a conflict of interests

However, separating power plants' property from RAO EES Rossii is not a simple task that can be fulfilled overnight It would necessitate resolving pricing and contracting issues and creating an appropriate investment and operating environment In particular, the following requirements must be addressed

- *Establish Share Prices that Reflect the True Market Value of Power Plants' Property*

  Accomplishing this is inseparable from establishing a power pricing policy and implementing regime A power pricing and contracting system must be implemented that gives cost-competitive generators an opportunity to earn profits, to reward current investors, and to attract new investors for upgrading and expanding power facilities

  The pricing problem is somewhat complex, particularly for existing generators, and it is has not been practical within the scope of this joint effort to resolve this issue definitively, either empirically or politically For example, one might argue that existing power plants were built with state funds and that current shareholders should receive only "constrained" or "regulated" returns This approach will not be received favorably by power facilities owners, nor will it foster strong support for the proposed restructuring and privatization plan presented in this report It also does not financially strengthen the sector or open up access to desperately needed investment financing But one might also argue that investment returns should reflect some notion of "asset values" To illustrate, one could "estimate" values for generators through various means, such as by estimating the "depreciated replacement value" of generation facilities needed under an optimal system-wide dispatch, and then "regulate" prices to produce a specified return on the established values for these facilities But, in addition to being methodologically contentious and regulatory- intensive, such an approach fails to capture the efficiency benefits that should be sought through competition and market-driven enterprises

  In the final analysis, both regulatory and political processes will play a role in establishing pricing policy and investment values during the transition In these processes, however, the "market" should be used as much as possible to resolve price and value issues by introducing competition and efficient pricing signals

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The reformed market-based system described in Chapter 2 includes a competitive wholesale market where generators are paid based on a competitive price-bid system "Capacity" payments may or will be required as well, at least for some generation services All power plants whose shares are to be sold on the stock market should conclude wholesale market contracts/agreements for power supply that account for the price-bid system These agreements should provide the generator with a degree of confidence that its power supply services will find a market and that its investors will have reasonable prospects for recouping funds they invested in shares These agreements should precede any privatization of power plants (the sale of shares on the stock market)

- *Enact Legislation*

Legislation should be enacted and tested to establish the procedures for regulating the performance of power plants and RAO EES Rossii on the wholesale market and in other areas (environmental protection, land tenure) These legislative acts must establish the operating rules of the wholesale market, the procedure for setting rates for the power plants' services, and the licensing procedure for these plants' operation

These legislative acts should establish the legal basis for economic pricing by generators as well as collection from customers that will enable competitive generators to achieve self financing, while also specifying the responsibilities of the power producers to provide power pursuant to licensing agreements

- *Set Up Power Producers Structures*

Even after solving the problems of price formation, signing contracts, and approving much-needed legislation, it is still unclear what electric utility structure would best meet the conditions of competition and privatization The sale of power plants' shares will not help solve this problem Transforming some or all power plants into holding companies prior to the sale of their shares may provide an answer This solution may prove quite successful in establishing financially healthy companies that may become attractive for investors It may also spur competition on power markets

- *Create Management Bodies and Train Managerial Staff at Power Plants*

Making power plants into commercial entities and training personnel is of great importance It is essential that power producers be able to operate successfully in a competitive market environment where they do not enjoy the support of

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RAO EES Rossii This task will become simpler if power plants are grouped into holding companies, because fewer management bodies will be required

Withdrawing Power Plants from AO Energos The vertical disintegration and enhancement of competition in power generation, as well as the support for market incentives, constitute major aspects of transformations in the power sector

The restructuring of the power sector aims at bringing the production of 400 power plants of the regional power suppliers to the wholesale market Following this, nearly all power plants in Russia will be able to compete with each other on the wholesale power market as independent entities, and regional power companies will satisfy their requirements for electric energy through purchasing it on the wholesale market

It is worth noting that one transformation problem has been resolved the power plants that were withdrawn from regional power companies in accordance with Decree No 923, dated August 15, 1992, have become independent players on the wholesale market They will only have to withdraw their property from RAO EES Rossii However, power plants currently incorporated in AO Energos will have to tackle both problems they must sell the electricity generated by their plants on the wholesale market as well as separate the Energo activities from electricity generation

Bringing Energo power plants to the wholesale market helps solve a number of problems

- It breaks the vertical integration between the distribution function--which exercises monopoly control over much of the retail market--and generation As a result, the Russian power industry will be unbundled, with a competitive generation industry separated from transmission and distribution

- It will help liquidate the monopoly of some regional power companies on the power market The transformations that began in 1991 resulted in the AO Energos beginning to assume control over power generation volume and price, which were earlier under federal control However, Russia's generating capacities are located in such a way that 20 territories have a surplus of power, while the other 52 territories experience power shortages The capacity-long AO Energos have been able to extract monopoly prices from those power companies which experience power shortages The reliability of power supply is adversely affected in the capacity-short regions as a result

- It will help enhance the reliability of the IPS Currently, the IPS can not fully rely on all power producers when satisfying collective demand on the Russian wholesale market Bringing power plants to the wholesale market and signing

contracts for supplying electrical power and capacities to this market will induce generating sources to sell their energy To meet the market power demands, load distribution will be effected on the integrated and coordinated basis which requires the least cost

- The process of regulation will become simpler, especially as regards the performance of power suppliers Enhancing the efficiency of integrated power generators and power distributors' performance constitutes one of the most complex tasks of regulation, and it cannot be said that the cost-based traditional regulation schemes are very effective After power plants are withdrawn from AO Energos, this part of the production process will be regulated by market relations and competition The regional power commissions will concentrate their efforts on the efficiency of power transmission and distribution

Obviously, it will not be easy to bring Energo power plants to the wholesale market There are problems related to price formation, share prices, the need for concluding contracts for selling power on the wholesale market, the future structure of power producers, and the system of operation and commercial relations that will allow power plants to act independently

Notwithstanding these obstacles, bringing power plants to the wholesale market is a corner stone of further transformations in the industry These transformations are to be effected throughout the transition stage

To bring power plants to the wholesale market, it is advisable to adopt a special presidential decree and later seal the provisions of this decree in a law Taking into account that the bringing of Energo power plants to the wholesale market affects the interests of the broadest sections of the population as well as various state authorities, it is necessary to enlist the support of the Russian Government, the administration of the Russian President, and the legislative bodies for the transformation program

