

# ***AO MOSENERGO***

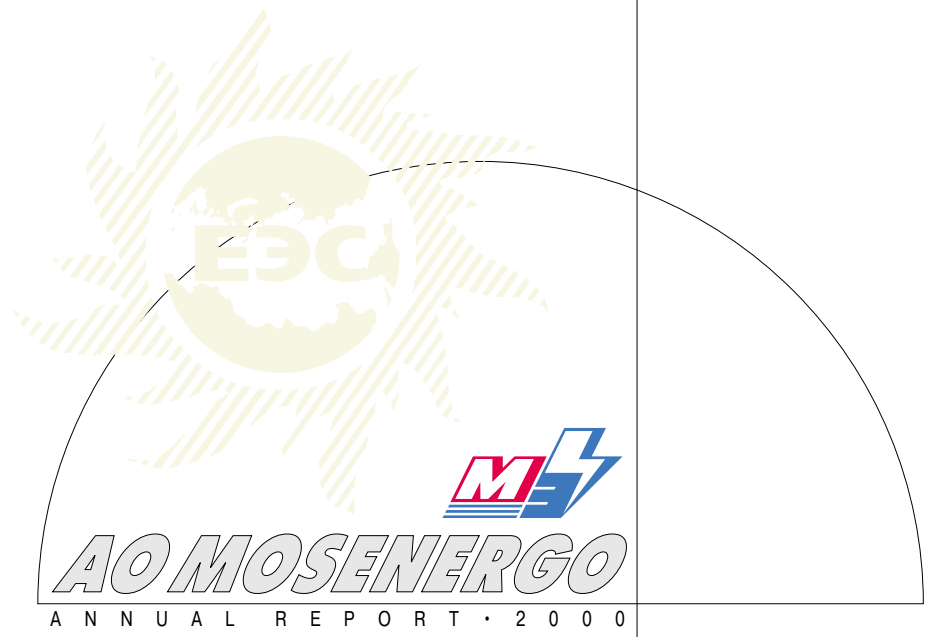
ANNUAL REPORT



# ***2000***



*Towards light,  
warmth and  
friendly environment!*





*Dear shareholders!*

*In the last year, MOSENERGO reached a new level of efficiency in the core fields of its business. This was achieved in conditions where the energy sector and indeed the entire industry of Russia was in a very difficult situation. The increasingly pressing need for radical reform coincided with changes in the top management of the Company. The Company succeeded in overcoming its extremely challenging and, in many respects, systemic problems, and showed a good performance at the end of the year.*

*In 2000, MOSENERGO's net profit amounted to RUR 1.44 billion.*

*We are pleased to report that almost 15% of the Company's net profit has been earmarked for payment of dividends that have more than doubled as compared to 1999: the dividend grew from 0.3 to 0.77 kopecks per share.*

*During the year, MOSENERGO's corporate ranking saw several upward revisions, reaching Standard & Poor's CCC+ by the yearend, which is evidentiary of a positive perception of the Company's development dynamics by leading rating agencies.*

*The Company attaches great value to its reputation of a responsible borrower and treats its liabilities with utmost responsibility. During 2000, two Eurobond coupon payments worth a total of USD 13 million were timely made.*

*In 2000, additional shares were issued for a total of RUR 2.668 billion, the new shares being transferred to RAO UES of Russia and the Government of Moscow in exchange for property complexes of the facilities that are strategically important for MOSENERGO.*

*The year 2000 saw radical changes in the Company's electricity sales activities. We could no longer tolerate huge non-payments and resorted to the toughest measures against non-payers, including cut-offs. Our actions met understanding and support on the part of the Governments of Moscow and the Moscow Oblast.*

*Remarkable success was achieved, first of all, in the work with the most difficult consumers: the budget-sponsored sector; municipal organizations and wholesale resellers.*

*We managed to secure stable 100% payment for current consumption of electricity and heat, something unheard of since the times of plan-based economy.*

*The amount of receivables was substantially reduced: as compared to the beginning of the year, it decreased by RUR 3.4 billion, or 17%.*

*"Agreements on Key Principles of Cooperation" were made with major debtors, defining, in particular, the conditions of debt restructuring and of payments for current consumption. The total payment collection in 2000 stood at 109%. Qualitative changes were effected in the structure of payments as well: set-offs account for a mere 12.4% against 42.5% in 1999. Cash collection rate considerably improved as compared to 1999 (45.2%) to reach 70%.*

*Another component of the Company's effort to streamline sales consists in transferring its sales operations from wholesale resellers (district electrical grids) to MOSENERGO's local agents. Implementation of this scheme allows to almost double the rate of cash collection from this consumer group while precluding growth of their payment arrears in the future.*

*By last year's sales, MOSENERGO has been recognized as one of RAO UES of Russia's best companies.*

*In 2000, electricity production grew by 5.2% against 1999 to reach 68.9 billion kWh. This fully satisfies the region's demand and allows electricity exports, thus demonstrating our product's competitiveness and marketability. In turn, the actual electricity sales grew considerably: from 99.6% in 1999 to 109.1% in 2000.*

*In the past years, the Company was a traditional supplier of electricity to the Federal Wholesale Market (10-15% of electricity production), which was not beneficial to us due to low profitability of sales and prolonged payment periods. For these reasons, we reduced electricity deliveries to the Federal Wholesale Market to a level of 2.2% (1.5 billion kWh) by 2000.*

*Along with the above, MOSENERGO adopted a more efficient method of wholesale trade, the open bidding. The new approach has substantially increased the attractiveness of this market segment, causing the Company to make plans for strengthening its position and build up its presence.*

*The positive electricity sales results allowed us to meet the tougher requirements of fuel suppliers and establish constructive relationships with them. Throughout the winter, stable fuel stocks were maintained, power supply was uninterrupted with virtually no accidents.*

*The set of measures aimed at strengthening the payment discipline both on the part of consumers and our own, made it possible for the Company to boost its capacity renovation and expansion activities in 2000.*

*Bringing the unique Zagorsk PSP to its design capacity became one of the most remarkable events of the year. It only became possible due to the USD 50 million provided by the EBRD and IFC.*

*Implementation of the small thermal plant (GTU-TEP) construction program is underway, with a view to resolving the issue of power supply to small towns and settlements. In the last year, a GTU-TEP was put in commercial operation in Elektrostal.*

*In 2000, MOSENERGO invested a total of RUR 6.02 billion in new construction, rebuilding of existing facilities, and technological modernization and upgrade.*

*An important place was given to a program of modernization and rebuilding of Moscow power substations. In 2000, state-of-the-art 110 kV substations were commissioned in Novo-Mazilovo, Zubovskaya, Mamonovo, and Gorenki.*

*Bringing tariffs in line with market realities is a top priority for MOSENERGO. The Company has adopted the practice of notifying its clients in advance of any pending modifications of tariff plans, allowing the clients to adjust their plans accordingly. MOSENERGO's longer term plans include the introduction of tariffs differentiated by voltage ranges and targeted at different consumer categories to help consumers optimize their energy costs.*

*Operating in the densely populated Moscow region with a well-developed industrial infrastructure, the Company has always regarded environmental safety of energy production as a priority. We are cooperating with leading international manufacturers in development and installation of equipment designed to minimize the inevitable damage to the environment. In 2000, not a single maximum permissible or temporarily approved emission standard was violated by any of the energy system's power plants.*

*Within the framework of the overall structural reform of Russia's energy sector, MOSENERGO has been preparing itself for restructuring.*

*To facilitate MOSENERGO's further development and increase its profitability, a preparation work is underway for divesting non-core.*

*The Company has initiated the setting up of a comprehensive management system based on advanced information technologies.*

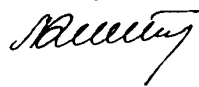
*MOSENERGO's Moscow Training Center provides training for over 8,000 trainees from MOSENERGO and other Russian and international power utilities every year.*

*In addition, we have our own technological college; a department of the MEI University of Technology was opened at TEP-27 in 2000. MOSENERGO is the only power utility in possession of such a strong training base of its own.*

*Realizing that efficient development is impossible without attracting external sources of financing and shareholders' support, the Company upholds the policy of open information and protection of shareholder rights.*

*The Company's management intends to make its best endeavors to strengthen the position of MOSENERGO as the leader of Russian electrical power utilities in Russia.*

**Chairman of the Board of Directors**  
A.Ya. Kopsov



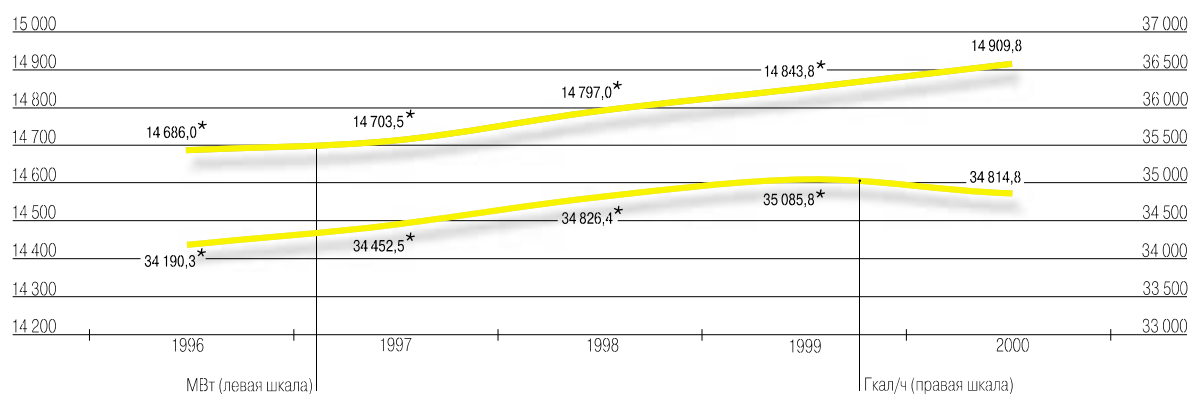
**Chairman of the Executive Committee**  
A.N. Remezov



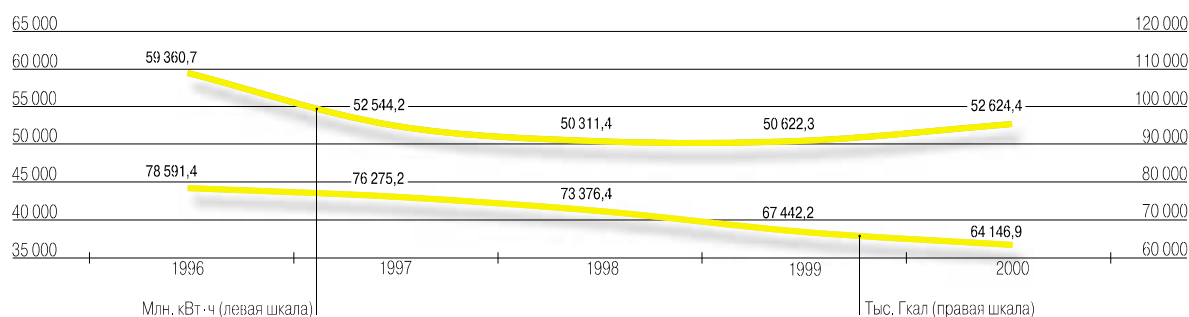
ОСНОВНЫЕ ПРОИЗВОДСТВЕННЫЕ ПОКАЗАТЕЛИ	1998	1999	2000
Установленная электрическая мощность, МВт	14 797,0*	14 843,8*	14 909,8
Собственное потребление мощности, МВт	8 846,9	9 126,0	9 566,3
Передача мощности на оптовый рынок, МВт	798,0	790,0	611,0
Выработка электроэнергии, млрд. кВт·ч	64,2	65,5	68,9
Полезный отпуск электроэнергии, млрд. кВт·ч	50,3	50,6	52,6
Передача электроэнергии на оптовый рынок, млрд. кВт·ч	1,9	1,6	1,5
Установленная тепловая мощность, Гкал/ч	34 826,6*	35 085,8*	34 814,8
Отпуск теплоэнергии с коллекторов, млн. Гкал	78,2	72,0	69,0
Число сотрудников, чел.	50 094	50 206	48 424

ОСНОВНЫЕ ФИНАНСОВО-ЭКОНОМИЧЕСКИЕ ПОКАЗАТЕЛИ, млн. руб.	1999	2000
Выручка от реализации продукции, работ, услуг («по оплате»)	19 587,0	22 439,7
Прибыль от реализации продукции, работ, услуг («по оплате»)	3 566,1	3 634,9
Инвестиции в средства производства	3 360,0	3 386,7
Амортизационные отчисления	2 168,0	2 128,0
Итого баланса	70 464,2	74 670,5
Собственный капитал	52 180,0	53 623,7
Уставный капитал	25 600,0	25 600,0

#### УСТАНОВЛЕННЫЕ ЭЛЕКТРИЧЕСКАЯ И ТЕПЛОВАЯ МОЩНОСТИ



#### ПОЛЕЗНЫЙ ОТПУСК ЭЛЕКТРИЧЕСКОЙ И ТЕПЛОВОЙ ЭНЕРГИИ



\* С учетом аренды ГРЭС-4 и ГРЭС-5

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000-1887

"Convert magnetism into electricity," Michael Faraday wrote in his diary 10 years before he discovered the electromagnetic induction phenomenon (August 29, 1831). Later, this discovery served as a basis for all power stations in the world.

# MOSENERGO Today and Tomorrow



## TODAY..

**M**OSENERGO is the largest of the Russian Federation's 74 regional energy utilities and a subsidiary of RAO UES of Russia. Technologically, the Company's power system is an inherent part of the Unified Energy System of Russia.

The Company's core business includes generation, distribution and sales of electricity and heat.

MOSENERGO accounts for approximately 8% of Russia's electricity generation and 6% of national heat production. The Company is a natural monopoly in

electricity production in the Moscow region, also supplying 77% of the total heat consumed in Moscow.

We have a stable sales market and provide life support to the Moscow region, with a population in excess of 15 million people (10% of the Russian Federation's total population) and a territory of approximately 47,000 square kilometers. We currently have about 4 million customers.

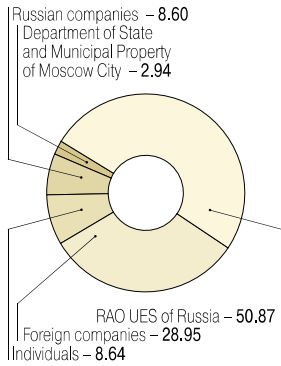
MOSENERGO is a vertically integrated company operating on the lines of self-financing under a single business plan and dealing with other economic entities on a contractual basis.

*The Charter of our ancestor, the Joint Stock "Company for Electrical Lighting" (a subsidiary of Siemens & Halske of St.Petersburg), received the High Approval on July 4, 1886. On February 5, 1887, at the very first meeting of the Company's Executive Committee, the issue of preparing the ground for the Company's expansion in Moscow was raised.*

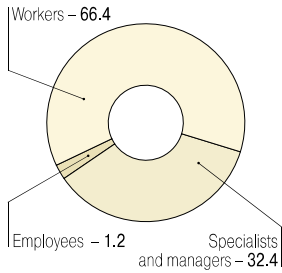




### SHAREHOLDER CAPITAL STRUCTURE, %



### MOSENERGO'S HUMAN RESOURCES STRUCTURE, %

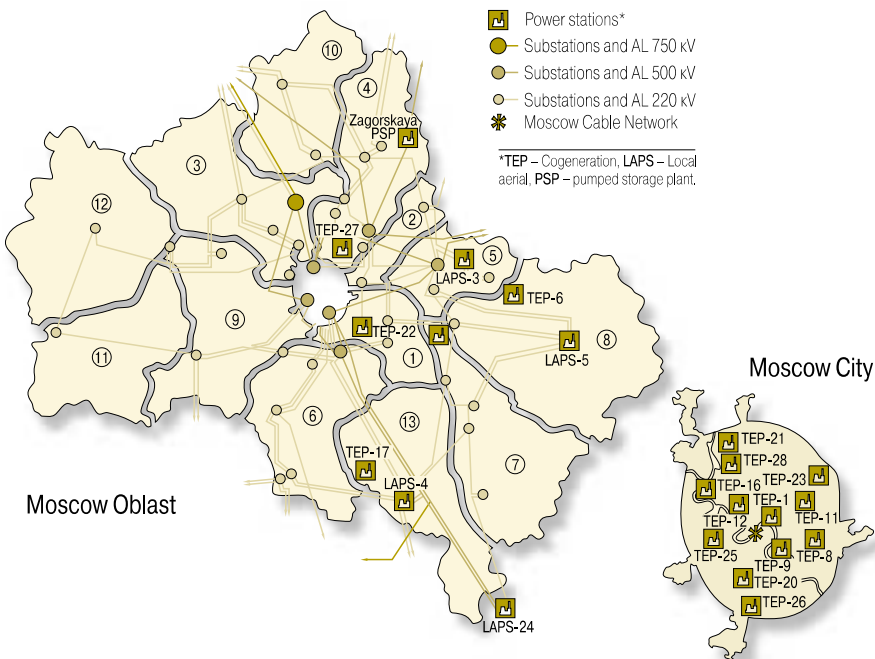


NOTE:  
The total heat capacity of the power plants includes the capacity of peak-load boilers

### POWER PLANTS OF MOSENERGO

Power plant	Electricity generation, kWh	Aggregate power capacity, MW	Total heat power, Gcal/h
TEP-1, subsidiary	383.2	95.7	954.0
LAPS-3	128.4	640.08	349.5
LAPS-4	6,337.2	1,885.0	466.0
LAPS-5	2,813.6	1,100.0	344.3
TEP-6	44.4	24.0	139.0
TEP-8	2,819.3	605.0	2,192.0
TEP-9	1,191.3	250.0	859.0
TEP-11	1,326.2	250.0	1,073.0
TEP-12, subsidiary	2,433.8	408.0	2,043.0
TEP-16	2,100.4	360.0	1,484.0
TEP-17	546.0	182.0	732.0
TEP-20	4,144.1	705.0	2,378.0
TEP-21	8,394.1	1,340.0	4,603.0
TEP-22	8,016.9	1,180.0	3,424.0
TEP-23	7,848.3	1,410.0	4,515.0
LAPS-24	1,316.2	310.0	-
TEP-25	8,141.9	1,370.0	4,088.0
TEP-26	8,625.8	1,410.0	4,006.0
TEP-27	897.2	160.0	1,125.0
TEP-28	101.4	25.0	40.0
Zagorsk PSP	1,297.6	1,200.0	-
<b>TOTAL</b>	<b>68,907.3</b>	<b>14,909.78</b>	<b>34,814.8</b>

### MOSENERGO SERVICE MAP



### MOSCOW CABLE NETWORK

Numbers of lead-ins, units	115,725
Installed transformer power, thousand KVA	12,924.6
Length of cable lines, km	54,187.6
Including:	
- Cable lines 0,4-1 kV	17,896.0
- Cable lines 6-10 kV	35,543.0
- Cable lines 35 kV	33.7
- Cable lines 110-220 kV	714.8
- Cable lines 500 kV	0.9
Number of RPs, units	1,753
Number of TPs, units	13,031

The Company's power system is a complex set of power plants, transmission lines, transformer substations, heating grids, and pumping stations linked for joint operation, having a common operation mode, and relying on a shared capacity reserve and a centralized operational and dispatching control system. Our installed electrical capacity totals 14,900 MW, the installed heat capacity equals 34,800 Gcal/h, the aggregate length of high voltage 35–500 kV transmission lines is 19,600 km, that of 0.4–10 kV distribution lines is 56,900 km, that of cable grids 53,500 km, and the heating grids are 2,400 km long.

