



Visit of Chinese Delegation to KEPA

Athens, Hellas – 4 April 2002

PROCEEDINGS



Organised by the
Energy Policy and Development Centre (KEPA)
National and Kapodistrian University of Athens

The meeting was held in the KEPA premises, during the visit of the Chinese delegation to Hellas. The visit was organized by the General Secretariat of Technology and Development (GGET), in the frame of the Hellenic-Chinese co-operation.

Prepared by Mrs. Margarita Vlami MSc., Environmental Policy Group, KEPA

AGENDA

Athens, 4 April 2002

- 12:00 – 12:10** **Welcome address**
Director of KEPA
Head of Chinese Delegation
- 12:10 – 12:25** **«Environmental policy issues»**
(Popi KONIDARI, Margarita VLAMI)
- 12:25 – 12:35** **Questions**
- 12:35 – 12:50** **«The opening of the electricity market in EU»**
(Spyros VASSOS)
- 12:50 – 13:05** **«The Hellenic electric power system and its interconnections with neighboring countries»**
(Konstantin TASSOS)
- 13:05 – 13:20** **«Restructuring of the Hellenic electricity sector»**
(Evangelos LEKATSAS)
- 13:20 – 13:35** **«Establishing a Regional Electricity Market in S.E. Europe»**
(Dimitrios MAVRAKIS)
- 13:35 – 14:00** **Discussion**



PRESENTATIONS

WELCOME ADDRESS

by

Prof. Dimitrios Mavrakis

Director of KEPA

Honored guests,

It is a privilege and a great pleasure for me, as Director of the Energy Policy and Development Centre of my University, to welcome you in our premises.

I am pleased to tell you that I have visited your country twice in the past. My first visit took place in the autumn of 1982, in the frame of the Hellenic – Chinese programme of scientific exchanges. The second one, took place on the occasion of the Conference on “*European Union – China, Energy Co-operation*” organized in the frame of the visit of the European Commissioner responsible for energy policies in China in October 1996.

During those two visits, where I had the opportunity to visit certain areas of China, I was impressed and still am by the enormous rates of economic development of your country and the achievements of the Chinese scientific society, not to mention the warm hospitality you have extended to me during those visits.

In return to your hospitality, I hope you enjoy your visit to Greece and to our Centre. The building of the Energy Policy and Development Centre, in which we are now, was established quite recently and it was financed 75% by the European Commission and 25% by the Hellenic Government.

It has been constructed in line with the principles of bioclimatic planning and this explains the orientation and the special characteristics of the building, the shape of the ceiling facilitating the ventilation and the extensive use of plantation.

In addition, we cover part of our power needs with photo voltaic cells and we use natural gas for cooling and heating in combination with high efficiency fire-places and water curtains on purpose to increase the energy efficiency of the building.

The main objective of the Centre is the promotion of international co-operation on Energy Policy issues with emphasis on the regions of S.E. Europe, Black and Caspian Seas and South – East Mediterranean.

Our activities in these areas cover:

1. Academic research, reports, studies and consulting services
2. Training courses and seminars while we are in the phase of finalizing our teleconference and teleteaching facilities
3. Energy observatory facilities

Out of these topics my colleagues and myself, have prepared a few short presentations for you on:

1. Environmental policy issues reflecting the present state of the implementation of KYOTO protocol among the countries of European Union. They will be presented by *Mrs KONIDARI Popi* and *Mrs VLAMI Margarita* who have carried out postgraduate studies on environment and are engaged to these topics.
2. The opening of the electricity market in EU, a hot issue among the EU countries in our days, will be presented by our senior expert and director in the Hellenic Power Corporation – DEI, *Mr VASSOS Spyros*.



3. The Hellenic power system and its interconnections with neighboring countries will allow you to get a feeling of the peculiarities we face in our efforts to be interconnected with the rest power systems of EU, will be presented by our senior expert and also Director in the aforementioned Hellenic Power Corporation, *Mr TASSOS Konstantin*.
4. Following, *Dr. LEKATSAS Evangelos*, senior expert and former Director General of the Hellenic Power Corporation will present you the main problems that emerge in restructuring the Hellenic Electricity Sector.
5. While at the end, I will try not to exhaust you when I will present you the contribution of our Centre in establishing a Regional Electricity Market – REM in S.E. Europe.

At the end, granted you feel up to it, we will be happy to have a brief discussion on those issues.

Finally, and before I give the floor to the distinguished head of your delegation, I would like to mention that I would be glad to accept in our Centre one or two students for a PhD thesis in the frame of a Hellenic or EU financed programme and that in the same framework I would be pleased to host, one at a time, Chinese professors or senior specialists for short time visits.

Thank you for listening and please welcome to the stand Mr. Li Baoshan.