The process of withdrawing power plants from AO Energos is rather complex, and these power plants should be brought to the wholesale market stage-by-stage In the first stage, the AO Energo will either sell electricity generation by its plants on the wholesale market, or transform its power plants into subsidiary power producers, obliging them to sell electrical power on the wholesale market These generators will sell their power on the wholesale market on a contractual basis This will allow power companies to participate in the operation of the wholesale market, as well as to adequately compare the cost of the power they produce and determine optimal conditions for signing contracts

At the next stage (when an appropriate environment is created), it will be possible to solve the problem of separating power plants' property from the AO Energos by selling the shares of these plants on the stock market in the interests of the AO Energos' shareholders

Redistribute Authority and Ensure Reliable Power Supply during the Transition Stage
Russia will switch from the current system of ensuring reliable power supply based on the state's responsibility for its reliability, to the reformed market-based system that ensures the same level of reliability, but is based on the legislative and property liabilities of power sector commercial entities

The basic tasks of the transition stage are 1) the development and legalization of responsibility-sharing for power supply among all participants of the industry's new structure and 2) the elaboration of the new system of planning and coordinating the activities of the industry's enterprises, adapted to the rights and responsibilities of the industry's new entities

The powers and responsibilities of the state management bodies and commercial entities will be distributed in the following way

Powers of the State Property Committee

- providing methodological support for and privatizing state-owned property in the Russian power sector
- participating in the management of those power companies whose controlling blocks of shares belong to the state

Powers of the Federal Energy Commission

- examining and setting power rates on the wholesale market
- developing and setting norms for power production, transmission and distribution costs while regulating tariffs
- controlling the signing of contracts with generators for the supply of power and capacity to the wholesale market, and controlling the provision of free access to the backbone networks of the IPS
- addressing contentious issues concerning the regulation of tariffs for electrical and thermal energy that arise on the regional level

- responding to customer complaints related to abusing monopoly situations on the wholesale market
- examining the feasibility study of facilities to be built through attracting borrowed funds or using investment funds
- providing jointly with the State Committee on Anti-Monopoly Policy and Support of New Economic Structures, methodology support for the state regulation of monopoly relations in the power sector, including the provision of legislative bases, sectorial mechanisms, and state regulation of natural monopoly entities

Powers of the Ministry of Economy

- devising long-term scenarios for the development of Russia's economy and its regions
- exploring opportunities, with the Finance Ministry for setting preferential rates for some groups of customers
- regulating the norms for revaluing and depreciating the fixed assets of power enterprises
- approving, after RAO EES Rossii's presentation, the balance sheets of electric power and capacity

Powers of the Ministry of Fuel and Energy

- devising the development strategy of the power sector within the framework of the *Russia's Energy Strategy*
- devising proposals for the Russian Government to upgrade the Russian wholesale market for electricity and capacity
- developing proposals for the state support of regional and technical investment programs in the power sector
- preparing a normative and legal basis for governing the activities of the state bodies that exercise control over natural monopoly entities
- approving and exercising control over rules and technical safety norms and the quality of customer service

- interacting with the legislative and executive authorities of the subjects of the Russian Federation
- exercising control over the funds allocated from the state sources to implement investment programs in the power sector

Powers of RAO EES Rossii

- coordinating the plans of all power plants and AO Energos concerning power generation and consumption (drawing up long and short-term balances of power and capacity)
- long-term system planning to enhance the efficiency of resource utilization, selecting economically-advantageous sites for new power plant construction, fostering interconnection ties in the industry and enhancing power supply reliability
- meeting the contract-specified demand of AO Energo and other wholesale market customers through the system of market relations and power purchase contracts to be signed with private power producers
- providing services for organizing the operation and development of the IPS, organizing the operation of Russia's wholesale market, organizing day-to-day dispatch control within the IPS, and effecting load distribution on the basis of price bids
- licensing the wholesale market participants' operations and exerting control over these players observance of government-established market regulations and requirements
- devising projects and building interregional transmission ties and hydroelectric power stations to ensure the reliable performance of the IPS and streamline its operation When the transition stage is over and the necessary environment created, RAO EES Rossii will not bear responsibility for the performance of other power plants and regional AO Energos, it will also not participate in exercising internal control over these companies

Powers of AO Energos

- suppling power to customers on their territories (this is the main function of the AO Energos)

- signing contracts with RAO EES Rossii for receiving power and capacity from the wholesale market or contracting directly with new generators
- being responsible for the design, construction and maintenance of the transmission and distribution systems in their territories (as a rule, AO Energos are not responsible for these functions at power plants, with the exception of smaller power plants or plants built as a "last resort "
- exercising full and independent control over their enterprises and achieving self-financing, and attracting investors (subject to regulatory oversight by the REC)
- allowing some large consumers located in their territories to purchase power directly on the wholesale market
- participating in the operation of day-to-day dispatch control within the IPS, as well as in the single system of planning the sector's operation

Powers of Generator Companies

- supplying power and capacity to the wholesale market (this is the main function of power companies)
- signing contracts with RAO EES Rossii for supplying power and capacity to the wholesale market (or for new generators, with either RAO or directly with Energos or large end-users)
- designing, building and operating new power plants
- exercising full and independent control over their enterprises, regulating their operation, achieving self-financing and attracting investors (with the exception of large hydroelectric power plants that are important system-wide)
- participating in the operation of the day-to-day dispatch control within the IPS, as well as in a single system of planning the sector's performance
- meeting the requirements and operating conditions of the wholesale market, which are established by the Federal Energy Commission and controlled by RAO EES Rossii

Powers of the RECs

- reviewing the Energo's least-cost plan and the prudence of investments and major financial decisions
- enforcing customer service standards and resolving conflicts between customers and the Energo
- regulating the structure and level of retail rates and associated investment return on distribution facilities, and providing for public participation in key deliberations
- approving and/or directing the implementation of performance-based incentives for the Energos

3 5 BUILDING THE WHOLESALE ENERGY AND CAPACITY MARKET

Building an all-encompassing competitive wholesale market is a central focus of the transition