By its scale, MOSENERGO is also one of the world's largest energy producers.

- The Company comprises 59 branches making up a single production and technological complex.
- Energy and power for the energy system are generated by 21 power plants. Most of the system's power plants simultaneously produce both electricity and heat. MOSENERGO's thermal plants operate 128 turbines, including 108 cogeneration steam turbines, 12 condensation cycle turbines, 6 gas turbine units and 2 expansion generating units. Combined electricity and heat capacities make up 68% of the total generation capacity.

- Transmission of electricity from the power plants to consumers, as well as maintenance of high voltage and distribution grids, cable lines, and transformer and distribution substations is supported by 13 electrical grid branches, 5 of which serve both Moscow and the Moscow Oblast, 8 serve the Moscow Oblast only, and the Moscow Cable Grid, a branch, serves Moscow only.
- Transmission of heat and operation of Moscow's heating grids are the responsibility of the Heating Grid, a branch.
- Sales of electricity and capacity to consumers are handled by MOSENERGO's Energosbyt. In Moscow City, heat sales go through the Heating Grid; and in the Moscow Oblast, heat is sold by LAPSs-3, 4, 5 and TEPs-17, 27.
- Along with the power plants and the grids, the energy system's operation is supported by its factories, maintenance, construction and equipment setup branches, an IT Center, design and development bureaus and other branches.
- CRMZ and RETO, the repair factories, are responsible for the repair of thermal and electrical equipment; they also manufacture industrial products for the energy system and third-party con-

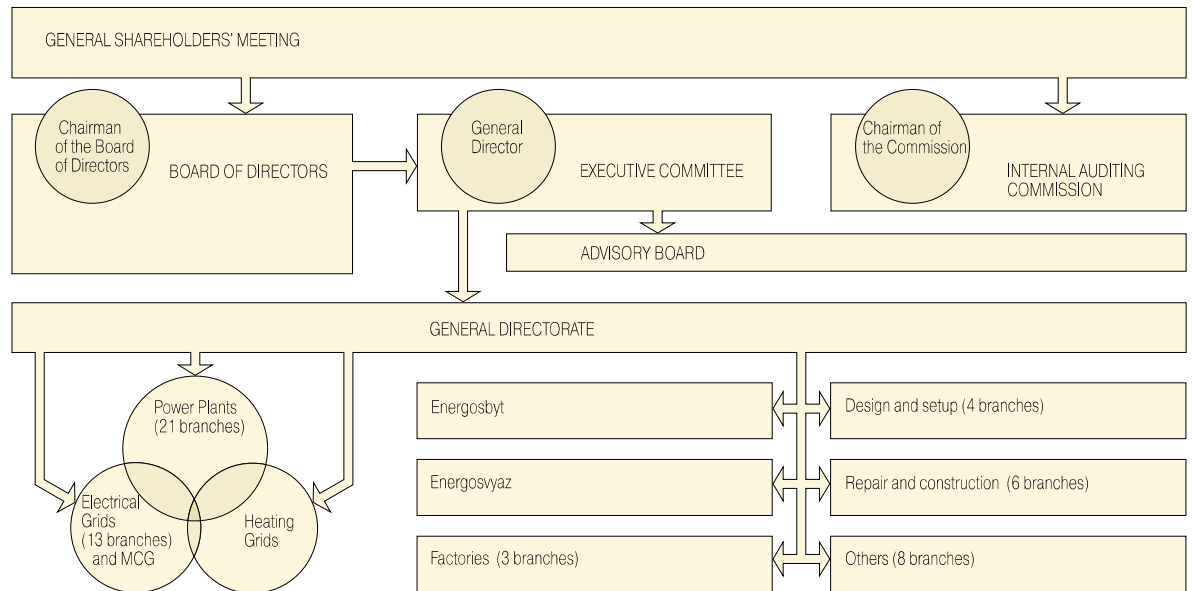
#### HIGH VOLTAGE ELECTRIC GRIDS

Electric grids	Length of power line, km	Service area sq. km
① Yuzhniye	1,564.0	2,392
② Vostochniye	636.5	3,600
③ Oktyabrskiye	2,019.8	4,000
④ Severniye	1,623.6	2,924
⑤ Noginskiye	1,774.2	3,830
⑥ Podolskiye	2,034.5	3,940
⑦ Kolomenskiye	1,442.6	3,978
⑧ Shaturskiye	1,553.8	4,370
⑨ Zapadniye	2,218.6	3,447
⑩ Dmitrovskiye	1,059.5	3,088
⑪ Mozhaiskiye	1,056.6	4,758
⑫ Volokolamskiye	801.7	3,383
⑬ Kashirskiye	1,793.6	3,290
<b>TOTAL</b>	<b>19,579.1</b>	<b>47,000</b>

#### DISTRIBUTION GRIDS

Installed transformer capacity, thou KVA	Number of TS 6–10/0,4 kV	Length of power lines, km
266	557	2,188
131	335	1,375
427	1,351	5,305
418	1,295	4,578
176	569	2,621
502	1,499	6,708
540	1,598	6,500
140	560	3,124
264	980	3,878
569	1,573	6,804
386	1,458	5,337
312	1,140	3,601
278	886	4,860
<b>4,409</b>	<b>13,801</b>	<b>56,879</b>

## MOSENERGO STRUCTURE



sumers. OZAP pilot factory develops and manufactures specialized equipment for the energy system.

- Other repair branches maintain chimneys, cooling towers, dams, ash dumps, other structures and buildings, and repair and replace heating mains and cable grids.
- Specialized construction branches perform installation and assembly of 110 kV, 220 kV, and 500 kV cables, as well as construction, assembly and refurbishing of overhead transmission lines and substations.
- Another branch of the Company, PPTK (Complete Equipment Supply Company) supplies materials and equipment for maintenance and construction operations.
- Mosenergonaladka, a branch, performs setup and trial operations on both existing and newly commissioned equipment.
- Mosenergoprojekt, a branch, and two specialized design bureaus, also branches, do research and

development for the power system, run design and test programs, etc.

- Telephone lines and radio stations, automatic and remote control systems that tie all components of the power system together into a single highly automated complex are operated by Energosvyaz, a Company's branch.
- The IT Center is responsible for developing and operating the process control systems of power plants and electricity grids, workstations, local area networks, and electronic mail.
- Motor vehicles are operated by the Company's Motor Division.
- The Moscow Training Center (MCPK) and the Moscow Technical College (MTK) are responsible for training, education, and advanced training of the Company's employees.
- The Medical Department conducts treatment and

prevention work in order to bring down the disease rate among company employees.

- Energotorg is charged with the organization of catering and maintaining a network of food and manufactured goods stores at the Company's branches.
- Shatursky Agroindustrial Complex produces and sells agricultural products, serving, first of all, the needs of the Company's catering and retail systems.

## TOMORROW...

**M**OSENERGO is a company with a well-established and reliable business. With a view to bringing up the efficiency of our operations, however, we have defined clear-cut strategic goals and developed ways to attain them.

Guidelines for development of the Company's production potential in the next 10 years are summarized in the Development Program for the Moscow Oblast's Energy Sector Through 2010. Over this period, we have scheduled commissioning of 1,713 MW in new generation capacity. Large-scale technological modernization and rebuilding projects are scheduled to cover 1,580 MW. This will enable us to maintain our production potential at a contemporary technological level and to remain competitive in Russia's energy market.

We intend to proceed with construction of small GTU-TEPs, as well as continue commercial operation of the GTU-TEP in Elektrostal, which should allow us to resolve the currently highly pressing issue of heat supply in small towns of the Moscow Oblast, and, possibly, in some districts of Moscow where massive housing construction is under way.

Another priority area in our future work involves streamlining MOSENERGO's structure and reorgani-

zation of the Company as an industrial holding entity. This will entail divesting all non-core business and spinning off Moscow's and the Moscow Oblast's generation companies, grid operators and marketing entities as subsidiary joint-stock companies; transferring social and cultural facilities to municipalities, and stepping out of the companies that are not in line with the holding's core business.

However, MOSENERGO will remain a single industrial and economic complex resting upon its Moscow subsidiary joint stock companies: power plants, electrical grids, the Moscow Cable Grid, the Heating Grid and Energosbyt. Investment activities and asset management of MOSENERGO's spin-offs will be effected via their Boards of Directors and Shareholders' Meetings (i.e. a mechanism of corporate governance). The power system will remain a surplus system in both power and electricity production in Moscow, and the surplus would be sold to the Oblast and on the Federal Wholesale Market.

Such a reorganization of the Company will allow us to secure a sine qua non condition for future growth: investing, while substantially cutting the costs incurred in financing inefficient (losing) non-core businesses, in existing wasteful Oblast's LAPSs, and in maintaining social facilities. MOSENERGO intends to improve the efficiency of its sales, to work proactively on tariff policy improvement, to propose new legislation and regulations to be adopted by state agencies in order to stimulate development of the energy sector, and to attract external financial resources that may effectively complement the Company's own funds.

The Moscow region's development prospects are closely linked to continued development of MOSENERGO's scientific, technological, production and human resource potentials.



■ **All the most important activities of MOSENERGO are conducted in close contact with the Governments of Moscow and the Moscow Oblast. MOSENERGO's construction program is part of the Development Program for the Moscow Oblast's Energy Sector, and tariff policies are implemented in accordance with the principal forecast indicators for the Oblast's development in cooperation with Regional Energy Commissions of Moscow and the Moscow Oblast. Our environmental program is an inherent part of the city's comprehensive program for environmental protection.**

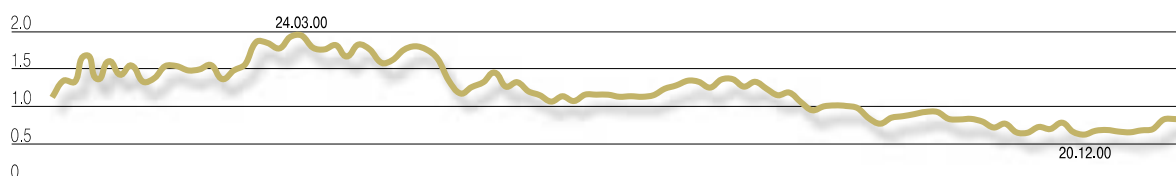
1. Raushskaya Naberezhnaya.  
Head Office of the Company.

# 2000. Events and Facts



■ **15 August, Payment of the 1999 dividend totaling RUR 80 million was completed.**

CHANGES IN STOCK QUOTATIONS, RUR



● During 2000, energy tariffs in MOSENERGO increased twice, thus resulting in tariffs growth as follows, %:

	Electricity	Heat
First stage (February, March)	21,0	32,0
Second stage (June, August)	19,1	24,6

- 7 April and 9 October, Eurobond coupon yield was paid.
- To reduce the principal on Eurobonds, in March 2000, MOSENERGO redeemed a part of Eurobonds issued and placed outside the Russian Federation, for the amount of USD 5 million, and the MOSENERGO's principal amounted to USD 155.3 million (with initial offering standing at USD 200 million) after such redemption.
- 11 April, Pursuant to the resolution of the Shareholders' Meeting of MOSENERGO held on April 8, 1999, a deal with RAO UES of Russia and the Moscow Government was finalized, envisaging that 2,667,726,000 MOSENERGO common shares would be placed in exchange for the property complexes of LAPS-4, LAPS-5 and substations of the

Center of Moscow. On May 31, 2000, the Federal Securities Commission of Russia registered the Report on Issue Results.

- 15 May, The Annual Shareholders' Meeting of MOSENERGO was held, which approved the Annual Report, the Balance Sheet, the 1999 Profit and Loss Account of the Company, and the dividend on common registered shares of MOSENERGO for 1999 in the amount of 0.3 kopeck per one share.

New members of MOSENERGO's Board of Directors were elected.

Mr. Alexander N. Remezov was elected MOSENERGO's General Director. He previously served as Deputy Chairman of the Executive Board, RAO UES of Russia.

- 16 June, The Board of Directors approved the new members of MOSENERGO's Executive Board.
- 3 July, The Moscow Registration Chamber registered a new version of the Charter and the Authorized Capital of MOSENERGO in the amount of RUR 28,267,726,000.

1. The capital is growing more beautiful, with Moscow's powermen contributing considerably.  
 2. LAPS-4. Since April 1, 2000, it is again property of MOSENERGO, as well as LAPS-5.  
 3. Lobby discussions during the General Shareholders' Meeting on May 15, 2000.  
 4. The main control panel of TEP-27. The plant's shift manager.  
 5. By the relay panel of Novo-Mazilovo substation.  
 6. A.B. Chubais, Chairman of the Executive Committee, RAO UES of Russia; B.V. Gromov, Governor of the Moscow Oblast; A. N. Remezov, General Director of MOSENERGO attending the launching ceremony at Unit 6 of Zagorsk PSP.  
 7. On October 14, His Holiness Patriarch of Moscow and All Russia Alexiy II, accompanied by MOSENERGO's General Director A.N. Remezov, visited Zagorsk PSP.

With the first contract made by the Company with Electrical Lighting, St. Petersburg on July 31, 1887 for lighting of the Postnikov Passage in Moscow, the history of our Company's growth in Moscow began. In 1888, the first central power plant,



- 31 August, Zapadnye Electrical Grids put into operation the first stage of the Novo-Mazilovo 110 kV Substation with the installed transformer capacity of 126 MVA. The Novo-Mazilovo Substation will enable electricity supply to facilities of the third ring road, new subway lines as well as to newly built areas, such as Fili, Davydkovo, Kuntsevo, Matveyevskoye, and Filevsky Park.

- 7 September, The Zagorsk PSP commissioned 200 MW Hydro Electrical Unit No. 6. The Zagorsk PSP's installed capacity reached the design value of 1200 MW.

- 14 September, Vostochnye Electrical Grids put into operation two new transformers with the capacity of 63 MVA each at the Gorenki 110 kV Substation that was built as early as in 1938, currently under renovation, to improve the reliability of electricity supply to the Balashikha area.

- 22 September, The renovated 110 kV double-circuit cable line between the Krylatskaya Substation and the Strogino Substation was commissioned, thus improving the reliability of the Krylatskaya Substation that provides electricity supply to the city residential districts, the sports complex, the district thermal plant (DTP), and TEP-25 water intake plant.

- 31 October, Preparation of the energy system for the winter was completed. Repairs and accumulation of solid and liquid fuel stocks were substantially completed.

- The level of payment for consumed electricity and heat at the end of 2000 amounted to 109.1% versus 99.6% at the end of 1999.

- During the year, the following professional skills contests were held by the Power System: the First End-to-end Contest of Operators and Dispatchers of MOSENERGO's Distribution Grids at MPTC (Moscow Personnel Training Center); the End-to-end Contest of Combined Operator Brigades of MOSENERGO's Module TEPs at TEP-26; the Contest of Repair Staff and Operators of the Electrical Grids at the Kashirskiy Electrical Grids.

- MOSENERGO's teams took part in the professional skill competition of cross-link TEPs operators arranged by RAO UES of Russia in Volgograd, and in the on-line repair staff competition of the Centrenegro Electrical Grids in Vladimir.

- According to the results of the Third All-Russia Competition of 1999 Annual Reports of Joint Stock Companies with participation of 77 issuers of the Russian Federation, MOSENERGO's Annual Report took the first place.

- In 2000, the following branches marked their anniversaries: Shatura LAPS-5 and Noghinskiye Electrical Grids – 80 years; Shaturskiye and Kolomenskiye Electrical Grids, TEP-6 and TEP-8 – 70 years; TEP-17 – 50 years; TEP-22 – 40 years.

Georgiyevskaya, generated its first electricity. The first 20 street lamps were installed in the same year in Moscow. November 28, 1897 saw great opening ceremonies of the new Moscow City "Raushskaya" Power Plant, the MGES-1 (now TEP-1), and on February 15, 1907, the Tramvaynaya (MGES-2) Plant, built by the City Administration, was launched.

R.A. Klasson, the Executive Director of the Company's Moscow branch, made a daring and very promising suggestion that helped strengthen the positions of the Company.

He suggested using fuel peat mined in swamps around Moscow as the fuel for power plants, and in 1914 such a plant was built in the Bogorodskiy District. Connecting the Bogorodskaya "Electroperedacha" Plant (now LAPS-3) to the Izmailovskaya substation in Moscow, and circuiting it with the Raushskaya Plant in 1915 marked the first steps toward creating the Moscow Power System.



8. Setup of new equipment at modernized Gorenki substation in Vostochniy Electric Grid.

9. MOSENERGO's General Director A.N. Remezov meets journalists after a press conference on July 19, 2000.

10. Replenishment of coal stocks for the winter at TEP-22. A railroad car tipper.

11. From November 20 through 23, 2000, an end-to-end contest between combined brigades of operators of modular TEPs was held. The winning team of TEP-25.

12. A night in modern Moscow.

# Power Generation and Transmission



On March 20, 1920, the State Commission for Electrification of Russia (the GOELRO), headed by G.M. Krzhizhanovsky, a power engineer, was established.

In December of the same year, the GOELRO Plan was approved. It set a goal of almost quadrupling the capacity of the Moscow power system in 10-15 years. The installed capacity was to grow from 93 MW to 340 MW. By the mid-30's, however, the actual installed capacity of power stations modernized and newly built under the Plan reached approximately 820 MW.

In implementing the GOELRO Plan, the following was built in the Moscow region: Kashira LAPS (1922, now LAPS-4), Shatura LAPS (1925, now LAPS-5), Krasnopresnenskaya TEP (1929, later TEP-7, now a branch of TEP-12), TEP-6 in Orekhovo-Zuyevo (1930), and TEP TEZhE (1930, now TEP-8) in Moscow. The country's first 110 kV overhead transmission line Kashira-Moscow (1929) and a double-circuit 110 kV ring transmission line with substations around Moscow (1931) were completed.

In 1922, a decision was made to set up a single entity to operate the power plants in the Moscow region. The new agency was abbreviated MOGES.

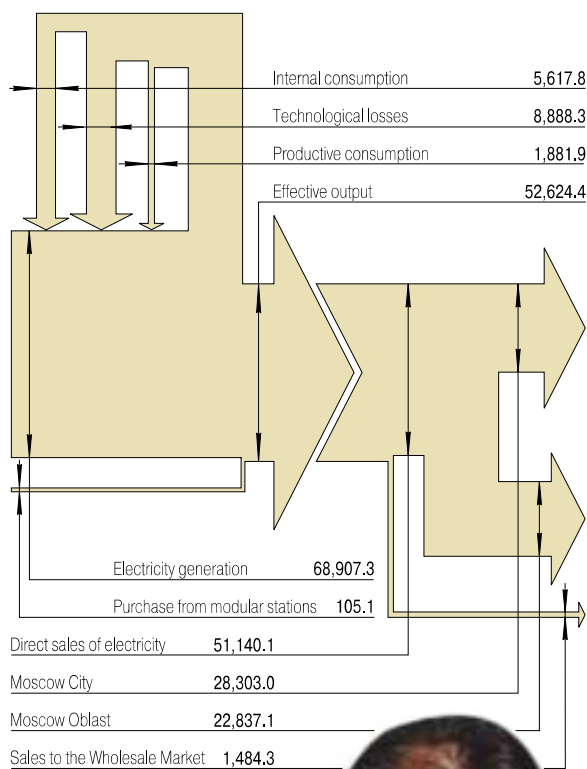
The GOELRO Plan was fulfilled by 1931. By mid-30's, the country was the second in Europe and the third in the world by electricity generation.