- The market and its pricing provisions create the mechanisms for introducing effective competition into the industry as the basis for improving the efficiency of investment and operations in generation
- The market is also the basis for ensuring that the system is operated to maintain a reliable power supply throughout Russia and to ensure the required power and capacity are made available to all Energos and other energy supply entities

During the transition period, the market will undergo significant development to lay the basis for the market system

The key objectives during the transition are

- to identify the wholesale market and expand its breadth to include all important generators
- to establish and execute an efficient contracting scheme for both new and existing generators, as well as for AO Energos and large customers participating in the market
- to establish efficient wholesale market prices for all generators

- to improve IPS dispatch and introduce dispatch methods based on generator price bids
- to develop and introduce a legal basis for regulating the market's operations of the wholesale market

3 5 1 Present Status of the Wholesale Market

Following the Presidential Decree of 15 August 1992 (No 923), RAO EES Rossii has been successful at establishing the beginnings of the wholesale market

Since 1993, RAO EES Rossii has been implementing a principally new (as opposed to the previously existing) model of the all-Russian wholesale energy and capacity market

Under the new model the wholesale market includes RAO EES Rossii, all 72 regional AO Energos, 23 hydro and thermal power plants and 8 nuclear power plants (with the exception of the Bilibinskaya nuclear power plant (NPP), which works in isolation) Thus, nearly all of Russia's NPPs operate in the wholesale market The thermal and hydro power plants participating in the market constitute only a very small share of Russia's total capacity On the whole, the market purchases about 30% of the electric power produced in Russia

RAO EES Rossii operates the wholesale market Its interregional transmission lines serve all wholesale market participants RAO EES Rossii also dispatches the IPS

The wholesale market now operates on a system of state price regulation in-market electricity prices for generators (including NPPs), out-market prices for energy-short Energos, and the fixed charge for RAO EES Rossii's services as the IPS operator are all set by the Federal Energy Commission

RAO EES Rossii purchases capacity and energy from generators under two-part (capacity and energy) contracts These power purchase contracts are priced to cover the generator's actual costs and control its profits

- The capacity component is priced to cover the generator's fixed costs plus a profit allowance
- The energy component is priced to cover the generator's variable costs incurred in providing energy A small profit is also built into the energy component to provide an incentive to the generator to be efficient and available for dispatch

Sales to Energos from the wholesale market are made under regionally-differentiated one-part tariffs (kWh charges only) Rates are established by the Federal Energy Commission, normally on a quarterly basis

Those in effect for the second quarter of 1995 are

Zone	*Tariff (Rub/kWh)*
North West/Center/Urals	63 73
Volga	54 20
N Caucasus	57 43
Siberia	50 09
Far East	28 40

Plans are currently underway at the FEC and RAO to reduce the number of pricing zones to three and to introduce two-part tariffs (capacity and energy) for sales to the Energos from the wholesale market

Through its settlements procedures, RAO EES Rossii matches up purchases and sales in the wholesale market and sends settlement statements to all the market participants

RAO EES Rossii does not earn a profit in its role as the wholesale market operator RAO EES Rossii's expenses for managing the IPS are covered with the fixed charge the IPS entities pay for the services RAO provides under contracts Fixed-charge rates are set by the FEC The fixed charge includes the following services

- maintenance of the IPS interregional transmission lines,
- dispatch of the IPS,
- operation of the wholesale market
- technical supervision of IPS power plants and transmission network of the IPS,
- the IPS growth measures (forecasting, design and development, investment, construction, etc)

3 5 2 Expanding Wholesale Market Participation

Expanding the breadth of the wholesale market will involve implementing initiatives dealing with the 51 Group plants and Energo generators

51 Group Compliance

Compliance with Decrees Nos 922 and 1334 is substantially incomplete Only 25 of the 51 plants are in compliance and selling into the wholesale market The plants subject to these decrees but not participating in the wholesale market are

- Nine plants remain as assets of RAO EES Rossii, but are leased to Energos In accordance with the lease terms, the electricity generated by these plants belongs to the relevant Energos
- Five plants owned by Energos are 100% subsidiary companies of RAO EES Rossii These plants' electricity is thus also owned by the Energos and is not sold directly into the wholesale market
- Twelve plants are still owned by Energos They do not participate in the wholesale market

Gaining the participation of these plants is a high-priority requirement for 1995 Compliance with laws and regulations must become a well established industry practice if a market-based system is to be established The wholesale market needs power from these plants to meet the collective needs of Energos reliably and efficiently The hoarding or the retention of power for one's own benefit violates the principle of fairness in using previously state-owned and state-developed resources

The task of including the 25 Energo-owned plants could be carried out in the following way

- Personnel training will be required at plants that have remained with Energos because their personnel are not yet ready to operate independently under difficult market conditions Using its right to ownership of the plants, RAO EES Rossii will put through the necessary change The plants include
  - Those leased to Energos Kashirskaya, Shaturskaya, Reftinskaya, Verkhne-Tagilskaya, Sredne-Uralskaya, Kirishskaya, Novocherkasskaya and Primorskaya TPPs and Novosibirsk HPP
  - Those inside RAO EES Rossii's 100% subsidiary companies Cheboksarskaya HPP, Iriklinskaya TPP, Surgutskaya TPP-1, Surgutskaya TPP-2 and Chirkeiskaya HPP
- In order to carry out Decree 923 with regards to certain other power plants, RAO EES Rossii will undertake a joint effort with the State Property Committee, Ministry of Fuel and Energy, and regional governments The plants that are the target of this initiative are

- Zainsk Thermal Plant and Nizhnekamsk Hydro Plant in Tatarstan
- Karmanovsk Thermal Plant in Bashkiria
- Tom-Usinsk and Belov Thermal Plants in Kemerove (Siberia)
- Bratsk Hydro Plant, Irkutsk Hydro Plant and Ust-Ilimsk Hydro Plant in Irkutsk (Siberia)
- Viluisk Hydro Plant in Yakutia (N Siberia)
- Nazarovsk Thermal Power Plant and Krasnoyarsk Hydro Power Plant in Krasnoyarsk

Inclusion of Energo Generators in the Wholesale Market

Gaining the AO Energo generators' participation in the wholesale market is also an important transition priority