In 2000, MOSENERGO provided reliable supply of energy to consumers in Moscow and the Moscow Oblast, and transmitted surplus electricity and capacity into other regions.

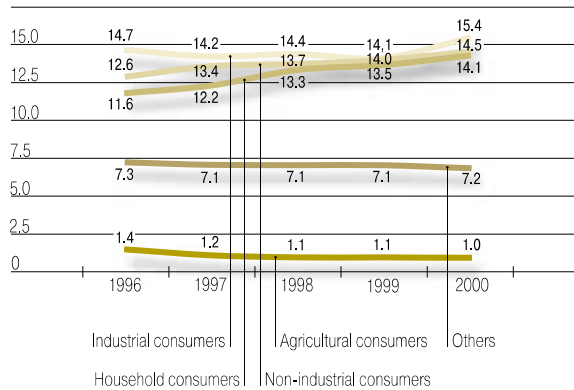
We endeavour to meet our own consumers' demand for electricity in full. Sales of surplus electricity in external market by no means restrict elec-

ELECTRICITY BALANCE OF MOSENERGO IN 2000, mln. kWt

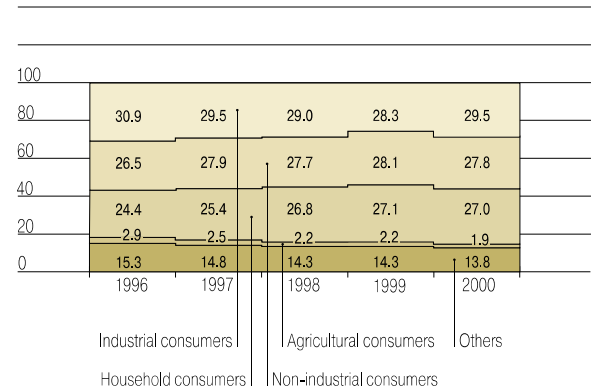




**HISTORY OF ELECTRICITY CONSUMPTION IN THE MOSCOW REGION BY INDUSTRY SECTORS, billion kWh**



**STRUCTURE OF ELECTRICITY CONSUMPTION IN THE MOSCOW REGION BY INDUSTRY SECTORS, %**



Electricity consumption by consumers of the Moscow region and are effected with due regard to our commercial interests.

In continuation of its financial stabilization strategy conceived in the previous year, MOSENERGO mastered and employed the techniques of operating its heating equipment in the deep low-load mode for the purpose of reducing the unpaid flow of electricity to other regions. As a result, supplies of electricity to the Federal Wholesale Market totaled 1.48 billion kWh, i.e. 5.1% less than in the previous year.

Due to the shortage of fuel and for the purpose of non-payment control, MOSENERGO applied Temporary Electricity Shutdown and Consumption Limitation Schedules in the summer period.

Starting from the second quarter of the previous year, electricity generation by our power plants has been growing due to increased demand. In 2000, 68.9 billion kWh of electricity was generated, a 5.2% increase over the previous year's level.

MOSENERGO's own consumers used 51.1 billion kWh of electricity, a 4.2% rise against the previous year, attributed to increased consumption by industry, electric-drive railroads, households, non-industrial consumers and resellers.

Electricity consumption by industries has been growing for over a year (since May 1999), particularly in energy-intensive sectors, such as:

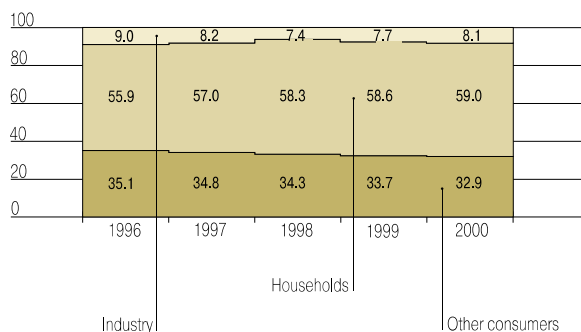
Sector	%
Mechanical engineering	6,4
Ferrous metallurgy	10,2
Non-ferrous metallurgy	14,8
Oil-refining industry	7,0
Chemical and petrochemical industry	4,3
Light industry	11,5

By quarter, electricity consumption in the region grew as follows:

Quarter	%
I quarter	5,17
II quarter	3,70
III quarter	5,21
IV quarter	3,04

13 electrical grid branches and the Moscow Cable Grid transmit electricity from power stations to consumers. The electrical grid branches, apart from commissioning new overhead and cable transmission lines, transformer and distribution substations and refurbishing the existing ones, do quite a lot to introduce new technologies and equipment based on personal and network computer systems and software.

## STRUCTURE OF EFFECTIVE HEAT DELIVERIES, %



■ In 2000, process losses of electricity in transmission grids stood at 8.9 billion kWh, or:

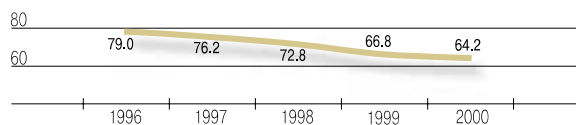
- 14.02% of the amount supplied to the grid that, adjusted for transit, equaled 63.4 billion kWh.
- 12.21% of the total volume of electricity transmission (equaling 72.8 billion kWh) supplied to the grid.

■ Compared to 1999, grid losses rose by 0.15 points in comparable conditions. The loss growth was mainly driven by the increased loads and net deliveries to own consumers, as well as by the following:

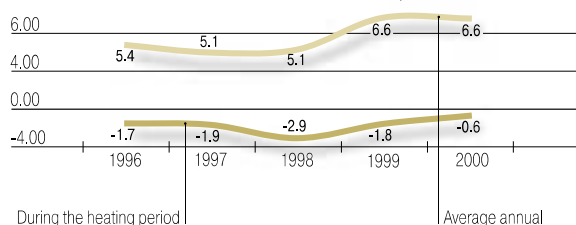
- Shutdown, from April through October, of about 2.5 million kVA of industrial consumers' compensation capacity.
- Impact of the commercial component on the total losses resulting from the inferior consumption metering system and increased non-metered consumption..

To minimize the technological and commercial components of losses, all branches took special measures during the year, including shutting down of unloaded transformers, reduction of internal consumption by substations. Also, electricity metering and efficiency of Energosbyt in controlling electricity payments by consumers and detecting non-metered consumption were improved.

## HISTORY OF EFFECTIVE HEAT DELIVERIES, million Gcal



## ACTUAL AMBIENT AIR TEMPERATURES, °C



MOSENERGO is the principal supplier of heat to consumers of the Moscow region: Moscow City consumers receive 94.5% of heat, while consumers in the Oblast account for 5.5%.

In 2000, effective deliveries of heat (both as steam and hot water) were 64.1 million Gcal, or 4.9% less than in the previous year, mainly due to higher (by 1.16 °C) average ambient temperatures during the heating period.

Compared to the previous year, the structure of heat deliveries improved. Heat deliveries from the peak water heaters fell by 2.9 million Gcal while deliveries of turbine recovery heat rose by 147,000 Gcal; however, its share in the total heat deliveries to external consumers grew from 84 to 87.6%.

Transmission of heat to consumers and operation of Moscow's heating grids are the responsibilities of the Heating Grid, our branch. The total length of its heating mains is 2,373.2 km, including 2,335.8 km of hot water mains and 37.4 km of steam mains.

By the beginning of 2001, consumers' connected heat load reached 31,275 Gcal/h. The process consumption (loss) in heat transmission was 7.05% in 2000.

In 2000, new technologies continued to be implemented, allowing to increase the service life and reliability of heating grids while reducing the heat loss.

# Repairs



**M**OSENERGO's repair work translates into reliable and economic operations and extended service life of the power system's equipment.

The key objective of the Company's repair work is to bring the technological and economic performance of the equipment to its design values, and to ensure long, reliable and cost-effective operation of the equipment through inspection and testing of the equipment as well as repair and replacement of its

individual parts and units. Repairs are performed by MOSENERGO's specialized repair branches, operating branches (power plants and grids), and third party contractors.

In 2000, repair costs totaled RUR 4.2 billion.

During the 2000 maintenance campaign, major repair, diagnostics and reliability improvement work was performed on the power stations' thermal and electric equipment.

## 1931-1945

The 30's were a new stage in our Company's development.

In 1931, the first step was made toward giving Moscow a system of central heating: the first hot water heating mains from MGES-1 was installed, and a dedicated agency was established to take up the operation and development of the Moscow Heating Grid.

On July 29, 1932, MOGES was reorganized as the District Energy Directorate (REU) of MOSENERGO. Thus our Company got its present name.

Along with building up its electrical grids, MOSENERGO commissioned TEP-9 (1933) and TEP-11 (1936). The power system's installed capacity exceeded 1 million kW in 1937. On June 14, 1941, first units of TEP-12 were put in operation.

World War II that came in our country on June 22, 1941 stopped the power system's development. Some of the Company's equipment was destroyed and some evacuated. MOSENERGO's capacity halved.

In spite of this, Moscow powermen continued production under the bombings and reliably supplied electricity to the capital's defense installations, built a 300-km semicircle of high-voltage obstacles in the way of the Nazis and later assembled railroad-mobile power stations for the liberated areas of the country.

Rebuilding of the power system began immediately after the Soviet Army's successful counter-offensive in the winter of 1941-1942. In 1945, MOSENERGO reached the pre-war level of installed capacity and gained a high momentum for further development and technological improvement.



13 out of the 31 installed power units, 21 out of 95 turbines, 30 out of 104 power boilers, and 11 out of 117 installed water heaters were repaired.

■ The following replacements were made at the System's power plants:

Power boiler heating surfaces, tons	540
Convection parts and water heater screens, tons	500
Turbine blades, sets	17
Turbine rotors, pcs	3
Guide vanes, pcs	3

As regards the electric equipment, the following work was performed: 22 turbine generators were overhauled, and 9 turbine generators went through medium repairs. 29 power transformers were overhauled. The Heating Grid repaired 134 electric motors of grid pumps, and 391 electric motors at the power plants.

17 sets of oil switches and 14 sets of air switches were overhauled.

Storage batteries were replaced at TEP-21, and TEP-23.

In 2000, the high voltage grids continued repair operations in order to improve reliability of their equipment. 69 substations were overhauled.

The workers of RETO (Electrical Equipment Repair) Factory and branch grids repaired 207 power transformers, 27 synchronous condensers, 177 sets of 110–220 kV oil switches and 89 sets of 110–500 kV air switches.

Along 35–500 kV overhead transmission lines, 2.1 thousand hectares of the right-of-way land was cleared, 234 km of earth wire and 21.2 thousand defective insulators were replaced.

In the distribution grids, 550 km of 0.4–10 kV overhead transmission lines were repaired, their wires being replaced, 4500 km of wire was replaced, and approximately 7,000 power pylons were replaced. Over 900 0.4/6–10 kV substations were overhauled, twenty four 6–10 kV feeders were split into smaller units and sectioned. 850 km of 0.4/6–10 kV overhead lines were cleared.

The MKS (Moscow Cable Grid) and MKER (Moscow Cable Repair) performed a total of 11,800 repairs in 2000.

Equipment was repaired at 1,055 distribution and transformer substations.

In 2000, major work was done in 110 kV, 220 kV, and 500 kV grids to improve reliability of the cable lines.

45 oil-filled low-pressure cable lines were repaired, where 152 oil leakages were stopped (140 oil leakages per 35 cable lines in 1999). Pluck-out sections of 110 kV cables were replaced.

By order of the Government of Moscow, extensive work is underway to reinstall the 110 kV cable lines that fall within the building zone of the Third Ring Road. New sections with polyethylene-insulated cables were put into operation at eight 110 kV cable lines.

The Heating Grid completed major preparation work for the heating season. Hydraulic and temperature tests and scheduled repairs of heating grids were carried out, 4,877 damaged and weak points were discovered and fixed (against 4,402 defects in 1999).

In 2000, 60.3 km of heating grids were overhauled.

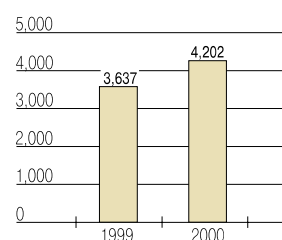
21 pumping stations were repaired and subjected to comprehensive trial runs. Heating pipelines with PU foam insulation in watertight polyethylene sheathing and insulation moisture control system continued to be used in rebuilding the heating grids in 2000. In 2000, 6.3 km of such heating pipelines were laid. In total, 37.4 km of pipelines with PU foam insulation were laid in the heating grids.

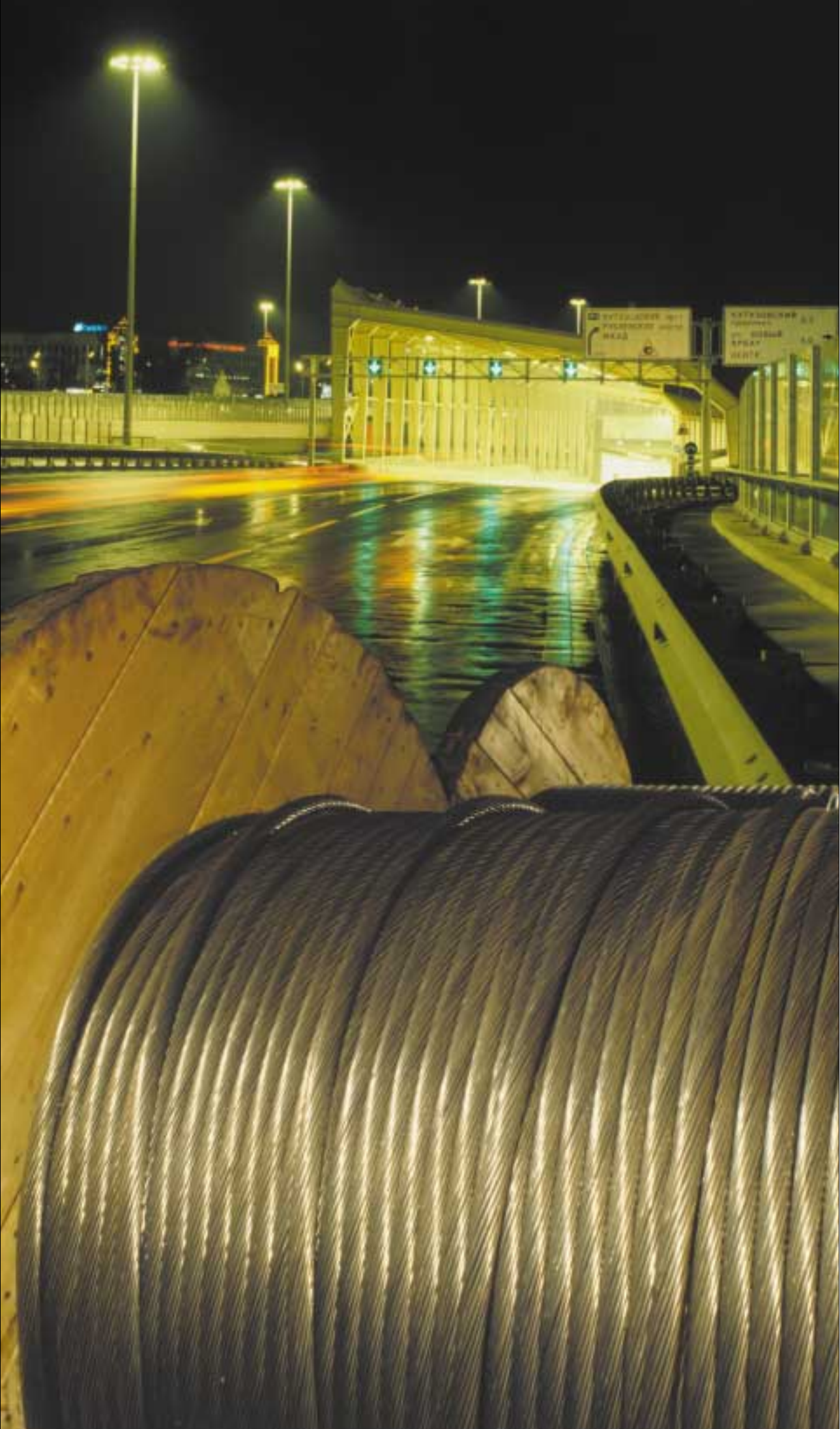
Microprocessor-based and computer-based pumping unit control, protection, automatic adjustment and operation optimization systems are being introduced at the Heating Grid's pumping stations.

Replacement of expansion glands for expansion bellows was continued. In 2000, 621 expansion bellows were installed.

At present, the length of heating pipelines that have exhausted their standard 25-year life exceeds 400 km and is constantly increasing, since replacement volumes are inadequate, while worn-out subscriber heat terminals are put on the Company's books. To ensure reliable heat supply for the region, the volume of replacement work on the hot water pipelines should be increased to 100 km per year, with proper financial and technological support for such operations.

### MAINTENANCE AND REPAIRS, RUR million





To shorten the assembly and commissioning periods, MOSENERGO used daily schedules in the first post-war decade.

In 1946, TEP-1 started using natural gas for fuel for the first time ever in the power system's history. The Moscow power system was interconnected with the Ivanovo, Yaroslavl, and Gorky power systems.

Commissioned facilities in the Moscow area included TEP-17 in Stupino on May 9, 1950; TEP-20 on April 2, 1952 and TEP-16 on April 26, 1955 in Moscow.

1956 was marked with the launch of the country's first 400 kV high-voltage transmission line connecting Kuibyshev and Moscow. Thus, the first link in the emerging Unified Energy System was created in the European part of the country.

In 1959, operation of the Stalingrad-Moscow 500 kV high-voltage line began.

In 1960, first units of TEP-22 were put in service, and, for the first time in the USSR, a heating mains of 1,000 mm in diameter was connected to TEP-11. On October 22, 1963, TEP-21 was put in operation. In the same year, MOSENERGO was charged with operation of all distribution grids in the Moscow Oblast.

The 50's and early 60's were marked with transition to units of greater capacities, further improvement of steam properties, and transition to modular designs of the equipment. Qualitatively new conditions were created for parallel operation of powerful thermal and super-powerful hydro plants that made up the Unified Energy System on an immense area.



# Investments

An integral part of the power system development is the investment activity, which is carried out by the Company according to the Development Program for the Moscow Oblast Through 2010 subject to the following key principles:

- Maintenance of the existing potential of the power system by way of reconstruction and modernization.
- Construction of new facilities, replacement and expansion of existing installations using advanced power-saving technologies.
- Implementation of short-cycle investment projects.
- Capital expenditure focus on projects with a high level of construction readiness.
- Optimization of the number of concurrent investment projects.
- Continuity of the investment process.

The bulk of investment resources was applied towards construction projects. In 2000, counting all sources of financing, those totaled RUR 6,020 million in current prices, including RUR 708.3 million from profit, RUR 2,380.3 million from amortization, RUR 500.9 million of borrowed funds, RUR 611.0 million of the City's contributions, RUR 1,819.5 million from other sources (including RUR 1,769.4 million for the account of additional issue of shares). RUR 161.0 million was spent to purchase equipment that requires no assembly.

Fixed assets totaling RUR 3,858.0 million were commissioned in 2000.

Our generating capacity increased by 200 MW as Hydroelectric Unit No. 6 was commissioned at the Zagorsk PSP in September. The Zagorsk PSP is a branch of MOSENERGO, designed to cover power peaks in the Integrated Power System "Center", perform emergency reserve functions and regulate power flows in the electric power system. The ceremony of the Hydroelectric Unit start-up was attended by Mr. Anatoly Chubais, Chairman of the Executive Board of RAO UES of Russia, Mr. Boris Gromov, Governor of

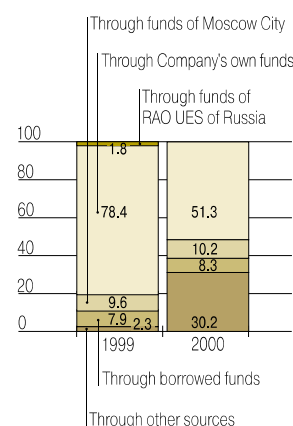
the Moscow Oblast, and Mr. Alexander Remezov, General Director of MOSENERGO.

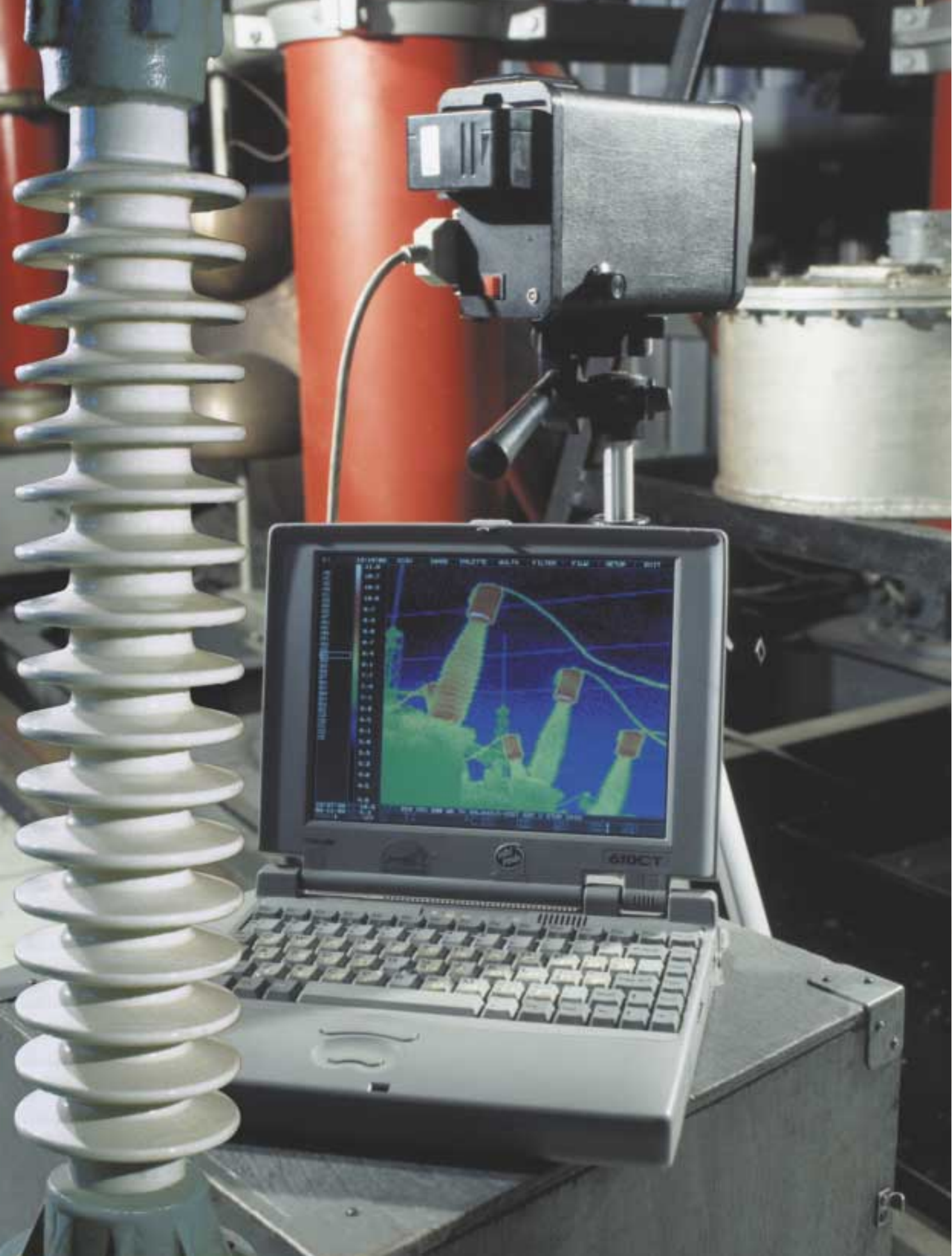
As a result of start-up of the last sixth hydroelectric unit, the plant will be used to full design capacity of 1,200 MW in the generator mode, and of 1,320 MW in the pump mode. It became possible to complete construction of the Zagorsk Pumped-Storage Plant owing to a USD 50 million facility provided by the European Bank for Reconstruction and Development and IFC to MOSENERGO.

- In 2000, MOSENERGO commissioned the following capacities:
  - Two 16 ton per hour power boilers and a 30 Gcal per hour water heating boiler at the GTU (Gas Turbine Plant)-TEP in Elektrostal.
  - 3.2 km of heating grids.
  - 413,980 kVA of transformer capacity, including 130,000 kVA of capacity built previously and recorded in the balance sheet, and newly placed into operation 63,000 kVA transformer at the Leninskaya Substation of the Yuzhnye Electrical Grids, two 63,000 kVA transformers at the Gorenki Substation of the Vostochnye Electrical Grids, two 25,000 kVA transformers at the Mamonovo Substation, and 44,980 kVA of the Moscow Cable Grid.
  - 0.53 km of 35 kV or more power transmission lines.
  - 14.43 km of 110 kV cable lines.
  - 5.98 km of below-10 kV cable lines of the Moscow Cable Grid.
  - 124.28 km of 04/6–10 kV rural power transmission lines.
  - 28.72 km of low-voltage power grids.
  - 4,935.1 square meters of residential space.

The principal results of the Company's investment policy include provisions to meet increasing demand for power, higher efficiency and reliability of power facilities, lower accident risk, and greater environmental safety of the power system.

STRUCTURE OF CAPITAL EXPENDITURES, %





# Innovation

In 2000, MOSENERGO focused on those innovation projects that allow to cut the power system's costs and help improve reliability of power supply:

- Development and introduction of new equipment, and instruments.
- Improvement of technological processes and power-saving technologies;
- Improvement of economic, operational, and dispatching control systems;
- Improvement of remote control and telecommunication systems;
- Protection of atmospheric and water basins.

We continued to master new types of generation equipment in our power system: high-capacity gas turbines and combined cycle units. Design and development work was completed on GTE-25U domestic gas turbine plant, whose pilot unit, to be installed at GTU-TEP in Elektrostal, is under construction at the TMZ factory.

At LAPS-3, work was continued to bring the GTE-150 gas turbine to design performance: test runs in various modes were conducted and a set of research and technological operations was performed to eliminate vibrations in the turbine's rotor.

For several years, MOSENERGO has been engaged in improvement of the PTK KVINT automatic control system. In 2000, TEP-27 commissioned automatic logic gas conduit control units, vacuum units, unit start and halt switches, turbine heat-up systems, gas conduit bleed and pressure testing systems at its Unit No. 1.

- In a row of new cost-effective technological improvements, the following are the most prominent:
  - 4 Allen Bradley high-tech computerized frequency-controlled drives carefully adapted to meet the



Russian standards were installed (two at TEP-25 and two with the Heating Grid), tuned and put in operation. MOSENERGO operates a total of 23 frequency-controlled drives. According to preliminary estimates, these drives will save approximately 40 million kWh a year for the Company.

- A refurbished system for extraction of gas-vapor mixture from pressure heads was introduced at Unit No. 5 of TEP-25, allowing approximately 2,500 tons of equivalent fuel to be saved annually.
- TEP-25 introduced an automated vibration diagnostics system at the T-250 turbine generator, and adjust-

## 1965-1985

For our Company, the twenty years from mid-60's through mid-80's were a period of constructing and commissioning new power plants in Moscow: TEP-23 (1966), TEP-25 (1975), and TEP-26 (1979), of rebuilding the old ones and launching of new capacities at them.

In addition, three 100 MW gas turbine units were put into service at R.E. Klasson LAPS-3 that then were a new type of equipment for our Company and allowed for peak load adjustments in the power system.

In the 70s, a 250 MW cogeneration unit operating at supercritical steam parameters was successfully mastered. First installed at TEP-22, this unit became a standard for the rest of the "millionaire" cogeneration plants: TEPs 21, 23, 25, 26.

Development of the heating system beyond the capital into the entire region was another challenge for our Company in those years. The heating grid grew rapidly as mass housing construction began in the city, and 20-30 km stretches of heating mains 1,200-1,400 mm in diameter were installed and connected to new powerful TEPs, requiring new technological solutions.

Those years are also marked with extensive transmission capacity construction and introduction of 750 kV overhead lines. The total length of high-voltage lines increased by several times. Two high-voltage rings, a 220 kV ring and later a 500 kV one, circled Moscow.

In 1978, the first units of domestically manufactured RU110 kV gas insulated equipment were put in service at Yelkhovskaya substation. Another characteristic feature of those years involved dismantling of overhead high-voltage transmission lines within the city boundaries and placing cable lines in their stead.

In 1965-1985, introduction of automatic and remote control systems in technological processes was continued, and transition of the entire power system to computerized equipment began.



1. GTU-TEP in Elektrostal. A gas turbine.



ment diagnostics systems at the PT-60 turbine and turbo feeding pumps of the T-250 unit, resulting in an anticipated annual economy of nearly RUR 1.0 million.

- Water supply, bleed, and bonderization systems were improved at boilers No. 2B of LAPS-5 and Nos. 12,13 of TEP-8. The anticipated annual economic benefit is RUR 0.2 million per boiler
- Research and implementation work was continued to extend the power system's adjustment range through the introduction of sliding-pressure low-load operating modes at T-250 and K-300 units. At MOSENERGO's plants, 21 power units were prepared for operation in the deep low-load mode. Operation of power units at sliding pressures allowed the System to cut fuel costs by RUR 75 million in 2000. Plans for 2001 include introduction of sliding-pressure low-load modes at fuel oil-fired units.
- At TEP-23, development work was performed on a built-in protection system for the CSD-1 setting of the T-250-240 turbine, intended to prevent or significantly reduce abrasive wear of guide blades and sleeve tube seals. This will result in at least doubling the service life of turbine setting components and cut the replacement and maintenance costs of the blade assembly and seals.
- Research and development performed by the Moscow Technological University (MEI) is an important contribution toward improving the functioning of MOSENERGO's equipment:
  - In 2000, a set of measures was implemented at TEP-8 to increase the capacity of its evaporation unit:

a VPU water steam circuit was developed and assembled for evaporator feed water treatment, and technological trials were completed. The unit will allow to cut water consumption through utilization of boiler bleed water, and to reduce the internal loss of steam and steam condensate. Refurbishment of the unit has been scheduled for 2001 to attain the unit's design capacity of 70-80 tons per hour.

- Technological proposals were developed on the use of industrial heat pump units for utilization of low-potential heat of return delivery water and power plants' steam turbine cooling system condensers.
- In 2000, TOSPO JSC started research work on ways to link an HPU to TEP-23's heat supply system, implementing a feasibility study on various technological hardware designed to utilize waste heat, and on selection of a drive for the HPU compressor in TEP-23's production zone. This work will be continued in 2001. Other major projects include:
  - VNIKP Research Institute developed a common terminal box for plastic-insulated 110 kV cables to be produced domestically, the box will cost about one third of currently used imported boxes, resulting in considerable savings for the Company.
  - MOSENERGO introduced a software package for on-line analysis and cyclic forecasting of MOSENERGO's capacity and electricity balance elements, used to correct and optimize operating modes in the Federal Wholesale Market in real

time. About 20 software packages and modules were integrated in a single Energostat software system, the first of its kind in Russia.

- A portable set of instruments was developed for locating points of fault in 6–10 kV cables by the induction method, and a test sample was manufactured, commissioned and tried at the branches. For 2001, a pilot batch is scheduled to be manufactured based on requests from branches.
- The Moscow Cable Grid introduced and mastered the operation of approximately 14 km of polyethylene-insulated 10–20 kV cable; new remote control devices for 6–10 kV grids and a new dispatcher station equipped with a projection-type instrument panel were put into pilot operation.
- Approximately 27 km of domestically manufactured 0.4 kV insulated wire lines were installed in Oktyabrskiy, Mozhaiskiy, Noghinskiy, Kolomenskiy, Kashirskiy and Dmitrovskiy Electrical Grids.

■ Other technological developments introduced in 2000 are aimed at reducing discharges of waste water and air emissions and their control:

- At LAPS-4, TEPs-8, 17, 21, the cavitation technology of neutralizing wastewater past the chemical treatment, and automatic control systems based on cavitation neutralizing reactor were introduced. Apart from reducing the wastewater pollution, this measure saves a lot of chemicals, makes pipeline gumming unnecessary and thus allows an average saving of RUR 0.6 million per year per TEP.

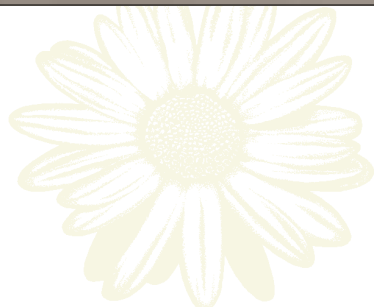
- At TEP-26, a technology of wastewater treatment in preparation for its return into underground horizons was introduced to reduce contamination.
- The CRMZ Repair Factory introduced a bi-absorption treatment unit to reduce adverse gaseous discharges from its industrial buildings.
- TEP-22 started using automatic monitoring instruments to detect flammable substance content in the drag-out.

■ Also introduced were:

- Microprocessor protection units made by ABB Relay-Cheboksary: at TEPs-20 and 27, at Oktyabrskiy and Zapadnyy Electrical Grids.
- 110 kV SF6 tank circuit breakers at LAPS-4 and TEP-20, at Oktyabrskiy and Zapadnyy Electrical Grids.
- Tavrida-Elektrik vacuum breakers at Mozhaiskiy Electrical Grids and the Moscow Cable Grid.
- Automated workstations of the manager of the TAI Heating Automated Control shop at TEP-16 and an automated workstation for the Head of Relay Protection and Automation Service at the electrical grids.
- A "Power System Accident Analysis" software package.
- A system of commercial metering of heat and gas based on the ASUT-600 complex at TEP-12, and an automated commercial electricity metering system at TEP-23.
- 250 automated metering systems of household electricity consumption at Energosbyt.



# Environmental Issues





## 1985-1993

*Perestroika, or the reforms that began in the USSR in 1985, brought considerable change in the Company's functioning. The economic mechanism of the Company and its relations with energy consumers became totally different. In 1988, we were one of the first (among other power utilities of the country) to adopt self-financing as the basis for our development. In that period, the Company was increasingly successful in using mechanisms of the market economy while retaining unchanged its principal goal, plentiful and uninterrupted supply of its consumers with energy.*

*On December 30, 1987, the first hydro unit of Zagorsk Pumping Storage Plant (PSP) was commissioned, establishing the power plant as a unique facility, the only one of its kind in Russia used to smooth out peak loads in the power system.*

*In 1990, our system absorbed Ryazan LAPS-24, and Moscow's TEP-28 in 1992. In the same year, the first water heating boilers were commissioned at the new TEP-27.*



**E**nvironmental issues of the Moscow region are one of the major priorities for MOSENERGO. Moscow is the largest megalopolis in Russia where a large number of industrial enterprises, motor vehicles and other facilities are concentrated, affecting the city's environment. Motor vehicles account for over 85% of pollutant emissions in the city's atmosphere. The energy-related entities account for approximately 5% of all emissions in the city atmosphere.

In order to improve the environmental situation, a decision was made in the 70's to convert Moscow's power plants to natural gas. At that time, the share of gas in the fuel mix of Moscow's power plants was 50%, with the remainder made up of fuel oil and coal in equal proportions. Today, the share of gas stands at 97.7%, and the rest is fuel oil. The only coal-burning plant is TEP-22 located in Moscow's vicinity across the MKAD ring road.

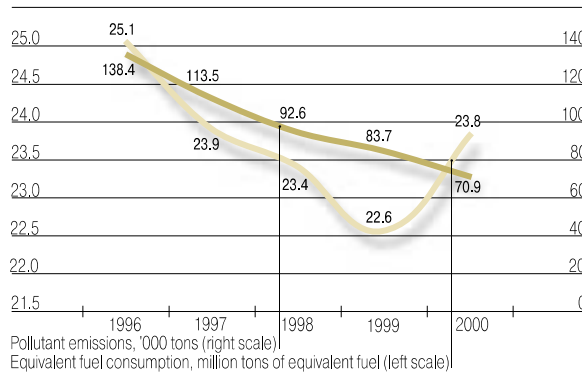
1. Novo-Mazilovo substation. The visible environmental friendliness of gas-insulated closed-type substations makes them a harmonious element of the landscape.

2. Gas-insulated substations are built with state-of-the-art technologies and to stringent environmental standards. Their equipment is reliable and friendly to humans...

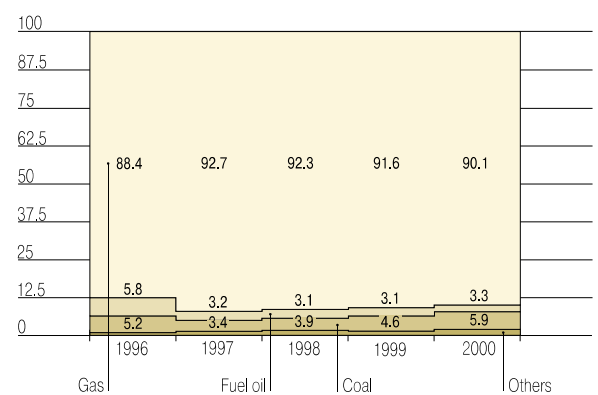
3. ... and gas-insulated 110 kV terminals can even be touched at no risk to your health.



**POLLUTANT EMISSIONS BY MOSCOW TEPs (including TEP-22)**



**FUEL CONSUMPTION STRUCTURE, %**



For 8 years now, we have been implementing the Program of Environmental Measures at the Operational Power Installations of MOSENERGO integrated in the City's comprehensive environmental program.

One of the features of the Moscow's environmental policy is that the requirement and pace of environmental actions at power plants are directly dependent on housing construction in adjacent areas.

For example, all boilers at TEP-27 burn natural gas, which precludes any discharge of soot, sulfur oxides, and carbon monoxide in the atmosphere. The plant employs two Haldor Topse DeNOx catalytic systems allowing to bring concentration of nitrogen oxides in the chimney gas much below the statutory values. Apart from this, boiler refurbishing operations are underway at other TEPs in the northern districts of Moscow to eliminate cyclone-type furnace extensions and introduce new type burners. As a result, nitrogen oxide emissions will drop to statutory standards, thus contributing to a healthier environment.