During the power sector's development, some AO Energos were endowed with adequate or surplus generation, and others were left with inadequate or no generation At present, AO Energos are not required to offer generation capacity to meet the needs of capacity deficient AO Energos, and when it is offered, the prices can be high The cost disparities among the AO Energo generators are also substantial (up to ten-fold)

Like the 51 Group plants, the AO Energo plants were built with state funds It is not unreasonable to require that this generation be made available to serve broader Russian power market needs By participating in the wholesale market, Energo generators can be brought under efficient economic dispatch and the economic discipline of competitive markets Their inclusion will also allow the control of existing generators' surplus profits under a consistent national policy and pricing methodology, a key feature of both the transition stage and reformed market-based system It will also help reduce the differences in electricity prices across regions In sum, inclusion of Energo plants is a logical and important feature of the restructuring plan

Gaining the participation of the Energo generators is more problematic and must be approached within the broader context of gaining consensus and legislative support for the overall restructuring plan

3 5 3 Wholesale Market Contracts and Licenses with Generators

In the transition, power purchase contracts and/or wholesale market licenses (collectively, called "Agreements" here) will be executed between generators and RAO EES Rossii on behalf of the wholesale market In the reformed market-based system these Agreements will replace the current price regulation for generation The 51 Group, nuclear stations, Energo

generators and new generators will all operate in the wholesale market under these Agreements

The structure of contracts during the period leading up to the implementation of the price-bid system, and the passage and testing of supporting legislation will differ from the Agreements after the price-bid system is fully functioning

Before the price-bid system is implemented, generators will operate in the wholesale market under interim, "conventional" power purchase contracts These contracts will include a fixed payment for capacity and payments to cover energy

Because these interim contracts are intended to accomplish essentially the same purpose as the present price regulation system (i e , paying generators based on their costs and controlling the level of profits), it will be important that the contracts reflect generators' fixed and variable costs as closely as possible Generators might earn additional profits under these contracts by reducing their costs below the contract prices This incentive would help promote generator efficiency

In concept, these interim contracts offer several potential benefits They can help hold down electricity rates and reduce the need for regulation However, their execution and administration are challenging aspects of the restructuring plan Two factors in particular must be dealt with

1 With the exception of their owners and operators, no one knows in advance the exact costs of these generators These costs are dynamic, particularly in the present inflationary environment Today's operating and maintenance costs may not be representative of what is achievable under circumstances where reasonable amounts of capital are regularly invested in plant improvement and preventive maintenance For these reasons, structuring and administering these contracts will be problematic

2 Contracts constrain (or define) the investment value of generators (and thus, current stock values and privatization proceeds) This will be a keen concern for plant owners (workers, RAO EES Rossii, Energos and GKI)

The difficulty in structuring and administering contracts will be substantially lessened upon the implementation of competitive price bids for dispatch, payment of generators based on the marginal price-bid, and implementation of the wholesale market licensing system With the price-bid system, a straightforward payment and incentive for energy generation and sale can be included in Agreements, and this would eliminate or reduce the need to negotiate either fixed payments, or to audit or otherwise try to control the generator's costs This is only one of the reasons why the price-bid system will be implemented as early as possible in the

transition period Properly structured Agreements with profit incentives that reward efficiency can have two additional positive effects 1) they can build support among generators to participate in the wholesale market and 2) they can reduce power costs

Early in the transition, RAO EES Rossii will work with representatives of generators and the FEC to begin working out the details of the price-bid system and related contracting principles A considerable degree of empirical analysis is needed to support this process In addition, the price-bid system must be supplemented with other contracting mechanisms, e g , for hydro facilities and for a range of ancillary services such as spinning reserve, cold-start reserve and other services needed for reliability Also to be addressed is how to best implement the price-bid system for existing thermal generators This is currently complicated by the depressed level of demand and existing structure of the generation sector (characterized by a large number of individually owned and operated power plants)

The second issue -- the effect of interim contracts and longer-term Agreements on investment values for previously state-owned assets -- is a matter of public policy Investment values that support privatization and ongoing financial viability must be balanced with corresponding tariff levels and costs to consumers Because potentially hundreds of Agreements must be consummated, this issue will arise often Its resolution also affects the motivation of assets owners to support the restructuring plan Establishing a policy to resolve this issue and adopting contracting guidelines is therefore essential RAO EES Rossii will take the initiative to organize the relevant government agencies on this task (see Section 3 7)

In the reformed market-based system, existing and new generators will operate in the wholesale market under the same basic Agreements An exception might be that the profits of some existing generators may be contractually constrained, but the need for and advisability of such contractual limitations (except for hydro plants) have not as yet been empirically demonstrated or subjected to rigorous economic policy evaluation

New generators may enter the wholesale market in two basic ways 1) by securing a license to participate and operate in the price-bid spot market independent of a RAO EES Rossii competitive procurement, or 2) by bidding in response to competitive procurement programs administered by RAO EES Rossii on behalf of the wholesale market In either case, the new generator's potential profits will be a function of market conditions and its competitive cost position

Until the price-bid system is in place, however, a proxy for the marginal generator's hourly bid is required to accommodate potential new generators that might operate in the spot market This will be accomplished by paying new generators the highest variable cost of the marginal generator(s) for each hour This variable cost is determined by the marginal generator's interim contract or by the interim price regulation until bidding is implemented In the reformed market-based system, the marginal generator's bid will set the hourly price

3 5 4 Contracts With New Power Plants Outside the Wholesale Market

An additional element of competition is introduced if Energos and large end-users also support new power projects by contracting with power developers and generating companies Since the Energos have the ultimate responsibility to meet their obligation to serve, establishing arrangements where they (and large users) can contract directly with new power suppliers is a valid policy During the transition, provisions will be developed to support this policy In developing these provisions, every effort will be made to retain the key feature of the wholesale market the sale of the new plant's energy through the market under the price-bid system Wholesale market pricing, settlements and operating procedures must account for and accommodate these "outside-the-market" arrangements

Another important form of contracting outside the wholesale market is price hedge contracts, also known as contracts for differences These allow buyers (e g , Energos) and generators to enter into contracts to manage price volatility for either or both parties This form of contracting is anticipated to develop outside the wholesale market to meet the needs of participants, but will not affect the operation of the market itself

3 5 5 Implementing Generator Price Bids and the Dispatch System

This is a key activity and will be accomplished as early in the transition as possible