Contaminant emissions are directly dependent on the amount and quality of fuel burned, and, to a large extent, on the efficiency of environmental measures taken.

In connection with growth in energy output by our power plants that was caused by higher demand for electricity in the region in 2000, the aggregate fuel consumption in the electric power system increased by 584,000 tons of equivalent fuel (2.1%) year-on-year. Gas consumption increased only by 0.5% due to some constraints. At the same time, consumption of liquid fuel increased by 8.1%, and consumption of solid fuel increased by 27.6% (LAPS-4, LAPS-5, TEP-17, and TEP-22). The share of coal in the System's fuel mix reached 5.9% against 4.6% in 1999.

The aggregate fuel consumption by Moscow's TEPs in 2000 increased by 3.0%, or 576,400 tons of equivalent fuel year-on-year. The share of gas in the Moscow TEP's fuel mix amounted to 97.7% against 97.8% in 1999, and the share of fuel oil reached 2.3% against 2.2%.

Contaminant emissions by Moscow's TEPs fell by 17,400 tons (24.8%), which was achieved through appropriate environmental protection measures, and is conditioned by different methodology of gross emission calculation. Nitrogen oxide emissions reduced by 33%. At the same time, particulate matter and sulfur dioxide discharge rose due to increased consumption of fuel oil

(in connection with limited availability of gas) and some impairment of its quality. The statutory rates of maximum permissible and temporarily agreed emissions in 2000 were not exceeded with respect to any single component at all power plants of the electric power system.

- In 2000, the following environmental protection measures were taken:
  - Refurbishment of boiler No. 7 at TEP-23 with elimination of cyclone-type furnace extensions.
  - Introduction of 12 stationary emission monitoring devices at 6 power plants.
  - Refurbishment of fuel oil facilities at TEP-1 in order to prevent leakage to the Moscow River.
  - Introduction of cavitation process and improvement of the existing arrangements for liquid fuel treatment, storage and burning at LAPSs Nos 3, 4, and 5, TEPs Nos 8, 11, 20, 21, 23, 25, and 26.
  - Introduction of automatic fuel oil moisture control systems at LAPS-5, TEPs Nos 8 and 23.
  - Introduction of oil sludge utilization process at TEP-11.
  - Introduction of a waste oil homogenization unit based on cavitation technology.
  - Installation of new clean-burn burners at water heater No. 3 of TEP-21.
  - Installation of noise suppressors at boiler No. 5 of TEP-1 branch, boiler No. 9 of TEP-21, boiler No. 5 of TEP-23, and boilers Nos 3 and 4 of TEP-26.
  - Determination of capital equipment noise rates at TEPs Nos 9 and 21.
  - Inspection of noise impact on the residential areas near TEPs Nos 7, 12, 23, 25, and 27.
  - Introduction of noise suppression at the feeder distribution center of TEP-21.
  - Construction of production facilities to manufacture sealing graphite materials to replace asbestos-based materials at TEP-25.

- Construction of production facilities to manufacture environmentally-safe heat-foamed fire retardant paste at TEP-25.

Moscow's power sector is a major consumer of water. Its annual water consumption reaches 1.5 billion tons. Reduction of water consumption and water recycling remains our constant priority. Adverse impact on the water basin may be eased through reduction of contaminant discharge by wastewater treatment and recycling by TEPs, decrease in wastewater drainage into surface waters, solid waste recycling, and reduction of water consumption.

- In 2000, the following environmental actions were taken by our branches to reduce their water consumption and draining, improve wastewater quality and boost the efficiency of their treatment facilities:
  - Introduction of cavitation process to neutralize wastewater and automatic control systems with the use of a cavitation-type neutralizing reactor at LAPS Nos 3 and 5, TEPs Nos 17 and 23.
  - Introduction of hydrocavitation fish protection systems at LAPS-4, TEPs Nos 16, 17, 21, 22, and 26.
  - Modernization of a RVP (regenerative air heater) wash water neutralization unit at LAPS-5.
  - Installation of garage washing units and storm drain treatment facilities at TEP-12, MESR (Moscow Specialized Energy Repair), MKER (Moscow Cable Repair), RETO, which will allow to completely preclude any discharge of pollutants past the treatment facilities of motor vehicle sites.

MOSENERGO is continuously at work to develop and obtain approvals for maximum permissible emission rates, waste disposal limits, water consumption and water discharge standards; as well as to keep its environmental actions duly licensed.



# Economic Performance

## SALES OF ELECTRICITY AND HEAT AND WORKING ON THE FEDERAL WHOLESALE MARKET

MOSENERGO's sales activities are based on regulatory documents, orders, directives, and methodological instructions from RAO UES of Russia.

According to Order No. 118 of February 24, 2000 of MOSENERGO, an Energy Sales Department was established as a division of the General Directorate. The Department's functions include planning and supervision over energy sales performance, organization of sales activities of MOSENERGO's divisions to meet the targets, improvement of consumption limitation work, regulation of set-off arrangements, organization of work with local authorities, and general coordination of the sales branches' work.

MOSENERGO develops annual and quarterly plans (with breakdown by month). Their implementation results are tracked on a monthly basis.

The Company's budget revenues are projected in strict compliance with the energy sales targets and the cash collection targets.

To streamline settlements with electricity and heat consumers and increase the cash-based component in payments for energy, MOSENERGO has given up set-off arrangements since May 2000.

MOSENERGO's Order No. 371 of May 24, 2000 establishes that any non-cash payments can only be allowed under extraordinary circumstances based on a resolution of MOSENERGO's Settlement Commission.

As a result of a set of measures implemented by MOSENERGO's divisions in 2000 in order to streamline settlements with both debtors and creditors, a stable level of cash payments of 95–100% for energy deliveries has been achieved. This creates the conditions for a transition to cash-based settlements with subscribers.

Since Q4, 2000, MOSENERGO has been working on restructuring the arrears of energy payments formed before 2000, taking into account consumers' actual financial guarantees.

For the purpose of reducing consumer non-payments, MOSENERGO has set up a permanent commission.

Every week, 600 to 920 consumers are issued warnings of limitation or cut-off of power supply. Since the beginning of the year, about 50 thousand warnings have been sent to consumers. Approximately 10 thousand complete or partial cut-offs were effected. As a result of

the measures taken, over 25 thousand consumers made payments. Tough measures involving cut-offs were taken against wholesale resellers, resulting in a considerable increase of electricity sales by them.

In addition, work is underway on transferring the electricity sales function from wholesale resellers to MOSENERGO itself, with resellers retaining the electricity transportation functions in areas served by such wholesale resellers.

Since November 2000, OOO Klin-Energosbyt, an agent of MOSENERGO, has started operations in the Klin district, and Nara-Energosbyt has been operating in the Naro-Fominsk district since December.

MOSENERGO is working on contracts with major electricity and heat consumers and with municipal administrations of the Moscow Oblast in order to streamline settlements for energy supplies with consumers sponsored by the local budgets.

We already have in place agreements with the administrations of 58 out of 60 Moscow Oblast municipalities, as well as 768 agreements with major consumers of electricity and heat. Supervision of the contracts' implementation has been organized.

Starting from July 1, 2000, and in accordance with the "Temporary Procedure for Tenders to Sell Electricity Produced by MOSENERGO in the Federal Wholesale Market," our Company has participated, by way of experiment, in the bidding sessions on the Federal Wholesale Market, selling surplus electricity with regard to our commercial interests.

The tender is organized in the form of a closed auction. Participating in the bidding are the subjects of the Federal Wholesale Market, i.e. the Buyers that entered into the Trilateral Agreement with the Seller and the Tender Organizer on electricity supplies, applied for participation in the bidding and are registered by the Tender Organizer. The results of the bidding are summed up by a tender commission.

- Declared winners of a tender are those bidders who offered:
  - The highest tariffs and the highest price for the lot within the limits stated in the tender notification.
  - To fully pay in advance and in cash for the entire amount of energy purchased at the tender in accordance with the terms and conditions of the Trilateral Agreement.

In 2000, we supplied 1,484.3 million kWh of electricity (including the amount supplied through

In 1993, our Production Association was reorganized as an Open Joint Stock Company. The Company obtained the right to decide on the most efficient development strategy solutions on its own. MOSENERGO's shares are traded proactively both domestically and internationally. The Company's stocks stand out prominently in the portfolios of major Russian and international investors.

In 1994, the Dispatching Center moved into a newly renovated building.

In 1995, a hardware-and-software complex to monitor payments from household consumers was introduced at Energonadzor (now Energosbyt).

In 1996, the first pilot 10 kV cable line was installed that used cross-linked polyethylene phased cable manufactured by AO Moskabel. On December 11, the first power unit was put in operation at TEP-27. On December 12, the generator of GTU No. 5 was connected to the grid at LAPS-3 (the generator is the fifth by its number and the second in terms of its capacity of 150 MW).

In the same year, a Kvint hardware-and-software microchip-based complex was commissioned for the System of Automated Control over Transformer Substations.

In June 1999, Unit No. 1 equipped with an ABB-made GT-35 turbine was launched at GTU-TEP in Elektrostal. The completion of this small-capacity (64.9 MW) compact-size environmentally-safe power plant opens new horizons to our Company in the field of autonomous power supply to small towns of the Moscow Oblast and new areas of mass housing construction in the capital.

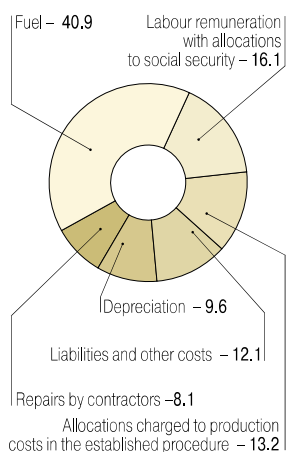
On September 7, 2000, 200 MW hydro unit No. 6 was launched at Zagorsk PSP.



■ ***In 2001, we are planning to reach a level of 100% cash payments for current consumption by all consumer categories. We shall continue improving energy sales arrangements with consumers located in the territories of wholesale resellers while expanding the energy sales market; and the work on reducing the commercial losses of electricity in the grids will also be continued.***



## COSTS STRUCTURE, %



tenders) to the Foreign Wholesale Market. It should be noted that in Q4 of 2000 sales of electricity in the Foreign Wholesale Market stood at 148.9% while the cash collection rate was 95.0%.

We have begun planned work with other energy utilities to collect their arrears of payment due to MOSENERGO. Relevant Amicable Agreements have been signed, envisaging the period of repayment from October 2000 through September 2002.

## PRODUCTION COST OF ELECTRICITY AND HEAT

Production cost of electricity in 2000 amounted to 28.33 kopecks per kWh, while production cost of heat stood at 138.93 rubles per Gcal. In 1999, they were 21.12 kopecks per kWh and 114.41 rubles per Gcal, respectively.

In the year elapsed, the costs of electricity and heat production totaled RUR 23.8 billion.

The production costs growth amounted to RUR 5.3 billion year-on-year, or 28.8% due to inflation and rise in prices of material resources. In the year elapsed, the production costs of electricity and heat were influenced by conflicting pressures.

Production costs growth was primarily driven by inflation, which reached 20.2% in 2000. It ratcheted up all cost components, especially materials and services.

Fuel prices grew as well. The price of gas was raised from 354 rubles per thousand cu m in January to 424 rubles per thousand cu m at the end of the year. The fuel oil prices kept changing, and they grew from 1,287.5 rubles per metric ton in January to 2,375.0 rubles per metric ton in December. The 2000 annual average price of equivalent fuel was 348.33 rubles per ton of equivalent fuel, growing just by 29.8% over 1999 (268.43 rubles per ton of equivalent fuel).

Higher deliveries of electricity to own consumers, reduced power consumption to pump water at Zagorsk PSP, and well-focused measures to slash the power system's costs helped limit the growth of the elapsed year's power production costs by RUR 0.41 billion.

The 2000 costs structure is dominated by fuel (40.9% against 39.9% in 1999) and repairs (17.4% against 19.3% in 1999).

Fuel costs amounted to RUR 9.7 billion, including RUR 8.2 billion of natural gas costs, since the Government kept the price of natural gas, which accounts for 90.1% of total fuel consumption, quite low during the year.

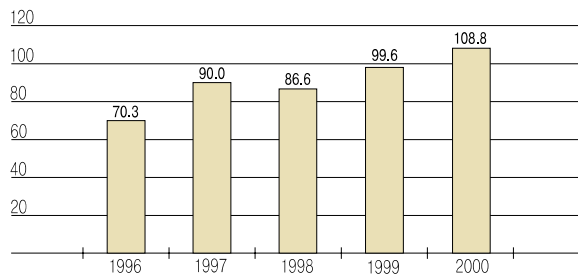
MOSENERGO's 2000 repair costs amounted to RUR 4.2 billion, which is RUR 0.6 billion, or 16.7%, higher than in 1999, given the identical physical scope of the repair campaign. The rise in the repair costs was caused by higher prices of metal and cable, and, especially, by growth of the heating grid replacement costs. At the same time, implementation of the engineering and financial resources mobilization plan, higher ratio of cash payments made it possible to keep the repair cost growth below the industry inflation rates.

The share of labor costs with allocations to social insurance in the total amount of expenditures increased from 13.6% in 1999 to 16.6% in 2000 due to scheduled increase in wages according to the Tariff Agreement with the Energy Industry Trade Union.

## TARIFFS

One of the priority tasks of MOSENERGO in 2000 was work with the Regional Energy Commissions of Moscow City and Moscow Oblast aimed at bringing the electricity and heat tariffs to a

ELECTRICITY. PAYMENT RATE, %



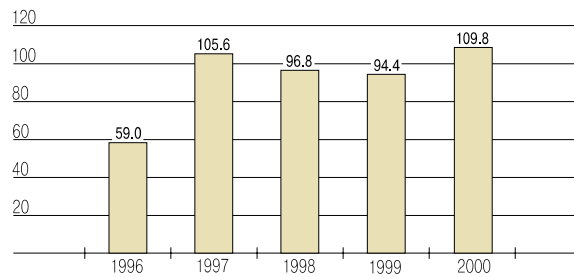
level that would support both energy production and development of the energy system.

The energy tariffs grow slower than prices of fuel and other production commodities. For example, the gas price was increased as early as in October 1999, while new tariffs for electricity and heat were only introduced as from February 1, 2000 in Moscow, and as from March 1, 2000 in the Moscow Oblast. Next time the Moscow tariffs were increased was on June 1, and that was made for all consumers, other than households. New electricity tariffs for Moscow households were introduced as from July 1, and on heat, as from August 1, 2000. New tariffs in the Moscow Oblast were introduced as from July 10, 2000.

In the aggregate, tariffs in 2000 increased versus 1999 by 35.1% for electricity, and by 39.8% for heat.

In spite of the tariffs growth, the system of cross-subsidies among individual consumer groups remains a problem in the Moscow Region. The electricity and heat tariffs for households do not cover actual costs of its production and transportation. The recent increase in the heat tariffs did not compensate MOSENERGO's expenditures for its production. The actual average heat tariff for 2000 amounted to 138.46 rubles/Gcal, with the actual cost price standing at 138.93 rubles/Gcal. Production of heat still remains unprofitable.

HEAT. PAYMENT RATE, %



Moreover, the set tariffs include the amount of profit from sales of electricity and heat below the level reached in 1999. Thus, there are less opportunities in 2000 to finance the Company's costs carried to profits, including to consumption and accumulation funds.

## SALES

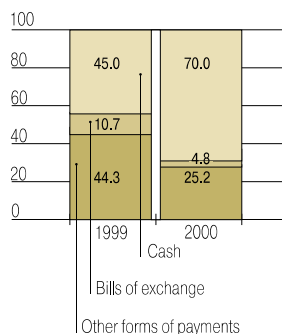
Electricity and heat are sold to consumers under Powers of Attorney by branches, such as Energosbyt (sales of electricity), Heating Grid (sales of heat in the City of Moscow), LAPSs Nos 3, 4, and 5, TEPs Nos 17, 27 (sales of heat in the Moscow Oblast).

Relations with electricity and heat consumers are maintained in compliance with current laws and regulations on the basis of Energy Supply Contracts. In 2000, the consumers paid for energy in cash and securities. Barter arrangements were gradually substituted for cash settlements. In 1999, Energosbyt renewed 72,600 contracts, including 4,300 contracts with industrial consumers and their equivalents, 67,400 contracts with non-industrial consumers, 884 contracts with agricultural consumers, and 56 contracts with resellers.

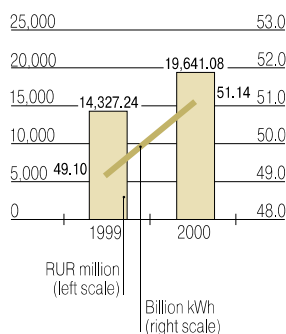
To eliminate subscriber indebtedness of the consumers, MOSENERGO concluded 755 deferred repayment agreements therewith, and 47 agreements on basic principles of cooperation with administrations of the Moscow Oblast towns in provision of electricity

■ *These days, improved operational efficiency is a precondition for successful business, and a company can only be efficient provided it is able to optimize its costs. MOSENERGO has been working on this in a deliberate manner in accordance with yearly operational orders on improving reliability and efficiency of its equipment, and the costs reduction program.*

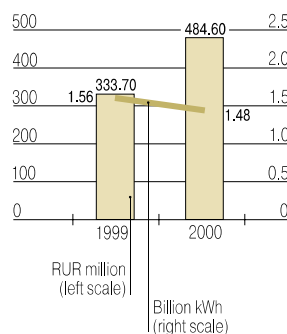
STRUCTURE OF PROCEEDS FOR ENERGY, %



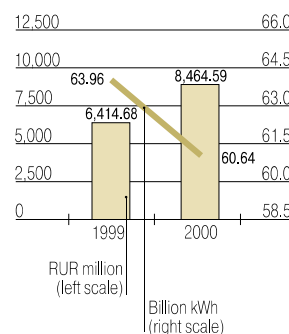
ELECTRICITY. DELIVERIES AND PAYMENTS IN THE MOSCOW REGION



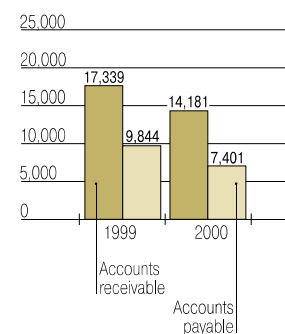
ELECTRICITY. DELIVERIES TO AND PAYMENTS ON THE FEDERAL WHOLESALE MARKET



HEAT. DELIVERIES AND PAYMENTS IN THE MOSCOW REGION



HISTORY OF ACCOUNTS RECEIVABLE AND ACCOUNTS PAYABLE, RUR million



supply to the budget-financed consumers, and on measures for settlement of accounts for deliveries made.

■ To implement the project of electricity sales functions transfer from wholesale reselling consumers to MOSENERGO directly, the following agreements were developed:

- For electricity transmission and distribution services.
- For services in settlement of accounts with subscribers who were earlier serviced by grid enterprises.

In 2000, electricity and heat sales amounted to RUR 28.9 billion, including RUR 20.0 billion paid for electricity, and RUR 8.9 billion for heat. As compared to 1999, the proceeds from the accrual-based energy sales increased by RUR 7.5 billion, or 35.1%, and that was mainly caused by higher tariffs and greater effective deliveries.