- It promises the quickest efficiency gains
- It greatly simplifies the negotiation and administration of power purchase contracts with existing and new generators
- It simplifies economic dispatch

Generators in the wholesale market are currently dispatched according to a "merit-order" based on each generating unit's fuel consumption The merit-order calculation does not account for fuel prices This is not the same as dispatching on the generator's variable costs, which would include the prices of the fuel inputs Thus, the current system is not achieving a least-cost dispatch

At a minimum, early in the transition period all generators in the wholesale market will be dispatched by variable costs This requires that fuel prices be included in variable cost calculations along with any additional variable operating and maintenance costs

These cost data must come from power plant operators, who possess accurate information on fuel prices, conversion efficiencies and other cost factors that must be assembled for each generator A system must also be established to maintain the accuracy of these data as their values change Assembling and maintaining accurate variable costs for generators is a major challenge

A solution to this problem is to introduce the generator price-bid dispatch system as quickly as possible As described in Chapter 2, the competitive bidding system sets up strong incentives for plant operators to provide accurate variable cost information, (i e , their bids) on an hourly basis No system of data collection, updating and monitoring will be able to match the timeliness and accuracy of a properly implemented bidding system The possibility of quickly implementing bidding, at least in parts of the system, places priority on completing the necessary empirical analyses (see Section 3 5 6 below)

A longer-term activity during the transition stage is to upgrade automated control, communications and dispatch (ACCD) capabilities These improvements will involve the installation of new hardware, software, and communications equipment, and the replacement of existing monitoring and control equipment at substations and generators The hierarchical structure of the existing dispatch system will be retained (a single dispatch center coordinating the actions of seven regional centers), but the level of automation in each center and the "real-time" communications capabilities between these centers and the system's operating assets would be enhanced The new system would have a "distributed architecture" that more easily permits power plants and substations to be added as the electric power system moves through the transition stage

3 5 6 Empirical Analyses

As Russia moves ahead to the next phase of transition, it will become increasingly necessary to support decisions and implementation programs with solid empirical analyses

Fortunately, important progress has been made to establish this capability The Russian Electric Power Sector Market Operational and Financial Framework (REPMOFF), a planning and analytical model developed under the current privatization work, enables many of the needed empirical analyses to be conducted In particular, some of the issues that can now be investigated empirically include

- What would the current and projected wholesale rates based on existing generator average costs for markets built around existing regions or a combination of regions, and how do these change under alternative policies for generator profits? How do these change if world energy prices are implemented in the Russian power sector?

- What will the current and projected wholesale rates be based on existing generator marginal costs and a price bid system for markets built around existing regions or a combination of regions, and what is the level of generator profits? How do these change if world energy prices are implemented in the Russian power sector?

- What is the potential degree of competition by region, e g , is there a sufficient number and diversity of generators?

- Is there transmission congestion, and how does the removal of congestion or increases in inter-regional transmission capacity affect the marginal costs of power supply by region?

- Is the approach to the reformed market-based system equally applicable to all regions or will modifications be required to account for the size, generator makeup, or other characteristics for any particular region?

The answers to these questions will be valuable in such activities as implementing the generator price-bid system, designing wholesale rates, making tradeoffs between efficiency and rate levels across regions, structuring and negotiating long-term contracts, and deciding on the desired structure for the generation sector

3 6 MAKING THE RETAIL MARKET MORE COMPETITIVE AND EFFICIENT

During the transition period, many important changes must occur at the retail market level (defined as the Energos and their customers, including large end-users that might contract directly with the wholesale market)

One of the more significant changes is the sale of electricity generated by Energo plants on the wholesale market and the subsequent focus on the distribution function (discussed in Section 3 4) Other important changes concern commercialization and investment promotion, large customer programs, transmission wheeling and energy efficiency

3 6 1 Commercialization and Investment

Nine Energos are currently 100% owned by RAO EES Rossii In the remaining Energos, RAO EES Rossii owns 49 to 51% The other shares of each Energo are held by some combination of the workers at the Energo and other shareholders

RAO EES Rossii's ownership of the Energos will be substantially reduced during the transition period, starting with 1999 The development and implementation of an investment promotion program including the sale of Energo shares will be an important priority in the transition stage (Section 3 7)

However, a significant hurdle will be to commercialize this large number of geographically dispersed enterprises that must assimilate a wide range of management skills and learn how to operate independently in a new and competitive environment The Energos must establish the ability to collect payments from their customers, generate internal funds for investment, raise capital in external markets, and cultivate professional investor relations and investment promotion The success of RAO EES Rossii's investment promotion program to divest Energo shares will depend in part on effectively establishing these capabilities at the Energos

The need to develop expertise within Energos will undoubtedly vary, some Energos may be ready for stand-alone commercial operation soon Others may require extensive development These questions will be resolved for each Energo Then a comprehensive plan and schedule will be prepared to achieve their effective commercialization

Part of such a plan will be an evaluation of whether seeking foreign strategic partners for Energos through investment promotion should be pursued This approach might more quickly establish the needed commercial management capabilities at selected Energos

3 6 2 Large End-User Programs

During the transition, three changes at the Energos regarding large users will be significant

First, conditions will be created at the Energos to allow their large customers to contract directly with the wholesale market for power supplies and to pay the Energo a use-of-facilities charge for moving their power across the local network This requires each Energo that serves such customers to develop a local network wheeling tariff, and establish conditions and procedures for its large customers to take the wheeling service The FEC will issue policy guidelines and directives on establishing retail wheeling services The Energo's rates and policies will be subject to the approval of the local REC However, a large end-user that believes its retail wheeling costs are unfair and discriminatory may appeal the rate to the FEC

Second, as the transition progresses, the Energo will see more accurate price signals from the wholesale market, in particular how power costs vary over the period of a day This enables the Energo to implement time-of-day rates for any customer that can justify installing the necessary meters

Third, the Energo may find it necessary to require very large users to sign long-term contracts if they elect to be served by the Energo This helps protect the Energo from the risk of contracting for long-term capacity to serve the large use customer without having a corresponding commitment from the customer

3 6 3 Transmission Wheeling

Those Energos that own and operate transmission facilities that are also needed by the wholesale market operator to move bulk power supplies, will make these facilities available through transmission wheeling tariffs These tariffs will be prepared and filed with the FEC The FEC will have approval and oversight authority for transmission access and pricing