Proceeds from electricity and heat cash-based sales amounted to RUR 31.6 billion, or 109.1% of accrual-based sales. Electricity sales to own consumers were RUR 21.5 billion, or 109.4% of accrual-based sales, those on the wholesale market stood at RUR 323.2 million, or 79.8%, and heat sales generated RUR 9.8 billion, or 109.8%.

As compared to 1999, the sales rose by RUR 10.3 billion, or 48.1%, to include a RUR 6.8 billion (46.7%) rise in electricity sales to own consumers, and a RUR 3.4 billion (52.3%) rise in heat sales.

A 64% of the cash-based energy sales proceeds growth is driven by the increased electricity and heat tariffs, while 36% of the growth comes from better marketing.

In the aggregate, the energy sales level in 2000 versus the previous year has grown by 9.5 points (in 1999, cash-based energy sales stood at 99.6% of the accrual-based sales). The level of heat sales has grown by 15.4 points, electricity sales to own consumers have increased by 7.1 points, while electricity sales at the Federal Wholesale Market have dropped by 9.4 points. Given a decrease in the general level of energy sales at the Federal Wholesale Market in 2000 down to 79.8% (89.2% in 1999), it should be noted that there is an upward trend in settlements at the Federal Wholesale Market that manifested itself in the fourth quarter. The level of electricity sales at the Federal Wholesale Market in the fourth quarter totaled 148.9%. The volume of the energy sales at the Federal Wholesale Market in the

fourth quarter of 2000 increased by RUR 47.3 million year-on-year, or 68.9 points.

Increased year-on-year energy sales were made possible due to more active work with consumers in respect of payment for the delivered energy and reduction in their indebtedness. Besides, RUR 2.5 billion (inclusive of VAT), including RUR 2.0 billion for electricity, and RUR 0.5 billion for heat, was paid from the federal budget in 2000 to cover arrears of payment for electricity and heat consumed by the federal-level budget organizations from MOSENERGO.

## RECEIVABLES AND PAYABLES

In 2000, the Company's receivables, including long-term indebtedness, decreased from RUR 20.1 billion to RUR 16.7 billion. During the year, the major part thereof – electricity and heat receivables – reduced from RUR 17.3 billion to RUR 14.2 billion.

The reduction in receivables was driven by contraction of arrears due from federal budget-financed consumers, abatement of debts of city organizations, and wholesale reselling consumers.

In connection with cancellation of settlements with electricity and heat consumers by offset in 2000 (MOSENERGO's Order No. 784 of 20 November 2000), the structure of the energy sales proceeds considerably changed as compared with 1999.

### ■ Sales Structure by Type of Payment: %

	1999	2000	2000*
Cash	45.0	70.0	76.4
Bills of exchange	10.7	4.8	5.2
Dedicated payments	–	12.8	14.0
Other payments	44.3	12.4	13.6

\* Acc. methodology of RAO UES of Russia

The sales growth versus 1999 is primarily attributable to the greater amount of cash received on MOSENERGO settlement account. Barter arrangements during the year were gradually replaced with dedicated cash settlements. In calculating the sales structure by type of payment, the methodology provided by RAO UES of Russia accounts dedicated cash settlements and bank bills of exchange as cash and includes the same in accrual-based sales.

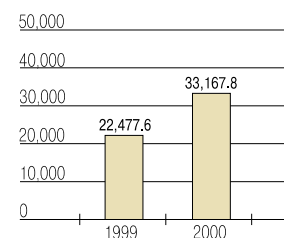
During 2000, the Company's accounts payable dropped from RUR 14.5 billion to RUR 11.4 billion, i.e. by 21.7%. It is largely conditioned by reduction of the Company's accounts payable to suppliers and contractors, which dropped during the year from RUR 9.7 billion to RUR 6.4 billion, or by 34%. The arrears of payment for fuel reduced from RUR 7.1 billion to RUR 4.5 billion (by 36%), the indebtedness on capital construction decreased from RUR 0.8 billion to RUR 0.56 billion (by 29.1%), and from RUR 0.8 billion to RUR 0.7 billion (by 16.2%) on repairs, the accounts payable to other suppliers and contractors dropped from RUR 0.98 billion to RUR 0.5 billion (by 46.5%).

## PROFIT

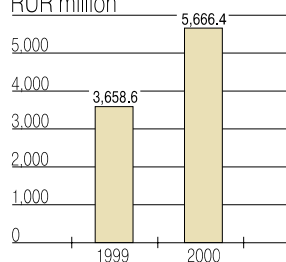
The 2000 profit on cash-based sales amounted to RUR 5.7 billion, and the accrual-based profit totaled RUR 5.4 billion. As the collection rate improved, the profit on cash-based sales increased by RUR 2.0 billion, and the accrual-based profit increased by RUR 2.2 billion.

The cash-based profit before tax, accounting for operating and non-operating incomes and expenditures, stood at RUR 3.1 billion. After taxes, with allowance for contingencies, a net profit of RUR 1.44 billion remains at the Company's disposal.

REVENUES FROM CASH-BASED SALES OF MARKETABLE PRODUCTS, RUR million



REVENUES FROM CASH-BASED SALES OF MARKETABLE PRODUCTS, RUR million



The received profit allows to allocate RUR 216.8 million for dividend payment in 2000.

## PROSPECTS FOR 2001

In 2001, MOSENERGO initiated the preparatory restructuring phase based on internal financial and organizational division of the Company by type of activities. A new economic mechanism for the Company's operation will be adopted that includes cost planning and accounting by type of activities, minimization of production costs, organization of functioning of the Company's structural divisions in conditions of self-support, and making their production and economic operations transparent.

The business plan for 2001 projects a 3.6% growth of electricity consumption in the Moscow region and a 1.9 billion kWh growth of electricity consumption by own consumers.

■ To cover the demand in the Moscow region and transmit 1.5 billion kWh of electricity to other regions, power generation should total 71.2 billion kWh, including:

- 69.65 billion kWh by TEPs.
- 1.55 billion kWh by Zagorsk PSP.

Compared to 2000, total generation will grow by 3.3%, including generation by TEPs by 3.0%, and Zagorsk PSP generation by 19.3%.

The work performed in 2000 to increase the volume of Zagorsk PSP's water reservoir will allow to operate the power plant to its full installed capacity, optimize TEPs' operational modes and save fuel.

Heat deliveries of 75.5 million Gcal from TEPs' manifolds, referenced to the average annual ambient temperature of +5.5 °C are planned at 9.2% above the 2000 figure.

The expected growth of heat deliveries in 2001 is attributed to lower temperatures as compared with the warm 2000 and a 150 Gcal/h growth in heat consumption over the year.

At the projected levels of electricity generation and heat deliveries, the rated fuel consumption amounts to 266.2 g/kWh. The tasks of optimizing the equipment operation and maximizing the utilization of turbines' recovery heat must be achieved. Work will continue to improve basic technological and economic indicators at plants that have not yet met the corresponding standards. Given the difficult financial situation of MOSENERGO and continued growth of prices of fuel oil and coal, timely accumulation of standard fuel stocks by the beginning of the heating period becomes particularly important.

The share of Kuznetsk coal in the fuel mix should be increased to 2,500,000 tons, that of peat and Moscow Oblast's coal – to 800,000 tons and 300,000 tons respectively, while natural gas consumption should be limited accordingly at LAPS-4, LAPS-5, TEP-17 and TEP-22.

■ In order to cover the increased consumption and reliably manage the 2001–2002 fall/winter maximum, the following equipment must be put in operation:

- At TEP-11, 80 MW power unit No. 10; a 500 tons/hour boiler.
- At TEP-27, a 180 Gcal/h PVK water boiler.
- At TEP-22, turbine No. 7.
- At the Heating Grid, 7.9 km of heating mains.
- Transformer capacity, 292,000 kVA.
- 35 kV and more overhead transmission lines, 2.55 km.
- 0.4–10 kV overhead transmission lines, 290 km.

The planned capital expenditures amount to RUR 5,990.0 million in current prices, or RUR 126.6 million in 1984 prices.

Tariff policies implemented by the Regional Energy Commissions of Moscow and the Moscow Oblast in the Moscow region are aimed at keeping back the growth of the industrial electricity tariff and tariffs for other consumers, resulting in reduced investment in refurbishing and commissioning of power capacity in the last four years. In 2001, capital expenditure will drop by 14% against 2000, by 26% against 1999 and by 35% against that of 1998.

The goals of MOSENERGO's financial and economic stability and efficient technological policy in 2001 can only be attained if energy tariffs are increased and the available resources are used with maximum efficiency. The minimum tariffs that can support MOSENERGO's normal operation, technological modernization, and rebuilding, are 56 kopecks/kWh for electricity and 220 rubles/Gcal for heat. The existing tariffs are required to be increased by 28% and by 34%, respectively.

Continued work on eliminating cross-subsidies to households by industries is another task of the tariff policy for 2001.

In addition to everyday work on implementing the main principles of the power utility's development, we shall continue to add new consumers in 2001, due to, first of all, the implementation of the program of new housing construction in the place of old worn-out houses to be demolished in Moscow and large-scale construction of cottages in the Moscow Oblast.

■ Priority tasks for 2001 include:

- Improvement of electricity supply to consumers in Teply Stan, Tushinsky, Babuskinsky, Odintsovsky and other districts.
- Construction of Yuzhno-Izmailovskaya and Khapilovskaya pumping stations; construction of

Ostashkovskaya, Businovskaya, and Druzhinikovskaya heating mains to improve heat supply to consumers.

- Development of technological solutions to modernize TEP-7, and connect extra heat loads to TEP-6.
- Development of proposals on eliminating the bottlenecks in heat supplies to consumers in Luzhniki and Yakimanka districts.

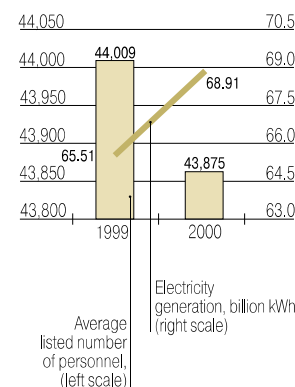
■ The need to pay off the Company's payables, effect the current payments for fuel in cash, and the interests of our shareholders set the following objectives for 2001:

- Timely collection of payments from energy consumers.
- Reduction in energy production, transmission and distribution costs.

■ In order to attain such objectives, a set of measures have been planned:

- Increasing the efficiency of fuel utilization through optimization of operating modes of heating equipment.
- Installation of adjustable electrical drives at the Heating Grid's pumps.
- Quality repairs and improvement of primary technological and economic performance of power plants.
- Strict supervision over spendings on capital construction and maintenance.
- Implementation of a well-balanced pricing policy in making contracts for supplies of equipment, spare parts, and contractor selection.
- Further improvement of the system of payments between MOSENERGO's branches, with a view to efficient utilization of financial resources.
- Pursuit of fuel-related claims, and conduct of licensing and legal activities of the Company.

HISTORY OF ELECTRICITY PRODUCTION AND NUMBER OF PERSONNEL



# Management and Supervision Bodies



1. Members of MOSENERGO's Board of Directors (left to right): I. N. Mouraviyov, V. G. Zavadnikov, V. V. Kuzmin, A. A. Vagner, A. N. Karev, I. T. Goryunov, N. I. Serebryanikov, V. I. Reshetov, V. V. Pronin, A. N. Remezov, A. Ya. Kopsov, Yu. I. Mozhareenko, B. V. Nikolsky.

2. MOSENERGO's Executive Committee

3. Powermen of the new millennium. Students of the Moscow Technological College of MOSENERGO.

## BOARD OF DIRECTORS

**A. YA. KOPSOV**, Deputy Chairman of the Executive Board, RAO UES of Russia; Chairman of the Board of Directors, MOSENERGO.

**A. A. VAGNER**, Head of the Power Plant Department, RAO UES of Russia.

**I. T. GORYUNOV**, First Deputy General Director and Chief Engineer, MOSENERGO.

**V. G. ZAVADNIKOV**, Deputy Chairman of the Executive Board, RAO UES of Russia.

**A. N. KAREV**, Director of the CRMZ (Central Mechanical Repair Workshop), MOSENERGO branch.

**V. V. KUZMIN**, Deputy General Director of MOSENERGO for Sales and Relations with Electricity and Heat Consumers.

**YU. I. MOZHARENKO**, Deputy Chairman of the Executive Board, RAO UES of Russia.

**I. N. MOURAVYEV**, Head of the Human Resources Directorate, RAO UES of Russia.

**B. V. NIKOLSKY**, First Vice Prime Minister, Moscow Government.

**V. V. PRONIN**, First Deputy Chairman, Energy Commission of the Moscow Oblast.

**A. N. REMEZOV**, General Director, MOSENERGO.

**V. I. RESHETOV**, Member of the Executive Board, RAO UES of Russia; General Director, OAO CDU (Central Dispatching Department) of UES of Russia.

**N. I. SEREBRYANIKOV**, General Director Adviser, MOSENERGO.

## INTERNAL AUDITING COMMISSION

**A. V. BOLSHAKOV**, Chief Expert, Human Resources Directorate, RAO UES of Russia

**I. I. VORONTSOVA**, Head of the Power Sales Operations Department, MOSENERGO.

2000-000

Relentless time flies on, assigning our Company new tasks.

At the General Shareholders' Meeting of May 15, 2000, a new General Director of MOSENERGO and a new Board of Directors were elected. In turn, the Board elected a lot of new members to MOSENERGO's Executive Committee.

As a result, the Company has a new style of corporate governance, and is developing new business fields to boost MOSENERGO's profitability through reforming its corporate policies and asset management, separating the Company's sales operations and working on the Federal Wholesale Market. This work is performed on a systematic basis: goal setting and planning have become more precise, with a stricter supervision over the implementation of orders, resolutions and assignments.

Weekly meetings of MOSENERGO's Executive Committee review various issues of the Company's financial and economic activities, planning and supervision over the administration of the budget, fuel supplies and payment thereof; and reports on the performance of the Executive Committee's resolutions are presented. On a monthly basis, the Company's technological and economic indicators, as well as the sales, taxes and other settlements with the budget are considered. The progress of and the payment for major construction and modernization projects, supplies and deliveries of materials and technological resources to the branches are also examined. Decisions on the staff are made, objectives and outcomes of PR campaigns are discussed; issues of charity and financial aid, as well as those of transfer of housing space and social assets to municipalities are considered.

To decide on current issues, the General Director holds weekly meetings of the General Directorate executives.

The influx of new blood in the management, the redistribution of effort and focusing on major issues has brought tangible results: the unpaid deliveries of electricity dropped, MOSENERGO's sales rose considerably, including the cash collection rate. The requisite conditions have been secured for the preparation of the power system for the winter: fuel stocks have been replenished, and a maintenance campaign and a construction program have been completed.

For the next year, the main functions of the Executive Committee remain the same as in the last year: financing of all the Company's business areas, its major construction and repair projects; tariff coordination work with Regional Energy Commissions to cover costs; implementation of an effective credit policy and fulfillment of the tariff agreement on salaries and wages.



**T. V. ZHELOBITSKAYA**, Chief Accountant, TEP-22, MOSENERGO branch.

**D. N. NIKITIN**, First Deputy Head of the Corporate Policies Department, RAO UES of Russia.

**S. B. SIDOROV**, Head of the Finance Audit Department, RAO UES of Russia.

**G. F. SHEVCHENKO**, Head of the PEO (Planning and Economy Department), TEP-21, MOSENERGO branch.

## EXECUTIVE BOARD

**A. N. REMEZOV**, Chairman of the Executive Board; General Director, MOSENERGO.

**I. T. GORYUNOV**, First Deputy General Director and Chief Engineer.

**V. P. CHERNY**, First Deputy General Director for Corporate Policies and Property Management.

**V. V. KUZMIN**, Deputy General Director for Sales and Relations with Electricity and Heat Consumers.

**A. A. MITIAYEV**, Deputy General Director for Distribution Grids and Long-term Development.

**A. V. YEVSTAFIEV**, Deputy General Director for Information Technologies and Authorized Government Liaison and Information Officer.

**S. P. ROMANOVSKY**, Deputy General Director for Capital Construction.

**A. G. UZILEVSKY**, Deputy General Director for Fuel Supply and Complete Equipment.

**V. L. NAZIN**, Deputy General Director for Economy.

**V. S. MOZGALEV**, Deputy Chief Engineer for Dispatching.

**A. V. PASKO**, Chief Accountant, MOSENERGO.

**N. I. SEREBRYANIKOV**, General Director Adviser.

**R. A. BALIKOYEV**, Heating Grid Director, MOSENERGO branch.

**YU. L. GUSKOV**, Director, TEP-21, MOSENERGO branch.

**A. M. BOYAR**, Director, Mozhaiskiye Electrical Grids, MOSENERGO branch.







# Financial Statements

## PROFIT AND LOSS ACCOUNT, RUR '000

Indicator	2000 accrual-based	2000 cash-based	1999 accrual-based	1999 cash-based
<b>I. Incomes and expenses in regular business</b>				
Sales of goods, products, works, services (net of VAT, excise duties, and similar compulsory payments)	30,499,381	33,167,851	22,619,759	22,477,682
Cost of sales	21,786,047	24,146,550	16,323,893	15,678,106
Gross profit	8,713,334	9,021,301	6,295,866	6,799,576
Commercial costs	215,970	216,014	162,642	161,159
Administrative costs	3,137,886	3,138,840	2,984,550	2,979,774
Profit from sales	5,359,478	5,666,447	3,148,674	3,658,643
<b>II. Operating incomes and expenses</b>				
Interest receivable	7,446	7,446	6,977	6,977
Interest payable	11,939	11,939	0	0
Earnings on interests in other organizations	3,422	3,422	407	407
Other operating incomes	912,222	960,369	1,469,313	1,419,949
Other operating expenses	2,038,694	2,084,149	1,797,774	1,751,719
<b>III. Non-operating incomes and expenses</b>				
Non-operating incomes	736,989	736,989	850,645	850,645
Non-operating expenses	2,146,870	2,146,870	1,635,080	1,635,080
Profit before tax	2,822,054	3,131,715	2,043,162	2,549,822
Profit tax and other compulsory charges	1,691,379	1,691,379	900,498	900,498
Profit from regular business	1,130,675	1,440,336	1,142,664	1,649,324
<b>IV. Extraordinary incomes and expenses</b>				
Extraordinary incomes	1,218	1,218		
Extraordinary expenses	1,350	1,350		
Net profit	1,130,543	1,440,204	1,142,664	1,649,324