3 6 4 Energy Efficiency

With more accurate price signals from the wholesale market (time-of-day costs, demand and energy costs, hourly spot market prices), the Energo can design and implement more accurate rates for its customers to promote the efficient use of electricity The wholesale market also provides a convenient measure of the value of saved energy and capacity, which can provide the justification for a range of Energo-sponsored energy efficiency and load management measures

3 7 FINANCE AND INVESTMENT

Attracting domestic and foreign capital to finance the rehabilitation and expansion of Russia's electric power industry is an essential goal of the restructuring and privatization plan In the past, the electricity industry relied on government appropriations to meet its capital needs This source of financing has all but ceased The industry must now rely on funds generated internally while it strives to develop sources of external capital RAO EES Rossii, generating companies and Energos must become financially viable if they are to survive and grow This requires adequate capitalizations, healthy cash flows, and a facilitating regulatory environment

Certain of the conditions that adversely affect finance and investment in the power sector are macro-economic in nature RAO EES Rossii, other industry participants, and regulators cannot unilaterally resolve or meaningfully influence these conditions Fortunately, progress is being made in the broader economy in addressing macro-issues

This report focuses instead on those high-priority transition stage initiatives that are more or less within the purview of RAO EES Rossii, regulators and industry enterprises These initiatives deal with

- customer non-payment and receivables management
- regulatory policies
- accounting and investor disclosure
- investment promotion
- financial training

Each of these is discussed below

3 7 1 Customer Non-payment and Receivables Management

Accounts receivable collection is an urgent issue requiring the adoption of new business practices

The revenue generating potential of the power sector is large At an annual consumption level of approximately 900,000 GWh and the June 1994 system average retail rate of 43 8 rubles per kWh ($0 023 at prevailing exchange rates), the sector's total annual revenue potential is around $20 billion The exact magnitude of the payments problem is not known However, it is estimated that the industry's collections fall in a range with a low of $10 billion and a high of $16 billion, creating a shortfall of between $4 and $10 billion The elimination of this shortfall is the most important and largest source of capital in the near future

The immediate focus in the transition stage will be on the industrial and agricultural customers that account for a high proportion of receivables owed to Energos Although the amount owed by residential customers is also large, collecting these receivables requires a disproportionate effort at this point

The primary transition stage initiative to address the non-payments problems is to improve the accounts receivable management at Energos This involves a two step process

1 RAO EES Rossii and one or two pilot Energos will develop a model approach for accounts receivable management, including organizational structure, and policies and practices for customer services and collections The model approach will focus on large customers, but will be generally applicable to all customer types New programs and policies will address 1) late payment charges that fully reflect inflation and include penalties, 2) discounts for timely payment, 3) security deposits for slow paying customers, 4) level billing programs to reduce seasonality of cash flow, 5) theft of service, 6) use of debt

management tools including consolidated statistical reporting, performance measures and software, 7) management incentives, and 8) information technology

REC participation in each pilot Energo will be encouraged The RECs can be instrumental in establishing policies and rules on collecting accounts and terminating service These rules might include an expanded service disconnection authority, a policy setting forth the terms by which RAO EES Rossii and Energos are required to serve customers, and the obligations of customers to pay for service in a timely manner

2 The model program will be introduced and promoted to all Energos on a prioritized basis, with those Energos suffering the most severe non-payments targeted first Setting these priorities will require analyses of accounts receivable by region and Energo, and by type of service (district heating versus electricity) Regional training will be the primary means of expanding the model program to other Energos RAO EES Rossii will also serve as advisor to the Energos in the development of accounts receivable policies and the execution of credit and collection strategies formulated with the model program

3 7 2 Regulatory Policies

Just as important as customers paying their bills, enterprises must be able to set prices that produce enough profits and dividends to attract financing and investment on reasonable terms The rates and policies that affect the financing capabilities of enterprises and the attractiveness of these enterprises as investments are largely determined by the FEC (for RAO EES Rossii) and the RECs (for Energos)

It is critical that the inter-relationship between regulatory practices on the one hand, and the availability and cost of capital and sector investment values on the other, be thoroughly understood by RAO EES Rossii, Energos, FEC and the RECs A task force composed of representatives from each of each of these groups should evaluate regulatory impacts on finance and investment, and attempt to develop policy guidelines on

- allowed profits on regulated activities, differentiated by former state assets versus new investment
- dividend payments to investors

- capital structures and steps that can be taken jointly by the enterprises and the regulators to secure debt financing
- depreciation allowances for rate determination purposes

The impact of regulation on investment values in the power sector has another timely relevance during the transition stage when further privatization will occur Regulatory practices affecting power rates and allowed profits on previous state assets will in large measure determine the proceeds that the Russian Government will receive from privatization sales For example, the government is now planning to sell a 10% block of RAO EES Rossii stock (representing approximately 5% of the power sector) At current prices, this stock sale will fetch about $140 million In contrast, the depreciated replacement value of RAO EES Rossii's generation holdings is likely in the $30 to $50 billion range, and 10% of this value is $3 to $5 billion The depreciated replacement value of RAO EES Rossii's transmission and distribution holdings might approach the generation values Since RAO EES Rossii has no debt, the contrast in values is extreme $140 million (10% of RAO EES Rossii based on the market price of stock) versus as much as $5 billion or more based on depreciated replacement values Large scale sale of RAO stock under existing conditions should not be made at this time because it is financially damaging to the Government of Russia

The point is not that depreciated investment value is an efficient benchmark, rather, the point is that efficient market-based generation pricing will undoubtedly yield higher investment values than currently prevail

The government can capture higher privatization values through pricing the power services provided by assets (generation, transmission, distribution) But of course higher stock values and privatization proceeds mean higher electricity prices for consumers This is an important public policy trade-off that the task force should carefully evaluate and understand Establishing more conformity between the true market value of electricity and the underlying assets on the one hand, and stock prices on the other might represent good public policy

3 7 3 Accounting and Investor Disclosure

The entire sector has much work to do to improve its accounting and financial disclosure Early in the transition stage, two initiatives will receive high priority adopting a uniform system of accounts (USOA) and preparing a comprehensive RAO EES Rossii prospectus

Uniform System of Accounts Both the transition stage and reformed market-based system will require reliance on uniform cost and accounting data that do not currently exist in Russia A USOA is required It should be responsive to three major uses 1) supporting the decisions of enterprise managers on the full range of operating, investment and control activities, 2)

disclosing the performance and status of the enterprise to investors, and 3) setting of rates and other decisions by regulators

RAO EES Rossii will work with the FEC to expedite the adoption of a USOA for the power sector To the extent possible, an existing USOA from another country will be adapted to Russian requirements The FEC must order its adoption by all entities that it or the RECs regulate and set the schedule for implementation The Law on State Regulation of Electricity and Heat Tariffs of the Russian Federation provides that the FEC set a single system of accounts for all energy-supplying organizations

RAO EES Rossii Prospectus A full prospectus will be prepared for RAO EES Rossii This will serve several purposes First, it will be essential to support efforts by RAO EES Rossii to raise capital, including selling additional shares The process of preparing the prospectus will provide invaluable training on a key activity that will be repeated many times in the future, not only for RAO EES Rossii, but also for the Energos and generating companies Since RAO EES Rossii is a principal owner in these other power sector entities, it has a strong interest in making its expertise in preparing a prospectus more broadly available

3 7 4 Investment Promotion

Investment promotion activities will be stepped up during the transition stage This has several benefits It supports the transition program by continuing to attract domestic and foreign investment It provides valuable feedback to Russia and power sector entities on the urgency of addressing investment obstacles It keeps Russia informed of the requirements of foreign investors, and helps power sector enterprises learn how to better negotiate and contractually structure private sector transactions As the transition progresses, promotion to Russian investors will also become increasingly important

A diversity of investors and projects will be pursued because it is not possible to know with certainty which types of investors are most likely to materialize One area for obtaining investment funds is through the sale of shares in power sector enterprises, including

- Sale of RAO EES Rossii common stock
- Sale of shares in generation
- Sale of shares in the Energos
- Investment in specific projects (particularly new generation, major renovation of existing generation, and new transmission) This will involve the

identification and assignment of priorities for specific projects that can be offered to international power sector developers and/or strategic partners

The adoption of project financing concepts to the Russian power sector will also be pursued through RAO EES Rossii's investment promotion activities

3 7 5 Financial Training

Successful implementation of the restructuring and privatization transition will require that RAO EES Rossii, the Energos and the generating companies equip themselves with the tools of modern corporate financial management RAO EES Rossii will seek further training for its own staff and help organize and deliver training for the Energos and generating companies

The areas where training is needed include

- capital budgeting and financial planning
- accounting principles and practices
- financial strategies for securing debt and equity (including financial disclosure, corporate governance policies, securities management, strategies to enhance the value of the enterprise, international financing opportunities and methods, and methods of debt financing)
- corporate financial policies (e g , dilution, capital structure, and dividend payout)

Training is discussed further in Section 3 9

3 8 REGULATION

There are certain principles that should guide the building of the regulatory system First, the system should support the transition to a market-based economy That is, it should employ profit incentives instead of direct regulation wherever practical, encourage competition wherever possible, and prevent the abuse of the market power where competition is not workable Second, regulation needs to acknowledge the central role that RAO EES Rossii must fill during the early years, but provide for an evolutionary change in that role as the wholesale market is established, as RAO EES Rossii disposes of its Energo and generation ownership, and as other power sector enterprises mature Third, the regulatory system should build on the current federal-regional system wherever possible

The current regulatory system is already positioned in many ways to facilitate the transition process However, building adequate staff expertise is a major requirement and certain additional authorities will be needed This section first reviews the current regulatory structure and authorities It then briefly discusses those changes most needed early in the transition stage

3 8 1 Present Regulatory System

The functions of the principal state agencies in regulating the activities of electric power sector enterprises are discussed below

Ministry of Economy/Ministry of Fuel and Energy The Ministry of Economy (MOE) and the Ministry of Fuel and Energy (MFE) exercise policy and management roles The MOE establishes pricing policy for all wholesale and retail transactions through its Committee on Pricing Policy

There is currently no practical licensing of plant operation or construction The MFE maintains control over the technical aspects of operation and monitors safety through its Office of the Chief State Inspector, which has the authority to shut down any power plant for violations of safety criteria There is currently no concept in place of licensing enterprises to participate in the wholesale market

The Council of Ministers has established independent regulatory bodies to handle wholesale rate-making (the Federal Energy Commission -- FEC, located in Moscow) and retail rate-making (Regional Energy Commissions -- RECs, located in each of 72 separate energy regions and the cities of St Petersburg and Moscow)

Federal Energy Commission The FEC was established in 1992 pursuant to the Act of the Council of Ministers No 493 The FEC currently comprises twenty members, including representatives from the government and the private power sector The members of the Commission are appointed by the Russian prime minister and serve unlimited terms They can be recalled at any time The federal government bodies represented on the Commission are the MFE, Railways, Communications, Labor, Finance and Agriculture The Minister of Economy serves as the FEC chairman The president of RAO EES Rossii is also a member

The FEC has maintained no permanent staff and has had no budget The members have had no routine functions and have not been required to meet on any periodic basis The FEC's members have not been compensated for their service Under the direction of the Council of Ministers, the FEC's organizational and technical activity has been provided by the MOE exclusively As a result, the FEC has been subordinated to the MOE from the standpoint of policy-making and administration

Currently, the FEC has two official functions

- *Regulating wholesale electric power rates*, which includes transactions between a wholesale power producer and RAO EES Rossii, between a wholesale power producer and an Energo, and between an Energo and RAO EES Rossii Fixed charges payable to RAO EES Rossii by Energos for organization and development of the IPS are approved by the FEC To the extent that these current regulatory practices are adequately authorized by the previously cited Ministerial Acts and promulgations of the Ministry of Economy, it would appear that the FEC might currently have broad enough authority to regulate the market-making and pricing features of the wholesale market as envisioned in this report, and related issues

- *Acting as arbitrator of disputes at the regional level*, where it is authorized to make decisions regarding retail rates to customers when there is a dispute between a customer and a REC or an Energo

The FEC also establishes the methodology for setting tariffs, which are followed by the RECs Whether this authority could be extended to require the Energos to use a uniform system of accounts is not clear