<b>BALANCE SHEET. ASSETS, RUR '000</b>	<b>As at 01.01.2000</b>	<b>As at 01.01.2001</b>
<b>I. NON-CIRCULATING ASSETS</b>		
Intangible assets	89,273	95,860
Including:		
Patents, licenses, trademarks, etc	81,546	62,723
Similar rights and assets organizational expenses	373	7
Fixed assets	45,020,448	45,877,416
Including:		
Land and nature use sites	85	85
Buildings, machinery and equipment, fixed structures	43,115,643	44,636,696
Other fixed assets	1,904,720	1,240,635
Construction in progress	3,010,826	4,720,001
Including:		
Equipment to be installed	725,431	1,105,809
Construction in progress	2,285,395	3,614,192
Long-term financial investments	86,887	87,261
Including:		
Investments in related companies	33,357	31,855
Investments in other organizations	48,491	50,367
Other long-term financial investments	5,039	5,039
<b>TOTAL, Section I</b>	<b>48,207,434</b>	<b>50,780,538</b>
<b>II. CIRCULATING ASSETS</b>		
Inventories	2,910,327	3,749,187
Including:		
Raw materials, materials and other similar assets	2,524,972	3,305,760
Animals in breeding and feeding	16,983	27,899
Costs of work in progress (circulating costs)	43,112	37,294
Finished commodity and goods for reselling	281,748	293,116
Expenses of future periods	43,041	81,573
Other inventories and costs	471	3,545
VAT on acquired assets	1,710,056	1,339,894
Accounts receivable (with maturity in over 12 months after the reporting date)	6,971	5,646
Including:		
Customers and consumers	0	636
Other accounts receivable	6,971	5,010
Accounts receivable (with maturity within 12 months after the reporting date)	20,097,206	16,746,798
Including:		
Customers and consumers	17,651,134	14,458,675
Advance payments	1,221,072	585,383
Other accounts receivable	1,223,127	1,702,740
Short-term financial investments	81,829	73,446
Cash	446,999	1,036,489
<b>TOTAL, Section II</b>	<b>25,253,388</b>	<b>22,951,460</b>
<b>BALANCE</b>	<b>73,460,822</b>	<b>73,731,998</b>

LIABILITIES, RUR '000	As at 01.01.2000	As at 01.01.2001
<b>III. EQUITY AND RESERVES</b>		
Authorized capital	25,600,000	28,267,726
Surplus capital	15,839,553	15,279,223
Reserve funds	325	325
Social fund	400,136	400,136
Retained profit of previous years, including the funds	10,787,384	9,470,326
Outstanding loss of previous years	- 1,206,315	0
Retained profit of the reporting year	-	1,130,543
Outstanding loss of the reporting year	-	0
Utilization of the profit of the reporting year	-	- 343,395
<b>TOTAL, Section III</b>	<b>51,421,083</b>	<b>54,204,884</b>
<b>IV. LONG-TERM LIABILITIES</b>		
Borrowings and loans	5,357,641	5,760,364
Including:		
Bank loans with maturity in over 12 months from the reporting date	1,030,426	1,388,068
Borrowings with maturity in over 12 months from the reporting date	4,327,215	4,372,296
<b>TOTAL, Section IV</b>	<b>5,357,641</b>	<b>5,760,364</b>
<b>V. SHORT-TERM LIABILITIES</b>		
Borrowings and loans, including	1,121,051	1,175,005
Accounts payable	14,542,445	11,385,480
Including:		
Accounts payable to suppliers and contractors	9,692,365	6,389,501
Accounts payable to Company employees	89,468	144,794
Accounts payable to the state and off-budget funds	75,247	63,674
Accounts payable to the budget	635,197	1,417,197
Advance payments received	216,450	120,290
Other accounts payable	3,833,718	3,250,024
Arrears of dividend due to shareholders	28,512	2,772
Incomes of future periods	990,090	1,203,493
<b>TOTAL, Section V</b>	<b>16,682,098</b>	<b>13,766,750</b>
<b>BALANCE</b>	<b>73,460,822</b>	<b>73,731,998</b>

## CASH FLOW STATEMENT, RUR '000

Indicator	Amount	Including current business	Including investments	Including financial activities
<b>1. Balance of cash as at the beginning of the year</b>	<b>435,320</b>	–	–	–
<b>2. Cash received, total</b>	<b>46,454,151</b>	<b>44,183,508</b>	<b>2 261,359</b>	<b>9,284</b>
Including:				
Sales of goods, products, works and services	29,276,709	29,276,709	–	–
Sales of fixed assets and other properties	25,741	24,379	1,362	–
Advance payments received from customers (consumers)	119,003	119,003	–	–
Budget allocations and other target financing	677,384	82,342	595,042	0
Gratuitously	20,026	20,026	0	0
Loans received	1,709,369	1,709,369	0	0
Borrowings received	0	0	0	0
Dividends, interests on financial investments on financial investments	3,168	–	0	3,168
Other proceeds	14,622,751	12,951,680	1,664,955	6,116
<b>3. Cash disbursed, total</b>	<b>45,865,557</b>	<b>38,049,237</b>	<b>3,553,567</b>	<b>106,032</b>
Including:				
Payment for acquired goods, works, services	17,910,435	16,757,657	1,152,778	0
Payroll	2,918,033	–	–	–
Allocations to state off-budget funds	1,238,688	–	–	–
Amounts paid out on account	90,687	90,681	6	0
Advance payments	708,157	510,419	197,738	0
Shared construction payments	119,491	–	119,491	–
Payments for machinery, equipment, and motor vehicles	337,789	–	337,789	–
Financial investments	81,146	0	81,146	0
Dividends, interests on securities	99,916	–	0	99,916
Payments to the budget	4,890,122	4,890,122	–	0
Payments of interests and principals on loans and borrowings received	2,854,107	2,854,107	0	0
Other payments, transfers, etc.	14,616,986	12,946,251	1,664,619	6,116
<b>4. Balance of cash as at the end of the reporting period</b>	<b>1,023,914</b>	–	–	–

## CHANGES IN THE BALANCE SHEET ITEMS REQUIRED BY THE AMENDED RULES

Once the Statute on Accounting "Incomes of an Organization" (No. 9), the Statute on Accounting "Expenses of an Organization" (No. 10), and the "Methodological Recommendations on the Procedure for Forming Accounting Statements of an Organization" were enacted, the Balance Sheet as at January 01, 2000 was modified as compared with the Annual Report for 1999. The modifications affected both the bottom line and a number of items. The values of particular items are provided in the table below:

Indicator	Annual Report for 1999	Balance Sheet as at 01.01.2000	Differential
<b>ASSETS</b>			
<b>I. NON-CIRCULATING ASSETS</b>			
Construction in progress	3,514,856	3,010,826	- 504,030
TOTAL, Section I	48,711,464	48,207,434	- 504,030
<b>II. CIRCULATING ASSETS</b>			
Customers and consumers	17,653,542	17,651,134	- 2,408
Advance payments disbursed	717,042	1,221,072	504,030
Other accounts receivable	1,224,040	1,223,127	- 913
TOTAL, Section II	24,752,679	25,253,388	500,709
Utilization of the profit of the reporting year	1,206,315	-	- 1,206,315
<b>Balance</b>	<b>74,670,458</b>	<b>73,460,822</b>	<b>- 1,209,636</b>
<b>LIABILITIES</b>			
<b>III. EQUITY AND RESERVES</b>			
Surplus capital	14,455,203	15,839,553	1 384,350
Accumulation funds	5,920,238	-	- 5,920,238
Social fund	1,796,583	400,136	- 1,396,447
Target financing and proceeds	996,270	0	- 996,270
Retained profit of previous years, including the funds	3,712,385	10,787,384	7,074,999
Outstanding loss of previous years	-	- 1,206,315	- 1,206,315
Retained profit of the reporting year	1,142,664	0	- 1,142,664
TOTAL, Section III	53,623,668	51,421,083	- 2,202,585
<b>V. SHORT-TERM LIABILITIES</b>			
Other accounts payable	3,830,837	3 833 718	2,881
Incomes of future periods	22	990,090	990,068
TOTAL, Section V	15,689,149	16,682,098	992,949
<b>BALANCE</b>	<b>74,670,458</b>	<b>73,460,822</b>	<b>1,209,636</b>

## MOSENERGO'S CONSOLIDATION PRINCIPLES AND METHODOLOGY OF PREPARING 2000 FINANCIAL STATEMENTS

MOSENERGO's accounting policies are implemented in accordance with Federal Law No. 129-FZ, dated November 29, 1996, "On Accounting," and the Methodological Recommendations on the Procedure for Preparation of Accounting Statements of an Organization approved by Order No. 60n, dated June

28, 2000, of the Ministry of Finance of the Russian Federation. These regulatory documents constitute a foundation upon which MOSENERGO's General Director issued its Order No. 792 "On Accounting Policy in 2000" that stipulates the Company's key accounting principles in 2000.

Business transactions are reflected in books according to the working chart of accounts "Classifier of the Charts of Accounts of MOSENERGO's Financial and Business Transactions," as approved in December 1997. MOSENERGO and all of its branches apply model interagency forms of primary accounting documents recommended by the State Statistics Committee of Russia.

**Valuation of property, liabilities, and business transactions. Inventory taking and depreciation of property:**

- Property, liabilities and business transactions are valued in the currency of the Russian Federation, i.e. in rubles.
- Accounting entries in relation to Company's foreign currency accounts and in relation to Company's other foreign currency transactions are made in rubles, as determined according to the ruble to foreign currency exchange rate of the Central Bank of Russia on the date of transactions in question, and, at the same time, the said entries are made in the currency of settlements and payments. Differences in exchange rates are recorded in account 80 "Profit and Loss" and are subsequently accounted for in profit tax calculation, unless otherwise provided for by legislation of the Russian Federation. Such reflection is effected on a monthly basis. Fixed assets, intangible assets, low-value items, materials and spare parts are valued and recorded at their actual costs as at the time of acquisition. Finished products (works, services) are valued at their actual production costs.
- MOSENERGO's fixed assets include facilities and items, the value of which exceeds 100 minimum wages stipulated by legislation of the Russian Federation.
- The historical value of fixed assets may be changed by the amount of actual costs incurred or by the net book value of partially liquidated facilities if respective facilities are built up, re-built or partially liquidated. An increase (reduction) in the historical value of fixed assets is charged to the Company's surplus capital.
- Instruments of labor with the value below 100 minimal wages each, as determined by their acquisition price since January 1, 1998, regardless of their age, are accounted for in circulating assets as low-value or quick-wearing items. Computers, office equipment and other material valuables

not exceeding the value limit of assets in circulation may be accounted for as low-value and quick-wearing items, with their list being reflected in the Order on Branch Accounting Policies – Letter No. 16-00-17.74, dated July 2, 1998, of the Ministry of Finance.

- Production stocks to be written off on production are valued at their average acquisition costs.
- Intangible assets include costs of intangible items that are used for a period exceeding 12 months.
- Value adding intangible assets (i.e. those used in production) are straight-line depreciated.
- Fixed assets are straight-line depreciated on the basis of the Unified Rates of Depreciation Allocations for Full Replacement of Fixed Assets of the People's Economy of the USSR approved by Decree No. 1072, dated October 22, 1990, of the Council of Ministers of the USSR. Their useful life is determined based on the rates stipulated by the same Decree.
- Fixed assets, whose consumer properties do not change in time (land plots and nature use sites), and other facilities set forth in paragraph 4.1 of Accounting Statute No. 6/97 "Accounting Fixed Assets" approved by Order No. 65n dated September 3, 1997, of the Ministry of Finance of the Russian Federation, may not be depreciated.
- Leased fixed assets, irrespective of a lease term, are depreciated by the lessor (unless otherwise provided for in financial lease agreements and company lease contracts).

**Special features of accounting production costs. Sales proceeds, profit and its distribution:**

- All kinds of incomes are recognized and recorded in appropriate accounts subject to Accounting Statute 9/99 "Incomes of an Organization."
- Since electricity and heat production coincides with their consumption in terms of time, there is no balance of work in process in core production of electricity and heat.
- Energosbyt is responsible for analytical records of payments with consumers for electricity, the Heating Grid is responsible for accounting heat, and LAPS-3, LAPS-4, LAPS-5, TEP-17, Zagorsk PSP, and TEP-27 are responsible for analytical records of payments in the Moscow Oblast. The amount of proceeds received from electricity and heat deliveries is determined in

analytical records prepared by the said branches and communicated by them to the General Directorate in the form of the "Report on Effective Deliveries and Sales of Electricity and Heat." Financial results of other sales are determined by the branches on their own.

Payment is deemed to have actually been made once the money is credited to branches' accounts, or barter transactions are paid for by securities, or settlements are effected through budgets of various levels. Non-operating incomes are determined as they are posted on the books. Incomes relating to received fines and penalties are recorded as they are recognized by debtors or courts.

Profit on sales is determined as the difference between the sales proceeds in existing prices or tariffs, exclusive of VAT and the costs incurred in energy production, transmission and sales. Profit of an accounting period is determined as profit (loss) from sales of products (works, services), profit from sales of fixed assets and non-operating incomes less non-operating expenses.

The Company's profit remaining at its disposal from payments for the products after taxes and allocations to the accumulation fund intended for capital expenditures, is allocated to the funds, subject to the accounting year results, upon approval by the shareholders' general meeting.

**In 2000, tax payments were made by MOSENERGO as follows:**

- Profit tax was paid pursuant to the procedure stipulated by Decree No. 660, dated July 1, 1995, of the Government, based on the average percentage of the labor remuneration fund and the percentage of the value of fixed production assets of a branch. This tax is paid from MOSENERGO's account to budgets of all levels separately: federal budget, Moscow City budget, Moscow Oblast budget, local budgets of towns of the Moscow Oblast and the Ryazan Oblast, according to the rates adopted by local authorities.
- VAT was paid pursuant to the procedure set forth in Joint Letter No. V3-4- 03/19n of the State Tax Services of the Russian Federation and No. 57n, dated July 16, 1997, of the Ministry of Finance "On Procedure for Calculating and Paying VAT by Energy Utilities." The tax is calculat-

ed for the Company as a whole, allocating its portions to the territories of the Federation constituent entities proportionate to the product generated by MOSENERGO and consumed within such territory. Payment of this tax is effected from MOSENERGO's account to the federal budget, Moscow City budget, Moscow Oblast budget, Ryazan Oblast budget, and Vladimir Oblast budget.

- Tax for maintaining housing and social assets was paid depending upon proceeds actually paid for product sales and upon the percentage of the branch's employees. The tax is paid from MOSENERGO's account to the Moscow City budget, local budgets of towns of the Moscow Oblast and Ryazan Oblast, according to the rates adopted by local authorities.
- Road user tax was paid pursuant to the procedure specified in the "Agreement for Road User Tax Distribution Between Constituent Entities of the Russian Federation" of July 1, 1998 covering the territory of Moscow and the Moscow Oblast. The tax is calculated for the Company as a whole, allocating its portions proportionate to the product generated by MOSENERGO and consumed within the territories of the said constituent entities of the Russian Federation. Payment of this tax is effected from MOSENERGO's account to the federal road fund, the territorial road fund of Moscow, and the territorial road fund of the Moscow Oblast.
- Property tax was paid pursuant to the procedure stipulated by Article 1 of Federal Law No. 1-FZ, dated January 8, 1998, of the Russian Federation; this tax is paid by MOSENERGO at the place of registration of its structural units.
- All other taxes are calculated and paid on behalf of MOSENERGO by branches on their own in the procedure prescribed by legislation.

**MOSENERGO's Consolidated Balance includes indicators on the following types of activities:**

- industrial
- design
- trading
- agricultural

When appraising balance sheet items, one should allow for the continuing impact of inflation processes on absolute figures.



## COMMENTS TO PROFIT AND LOSS ACCOUNT

The key financial indicators are profit on sales, profit before tax, and net profit. Once new Statute on Accounting and Reporting No. 9 "Incomes of Organizations" and Statute on Accounting and Reporting No. 10 "Expenses of Organizations" were enacted, expenses of the Joint-Stock Company for maintaining social facilities, paying Eurobond coupon yield, servicing the EBRD and IFC loan and individual payments are to be charged to non-operating expenses, which resulted in reducing the Company's profit before tax by RUR 1,218,919,000.

The Company's 2000 accrual-based profit before tax was RUR 2,822,054,000, and the 2000 cash-based profit before tax was RUR 3,131,715,000.

The 2000 cash-based profit is larger than the accrual-based profit. This can be regarded as positively describing the Company's efforts to get repayment on accounts receivable.

After paying profit tax and other levies from profit, the net profit remaining at the Company's disposal was RUR 1,440,204,000

■ In 2000, the Company utilized its profit as follows (RUR '000):

- For capital construction . . . . . 476,659  
Including from the 2000 profit. . . . . 476,659
- In allocations  
to general consumption fund . . . . . 200,839  
Including from the 2000 profit. . . . . 162,626
- In allocations  
to individual consumption fund . . . . . 184 271

- Including from the 2000 profit. . . . . 180,769
- Thus, the profit utilized totaled . . . . . 941,067  
Including from the 2000 profit. . . . . 820,054

■ It is suggested that the 2000 Profit and Loss Account be approved as follows (RUR '000)

- Profit before tax  
accrual-based . . . . . 2,822,054  
cash-based . . . . . 3,131,715
- Net profit  
accrual-based . . . . . 1,130,543  
cash-based . . . . . 1,440,204

■ It is suggested that the 2000 net profit be allocated as follows (RUR '000):

- Accumulation fund  
(capital construction). . . . . 476,659
- Individual  
consumption fund . . . . . 180,769
- General  
consumption fund . . . . . 162,626

■ It is suggested that remaining 2000 profit amounting to RUR 620,150,000 be allocated as follows (RUR '000):

- 2000 dividend . . . . . 216,820
- Reserve fund . . . . . 72,010
- Accumulation fund . . . . . 313,793
- Consumption fund . . . . . 17,527

## COMMENTS TO INDIVIDUAL LINES OF THE BALANCE SHEET

### FIXED ASSETS, RUR '000

	As at 01.01.2000	As at 01.01.2001	Difference
Land and nature use sites	85	85	0
Buildings, machinery, equipment	43,115,643	44,636,696	1,521,053
Other fixed assets	1,904,720	1,240,635	- 664,085
Construction in progress	3,010,826	4,720,001	1,709,175
<b>TOTAL fixed assets</b>	<b>48,031,274</b>	<b>50,597,417</b>	<b>2,566,143</b>

The smaller figure in the line "Other fixed assets" resulted from transferring a number of social assets (temporary housing at Zagorsk PSP, houses and apartment blocks) to municipalities.

These social assets were in fact a liability for MOSENERGO.

**INTANGIBLE ASSETS, RUR '000**

	As at 01.01.2000	As at 01.01.2001	Difference
Patents, licenses, trademarks, service logos, and other similar rights and assets	81,546	62,723	- 18,823
Foundation costs	373	7	- 366
Other	7,354	33,130	25,776
<b>TOTAL intangible assets</b>	<b>89,273</b>	<b>95,860</b>	<b>6,587</b>

The smaller figure in the line "Patents, licenses, trademarks, service logos and other similar rights and assets" resulted from writing some expired licenses off the balance sheet.

**FINANCIAL INVESTMENTS, RUR '000**

	As at 01.01.2000	As at 01.01.2001	Difference
Investment in subsidiaries	0	0	0
Investment in related companies	33,357	31,855	- 1,502
Investment in other organizations	48,491	50,367	1,876
Borrowings to organizations for a term of over 12 months	0	0	0
Other long-term financial investments	5,039	5,039	0
<b>TOTAL financial investments</b>	<b>86,887</b>	<b>87,261</b>	<b>374</b>

The increased bottomline of this section resulted from MOSENERGO's becoming a founder of Telecomenergo in accordance with a resolution of the GM, and a 50-fold increase of the value of MOSENERGO's holding in AO KAMAZ.