Some of these features of the FEC are changing rather soon In March 1995, President Yeltsin signed a decree which transforms the FEC from a "volunteer" group concerned only with power sector pricing issues at the wholesale and RAO EES Rossii-owned asset level, into an independent regulatory agency with five full-time commissioners (nominations are now being gathered)

Regional Energy Commissions The Law on State Regulation of Electricity and Heat tariffs provides the legal basis for the 74 RECs

In principle, the RECs are rate-making organizations whose members are approved by the local government Each region is authorized to establish a fund to pay for the rate-making work involved

The RECs are authorized to approve sales by Energos and re-sellers to customers, and sales from Energos to re-sellers

3 8 2 Legislation and Changes to the Regulatory System

The transition requires that a legislative basis be established for the structure, operation and regulation of the power sector This legislation would build on the current federal-regional framework through establishing authorities, policies, and legal bases

The most critical legislative acts that are needed as soon as possible in the transition are summarized below

Fundamentals of Legal Regulation of Federal Power System (Law on Federal Power System) The purpose of this legislation is to define the Federal Energy System which, in accordance with Article 71 of the Constitution of the Russian Federation, is within the jurisdiction of the Russian Federation and which, in accordance with Article 76 of the Constitution, is governed by federal laws valid throughout the Russian Federation

Legal Basis for Tariff Regulation The Law on State Regulation of Electricity and Heat Tariffs has been adopted by the State Duma This Law determines the basic principles for state regulation of electricity and heat tariffs, ensures customers the transparency of the rate-making process in the power sector, and provides for access by customers to associated documents and information This legislation provides for a balancing of interests between electricity supplying organizations and customers It also provides the required legal basis for the FEC's activities and for the possibility for any affected party to lodge complaints against the FEC (through the Russian Arbitration Court)

The Law provides, on the one hand, for a single methodological basis for electricity and heat tariff regulation through the Russian Federation and, on the other hand, ensures the rights of the Subjects of the Russian Federation to set rates for customers in their area of operations

The Regulation of the Wholesale Market This legislation would establish the legal principles for the operation of the wholesale market It would establish the basic structural, operating and pricing framework of the wholesale market and require all generators to participate in that market It would apply nationally and preempt any regional laws and regulations affecting wholesale market structure and pricing It would provide policy directives and empower the FEC on a broad range of wholesale market issues, e g

- On specifying the conditions under which a significant generator may be exempted from participating in the wholesale market This authority would apply to both existing generators and generators to be built in the future, regardless of ownership

- On licensing enterprises to participate in the wholesale market This authority would be broadly established, including the authority to license the system operator, the wholesale market organization, the settlements organization, transmission entities, distribution enterprises, and other entities to ensure

unbiased and efficient fulfillment of these critical functions, and to require that these be performed by truly independent entities if deemed necessary by the FEC

- On conducting investigations into anti-competitive allegations or at its own initiative, revoking licenses on the basis of anti-competitive behavior, and referring cases of anti-competitive behavior that it cannot resolve to the Anti-Monopoly Committee

The legislation would require the effective separation of the generation business from distribution under guidelines and conditions set and enforced by the FEC

Rules and Procedures for Licensing and Enforcement. This legislation would establish the legal principles by which market sector participants would be authorized to operate It would provide the legislative basis for the content of licenses for all entities in the sector

Regulation of the Retail Market It is necessary to adopt a legislative act regulating the relations between suppliers and consumers of electric power and specifying the civil code and other legislative acts

Uniform Dispatch of the IPS When dispatching the IPS of Russia, the interest of all participants in the wholesale market must be taken into account A law is required to regulate these relationships

Law on Responsibilities for Non-payment and Late-payment of Electricity and Heat Bills of Electricity and Heat Customers

RAO EES Rossii and the FEC should form a joint "legislative working group" to develop the details of these legislative packages and seek passage of the legislation

3.9 Training

IIE and IDEA, working with RAO EES Rossii and the restructuring team, have prepared a proposed training plan for the next year of the transition This training plan is summarized in Table 3 1 The plan is based on the priorities of the transition stage It also includes working with RAO EES Rossii or some other organization designated by RAO EES Rossii to carry the training effort to all needed organizations

During 1994, the majority of in-country training was conducted in Moscow Going forward, training would be held in certain regions as well in order to allow more people in the power sector to participate in the training

Table 3 1
Preliminary Training Courses

Course Description	Location/Study Tour
GENERATION This course will enable a participant to understand the financial and operational aspects of private non-regulated generation companies, spotmarkets, capacity and energy sales, contracts, expansion planning, operations and maintenance planning, fuel purchases and fuel management	Two-week course, offered in Moscow and Krasnojarsk Study tour of 15 persons
TRANSMISSION This course will enable the participant to understand issues related to the management of a private, regulated transmission system, obligation to serve, spot-market operations, financial records and settlements for transactions, system expansion, wheeling charges, and regulatory aspects	Two-week course, offered in Moscow and Krasnojarsk Study tour of 15 persons
DISTRIBUTION This course will enable the participant to understand issues related to the operation and management of regulated distribution companies, obligation to serve, competitive purchases of capacity and energy, spot-market purchases, financial settlements, competition, self-generation, solicitation for power purchases, and the operation of the proposed Russian wholesale market	Two-week course, offered in Moscow and Krasnojarsk Study tour of 15 persons
REGULATORY SYSTEMS This course will enable the participant to understand the functions of regulatory systems, incentives developed and promoted by regulation, customer service complaints, public hearings, rate making, inflation adjustments, fuel component of tariff, allowed rates of return, required generating reserves, system expansion, environmental concerns, and least-cost planning	Two-week course, offered in Moscow and Krasnojarsk Study tour of 15 persons
FINANCIAL/MANAGEMENT This course will enable the participant to understand how to work with commercial banks, development banks, and other investment organizations to raise debt and equity for electric power sector projects (Note This course may be eliminated as a stand-alone course and integrated with the above courses)	Two-week course, offered in Moscow and St Petersburg Study tour of 15 persons
INSTITUTIONAL BUILDING OF TRAINING Three courses will be offered to a group that will assume responsibility for training more broadly in the sector	[redacted]
INTERNSHIPS A certain number of internships (up to two months) will be offered for RAO EES Rossii employees to work with U S companies to learn the functions of finance and stockholder management	