**ACCOUNTS RECEIVABLE, RUR '000**

	As at 01.01.2000	As at 01.01.2001	Difference
Clients and customers	17,651,134	14,459,311	- 3,191,823
Bills of exchange receivable	1,873	0	- 1,873
Arrears by subsidiaries and related companies	0	0	0
Arrears of assessed contributions by founders	0	0	0
Advance payments	1,221,072	585,383	- 635,689
Other accounts receivable	1,230,098	1,707,750	477,652
<b>TOTAL accounts receivable</b>	<b>20,104,177</b>	<b>16,752,444</b>	<b>- 3,351,733</b>

The considerable reduction in the "Clients and Consumers" line has been reached through MOSENERGO's active work with consumers on collection of accounts receivable. The reduction in the "Advance payments" line has been caused by smaller advance payments under newly made agreements and receipts of equipment for advance payments previously made, posting the equipment in stock or transferring it to goods in progress. The increase in the line "Other accounts receivable" is mostly attributable to a considerable amount of claims: RUR 168,102,000, resulting from active claiming of receivables by MOSENERGO's legal service.

**AGING STRUCTURE OF ACCOUNTS RECEIVABLE (CLIENTS AND CUSTOMERS), %**

	Total	Including over 3 months	Including over 12 months
For electricity as at 01.01.2000	70	48	36
For electricity as at 01.01.2001	71	56	36
For heat as at 01.01.2000	28	16	5
For heat as at 01.01.2001	27	14	4

#### ACCOUNTS RECEIVABLE STRUCTURE (CLIENTS AND CUSTOMERS)

	As at 01.01.2000, RUR mln.	As at 01.01.2000, %	As at 01.01.2001, RUR mln.	As at 01.01.2001, %
Accounts receivable for electricity	12,437	70	10,324	71
Incl. for that supplied to the Fed. Wholesale Market	1,638	9	1,766	12
Accounts receivable for heat	4,902	28	3,858	27
Other accounts receivable	312	2	277	2
<b>TOTAL</b>	<b>17,651</b>	<b>100</b>	<b>14,459</b>	<b>100</b>

#### ACCOUNTS PAYABLES, RUR '000

	As at 01.01.2000	As at 01.01.2001	Difference
Suppliers and contractors	9,692,365	6,389,501	- 3,302,864
Bills of exchange payable	0	0	0
Arrears payable to subsidiaries and related companies	0	0	0
Wage arrears due to the personnel	89,468	144,794	55,326
Arrears payable to the budget and state off-budget funds	710,444	1,480,871	770,427
Arrears of dividends payable to shareholders	28,512	2,772	- 25,740
Advance payments received	216,450	120,290	- 96,160
Other accounts payable	3,833,718	3,250,024	- 583,694
<b>TOTAL accounts payable</b>	<b>14,570,957</b>	<b>11,388,252</b>	<b>- 3,182,705</b>

The reduction in the line "Suppliers and Contractors" is due to considerable decrease of accounts payable thanks to smaller accounts receivable and using of the funds toward payments to creditors. The line "Wage arrears due to the personnel" reflects the current arrears of wages for December 2000. The line "Arrears payable to the budget and state off-budget funds" reflects the current liabilities to the budget. The reduction in the line "Arrears of dividends payable to shareholders" reflects payment of the arrears of dividends due to shareholders for 1999. The outstanding part is dividends not yet received by shareholders themselves.

The reduction in the line "Other accounts payable" has been caused by transferring to the budget of VAT on the goods shipped earlier as the respective sales proceeds are received

#### AGING STRUCTURE OF ACCOUNTS PAYABLE (SUPPLIERS AND CONTRACTORS), %

	1-3 months	3-6 months	6-12 months	Over 12 months
As at 01.01.2000	38.3	16.2	21.5	23.9
As at 01.01.2001	30.0	20.3	25.8	23.8

#### ACCOUNTS PAYABLE STRUCTURE (SUPPLIERS AND CONTRACTORS)

	As at 01.01.2000, RUR mln.	As at 01.01.2000, %	As at 01.01.2001, RUR mln.	As at 01.01.2001, %
Accounts payable for gas	6,959.5	71.8	4,458.6	69.8
Accounts payable for coal	87.1	0.9	33.8	0.5
Accounts payable for peat	43.3	0.4	36.8	0.6
Accounts payable for fuel oil	41.6	0.4	11.9	0.2
Construction-related accounts payable	793.7	8.2	562.9	8.8
Accounts payable related to major repairs	835.2	8.6	700.0	11.0
Other payables for works and services	931.8	9.6	585.5	9.2
<b>TOTAL</b>	<b>9,692.4</b>	<b>100.0</b>	<b>6,389.5</b>	<b>100.0</b>

## ANALYTICAL BALANCE SHEET, RUR '000

BALANCE SHEET ITEMS	As at 01.01.2000	As % of the bottom line	As at 01.01.2001	As % of the bottom line	Difference	Change %
<b>ASSETS</b>						
Non-circulating assets	48,207,434	65.62	50,780,538	68.87	2,573,104	3.25
Stocks and expenditures	4,620,383	6.29	5,089,081	6.90	468,698	0.61
Accounts receivable	20,104,177	27.37	16,752,444	22.72	- 3,351,733	- 4.65
Cash	528,828	0.72	1,109,935	1.51	581,107	0.79
<b>Balance</b>	<b>73,460,822</b>		<b>73,731,998</b>		<b>271,176</b>	
<b>LIABILITIES</b>						
The Company's own sources	51,421,083	70.00	54,204,884	73.52	2,783,801	3.52
Long-term borrowed funds	5,357,641	7.29	5,760,364	7.81	402,723	0.52
Short-term borrowed funds	1,121,051	1.53	1,175,005	1.59	53,954	0.07
Accounts payable	15,561,047	21.18	12,591,745	17.08	- 2,969,302	- 4.11
<b>Balance</b>	<b>73,460,822</b>		<b>73,731,998</b>		<b>271,176</b>	

Over the year elapsed, there was eventually no increase in the Company's bottom line value. As at January 1, 2001, non-circulating assets amounted to RUR 50,780 million, of which fixed assets at their book value stand at RUR 45,877 million and capital construction in progress at RUR 4,720 million. Comparing the assets structure as at January 1, 2001 with that as at January 1, 2000, a substantial change in the structure of different asset groups can be found.

Non-circulating assets increased from 65.6% to 68.7% owing, largely, to the acquisition of RUR 1,835 million worth of LAPS-4 and LAPS-5 property complexes from RAO UES of Russia.

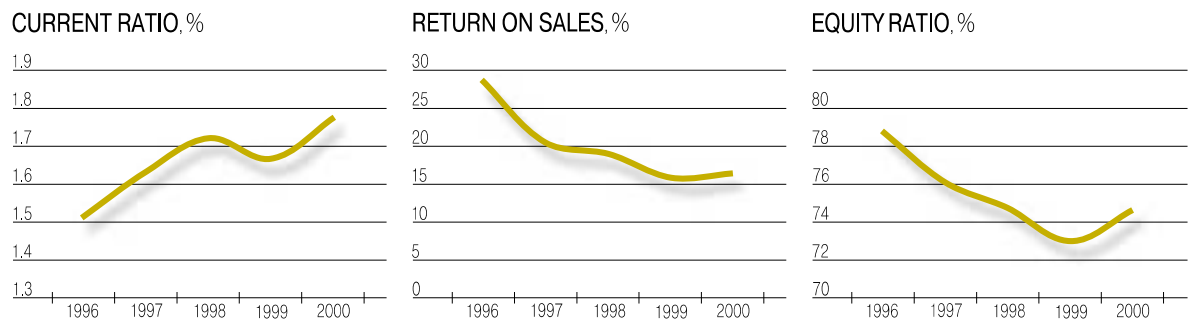
The percentage of accounts receivable has substantially reduced from 27.4% to 22.7%. Such positive

dynamics has been achieved thanks to vigorous efforts by MOSENERGO's divisions to collect the receivables from consumers.

Cash in the balance sheet structure have more than doubled from 0.7% to 1.5%. This can be regarded as an achievement evidencing a growth in the Company's short-term liquidity.

Analyzing changes in the Company's liabilities in the year elapsed, it should be noted that the Company's own sources increased from 70.0% to 73.5%, owing to acquisition of LAPS-4 and LAPS-5 fixed assets and other property from RAO UES of Russia.

It should also be noted that the percentage of accounts payable has considerably reduced from 21.2% to 17.1%, which was driven by reduced accounts receivable and allocations for payment to creditors.



## MOSENERGO FINANCIAL INDICATORS

All indicators have been calculated on the basis of the balance sheet and profit and loss account, as stated in Financial Statements. Cash-based profit values have been used in the indicators calculated on the basis of P & L accounts and profit utilization statements.

	1996	1997	1998	1999	2000
Equity ratio, %	78.9	76.0	74.3	73.0	74.7
Leverage ratio, %	26.4	30.5	34.5	37.0	33.9
Difference between current assets and current liabilities, RUR billion	3,755.0	8,437.0	9,864.0	9,954.0	10,047.1
Current ratio, %	1.51	1.63	1.72	1.67	1.78
Return on sales, %	28.0	20.6	18.2	16.2	17.1
Assets – RUR per share	2.1	2.3	2.8	2.9	2.6
Liabilities – RUR per share	0.4	0.5	0.5	0.6	0.5
Net assets – RUR per share	1.6	1.7	2.2	2.0	1.9
Return on fixed assets	27.44	18.37	12.65	9.26	11.83

To make analytical ratios calculated on the basis of 2000 accounting statements comparable with similar ratios for previous years, they were additionally adjusted for RUR 862,430,000.  
This amount is deducted from Total of Section V Liabilities of the balance sheet (Short-term Liabilities)

MOSENERGO's financial indicators, calculated from the Company's accounting data of the last 5 years, are evidentiary of its stable and profitable operation.

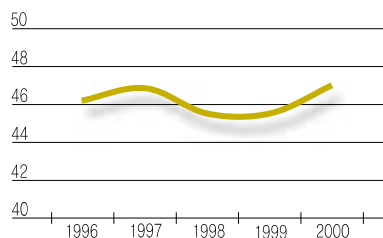
The relatively narrow fluctuation range of analytical ratios confirms that the Company has experienced no significant trouble.

Comparing the financials for 2000 against those for 1999, we note the increase of the Equity Ratio, suggesting stronger financial independence of MOSENERGO in the long term.

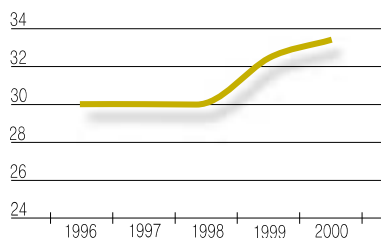
The growth of such indicators as the Difference between Current Assets and Current Liabilities, and the Current Ratio shows the greater ability of the Company to honor its short-term liabilities and therefore its financial independence in the short term.

The increased margins illustrate the Company's better efficiency in profit generation and the efficiency of its fixed asset utilization.

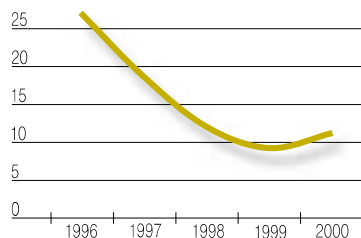
**WEAR AND TEAR OF FIXED ASSETS RATIO, %**



**ACTIVE FIXED ASSETS RATIO, %**



**RETURN ON FIXED ASSETS, %**



**Equity ratio** indicates the Company's financial stability in the long run: the higher the Company's equity ratio, the less it depends on external sources of financing, such as loans and accounts payable. This indicator is also called the "autonomy ratio".

Total for Liabilities Section III (Equity and Reserves) / bottom line

**Leverage ratio** is an indicator commonly used in financial analysis. It belongs to the group of financial stability indicators. The history of this indicator shows that MOSENERGO is dependent on borrowed capital to a little extent.

Total for Liabilities Section IV (Long-term Liabilities) + Total for Liabilities Section V of the balance sheet (Short-term Liabilities) / Total for Liabilities Section III (Equity and Reserves).

**Difference between current assets and current liabilities** is an absolute indicator showing whether the Company has its own circulating assets.

Total for Assets Section II (Circulating Assets) – Total for Liabilities Section V (Short-term Liabilities).

**Current ratio** is one of the liquidity indicators, i.e. the Company's capability to repay its short-term liabilities in time. The current ratio is used to appraise the general solvency of the Company, showing to

what degree Company's current accounts payable are covered by material circulating assets.

Total for Assets Section II of the balance sheet (Circulating Assets) / Total for Liabilities Section V of the balance sheet (Short-term Liabilities)

**Return on sales is a profit on sales**

(Section I of the Loss and Profit Account) / proceeds from sales of goods, products, works, services (exclusive of VAT, excise duties or similar levies) (Section I of the Profit and Loss Account).

**Assets per share**

Section bottom line / quantity of shares issued.

**Liabilities per share**

Total for Liabilities Section V of the balance sheet (Short-term Liabilities) / quantity of shares issued.

**Net assets per share**

Company's net assets value calculated according to the methodology of valuation of net assets of joint-stock companies / quantity of shares issued.

**Return on fixed assets** shows the efficiency of utilization of fixed assets.

Profit on sales / arithmetical average of fixed assets value (the respective line of Section I Non-circulating Assets of the balance sheet).

# Opinion of the Internal Auditing Commission

The Internal Auditing Commission elected by the Shareholders' General Meeting on 15 May, 2000, acting within its powers determined by Federal Law No. 208-FZ, dated December 29, 1995, of the Russian Federation "On Joint Stock Companies," the Charter of Mosenergo, an energy and electrification open joint-stock company, and the Statute on MOSENERGO's Internal Auditing Commission, has audited the 2000 financial and business operations of MOSENERGO.

The audit of financial and business operations has covered the following key areas: book-keeping; production costs; financial expenditures; allocation and utilization of the Company's funds and profit; fines, penalties, cost and time overruns, and other losses that have reduced the Company's actual profit; theft of, damage to, and unreasonable write-offs of, fixed assets, intangibles and other stores and supplies.

Based on the audit results of the Company's financial and business operations in 2000 and the audit results of the financial and business operations of a number of branches, the Internal Auditing Commission concludes that:

1. The Company's accounting statements with the bottom line of RUR 73,731,998,000 are accurate and reflect its assets and liabilities as of January 1, 2001 and the 2000 financial results.

2. The 2000 Annual Report is consolidated; it comprises the accounts of all 59 branches. The report accurately reflects the Company's financial position, financial results and cash flow, and is drafted in such detail and form as to comply with Order No. 4n, dated January 13, 2000, of the Ministry of Finance of the Russian Federation and the Methodological Recommendations with Respect to the Procedure for Formation of Organizations' Accounting Indicators approved by Order No. 60n, dated June 28, 2000, of the Ministry of Finance of the Russian Federation.

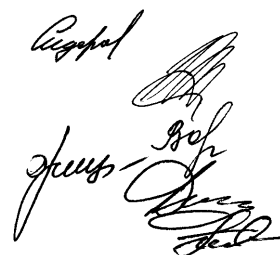
3. The accrual-based sales profit amounted to RUR 5,359.5 million, with accrual-based profit before tax standing at RUR 2,821.9 million and net accrual-based profit at RUR 1,130.5 million.

4. In the accounting year, the Company continued to redeem Eurobonds, thereby reducing the profit by RUR 364.6 million.

5. The Company has paid profit tax, value added tax, property tax, land tax, road tax, and local taxes due to the State budget as well as other allocations due to off-budget funds. The amount of penalties collected from the Company on payments and allocations totaled RUR 141,000, representing tax penalties for delays in payment thereof as a result of working capital deficiencies.

6. The Company's financial results are accurate.

*Chairman of the Commission*  
*Commission Secretary*  
*Members*



*S.B. Sidorov*  
*G.F. Shevchenko*  
*I.I. Vorontsova*  
*T.V. Zhelobitskaya*  
*D.N. Nikitin*  
*A.V. Bolshakov*

# Auditors' Opinion

Moscow, February 21, 2001

## INTRODUCTION

The audit of Mosenergo, an energy and electrification open joint-stock company, has been conducted by Vneshaudit auditors.

The Auditors have been registered by the Moscow Registration Chamber, Certificate No. 470.740, dated February 17, 1992, with the legal address at 25-27/2, B. Yakimanka, Moscow.

Telephone numbers of the Auditors:  
253-1331, 256-9353; fax number: 253-3744.

The Auditors' settlement account No. 40702810200020000047 is maintained with Tverskoye Branch No. 7982 of the Savings Bank of Russia, correspondent account 30101810400000000225, BIC 044525225.

At present, the Auditors operate pursuant to License No. 012998, dated February 26, 1998, issued by the Central Auditors' Certification and Licensing Commission (CACLC) of the Ministry of Finance of the Russian Federation for a three year term.

The audit has been performed by a team of auditors headed by Yelena V. Safonova, Leading Auditor, holder of Qualifying Certificate No. 0030069, issued on January 25, 1995 by the CACLC of the Ministry of Finance of the Russian Federation.

## SUMMARY FINDINGS

This Auditors' Opinion has been prepared by Vneshaudit for the shareholders of Mosenergo, an energy and electrification open joint-stock company, covering the 2000 accounting statements of Mosenergo.

We have audited the enclosed 2000 accounting statements of Mosenergo, an energy and electrification joint-stock company (hereinafter, the "Company"). The statements have been prepared by the Company's executive body according to Order No. 4n, dated Jan-

uary 13, 2000, of the Ministry of Finance of the Russian Federation "On Forms of Accounting Statements of Organizations," Instructions on the Procedure for Preparing and Presenting Accounting Statements approved by Order No. 4n, dated January 13, 2000, of the Ministry of Finance of the Russian Federation, and Methodological Recommendations with Respect to the Procedure for Formation of Organizations' Accounting Indicators approved by Order No. 60n, dated June 28, 2000, of the Ministry of Finance of the Russian Federation.

It is the responsibility of the Company's executive body to prepare the statements. Our responsibility is to render the opinion as to whether the statements have been audited to be accurate in all material respect.

We have performed the audit in accordance with the Temporary Regulations on Auditing in the Russian Federation, as approved by Edict No. 2263, dated December 22, 1993, of the President of the Russian Federation. The audit was planned and conducted as to obtain sufficient assurance that the annual accounting statements are free of material distortions. The audit included verifications, on a test basis, to confirm the figures and explanations as presented in the accounting statements. We believe that the audit provides sufficient basis to render our opinion as to whether the statements in question are accurate.

We believe the accounting statements with the bottom line of RUR 73,731,998,000, as enclosed to this Opinion, are basically accurate, i.e. they have been prepared as to reflect, in all material respect, the Company's assets and liabilities as of January 1, 2001, and its financial results for 2000, pursuant to Federal Law No. 129-FZ, dated November 21, 1996, "On Accounting," as amended and supplemented, and the Statute on Accounting and Reporting in the Russian Federation approved by Order No. 34n, dated July 29, 1998, of the Ministry of Finance of the Russian Federation.

General Director  
Leading Auditor


L.M. Mitrofanov  
Ye.V. Safonova



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OPEN JOINT STOCK COMPANY  
FOR ENERGY AND ELECTRIFICATION**

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For more information, please call

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**Natalia A. Khokholkova,**

Head of the Securities Department, at (095) 957-3417

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*Data is prepared by Technical  
and Production Department  
of AO MOSENERGO*

*Data of MOSENERGO, press and  
specialised books on power industry were  
used in preparation of this Annual Report*

*The chronicle is enhanced  
with prints of works by such artists as  
V. Astakhov (p. 7)  
K. Petrov-Vodkin (p. 13)  
V. Stepanova, A. Rodchenko (p. 15)  
Yu. Pimenov (pp. 19,21,23)  
V. Romanenko (p. 27)*

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