Welcome Address

We welcome the distinguished Chinese Delegation of the People's Republic of China consisted of:

- Li Baoshan
- Xu Honghua
- Li Bin
- Wang Zhifeng
- Xin Mingyi
- Wang Sicheng
- Liu Huihong
- Zhang Haihua

to our premises.

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Energy Policy and Development Center KEPA

- **Building Characteristics:**
 - **Bioclimatic planning**
 - Orientation
 - Special characteristics
 - Shape of ceiling
 - Plantation
 - Photovoltaic cells
 - Energy efficiency
 - Natural gas for cooling and heating
 - Efficient fire-places
 - Water curtains
 - Light savings

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Energy Policy and Development Center KEPA

- **KEPA activities cover:**
 - Academic research, reports, studies and consulting services
 - Training courses and seminars – finalization of teleconference and teleteaching facilities
 - Energy observatory facilities

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Agenda of the meeting

1. Environmental policy issues
Popi KONIDARI, Margarita VLAMI
2. The opening of the electricity market in EU
Spyros VASSOS
3. The Hellenic electric power system
Konstantin TASSOS
4. Restructuring of the Hellenic electricity sector
Evangelos LEKATSAS
5. Establishing a Regional Electricity Market in S.E. Europe
Dimitrios MAVRAKIS

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Co-operation Potential

- Join projects
- Hosting 1 or 2 PhD students
 - in the frame of a Hellenic or EU financed programme
- Hosting 1 or 2 Chinese professors or senior experts for short time visits

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EUROPEAN ENVIRONMENTAL POLICY ISSUES

by

Popi Konidari MSc.

Research Fellow

It is difficult, but essential to co-ordinate measures, action plans and policies so as to protect the environment and handle the major issues that have emerged recently.

The EU has set out its environmental priorities up to 2010.

Climate change. When talking for climate change the key words are: global warming, greenhouse gases, severe weather conditions and ozone depletion. Confronting climate change is one of the most significant issues for the EU environmental policy. This is the field in which we are specializing and the core of this presentation.

Nature and biodiversity is the second issue. Measures and action plans have been introduced to conserve wildlife, protect woodlands, watercourses and promote biodiversity in the areas of natural resources, agriculture and fisheries.

Modern societies need to be prepared in handling hazards, whether natural, technological or environmental. There are action programmes and Directives for civil protection, for the management of radioactive waste, for the prevention of major industrial accidents and for genetically modified organisms.

The third issue connects *environment and health*. A number of Directives has been adopted to introduce water quality standards for drinking water, bathing water, urban waste water etc. There is also a strategy to adopt maximum permissible levels for noise from certain types of machine (motorcycles, aircrafts, equipment used outside of buildings etc).

Finally, the fourth issue concerns the *management of natural resources and waste*. There is an EU policy on waste management that involves elimination, recycling and re-use of waste and reducing pollution caused by waste incineration.

In the Kyoto protocol the EU as a whole and all Member States individually committed to a GHG emissions reduction of 8% for the period 2008-2012. Through the Burden Sharing Agreement the EU has redistributed the reduction target among Member States. By Council Decision a monitoring mechanism of EU greenhouse gas emissions has been established to ensure that Member States will meet their burden sharing targets. According to this agreement Hellas is allowed to increase GHG emissions up to 25% compared to the 1990 level of emissions which is considered as the base year.

GHG emissions are directly or indirectly affecting all societal and industrial processes. Therefore climate change policy is usually embedded in environmental, energy and other sectoral policies. The EU Council of environment ministers acknowledged this complicated situation and the importance of taking further steps at EU level. So, the Commission was asked by them to put forward a list of priorities and policy measures for all involved sectors.

In March 2000 the Commission responded to this request by launching the European Climate Change Program to develop proposals for common and co-ordinated policies and measures in the field of climate change policy. The ECCP was concluded in July 2001. The programme consisted of a multi-stakeholder consultative process, organized in six Working Groups that brought together representatives from the Commission's different departments, Member States, industrial and environmental groups to deal with specific aspects of climate change policy.

The ECCP Working Groups were:



WG1: Flexible mechanisms

WG2: Energy Supply

WG3: Energy Consumption, Joint Sub-Working Group: Energy Consumption in Products and Industrial Processes

WG4: Transport

WG5: Industry, Sub Working Group: Fluorinated gases

WG6: Research

The first working group focused its recommendations on the flexible mechanisms of the Kyoto protocol. These policy instruments were introduced in 1997 in order to assist countries in a cost efficient way to fulfill their commitments towards the protocol. Joint Implementation (JI) and Clean Development Mechanism (CDM) concern projects whose main objective is the abatement of GHG emissions. These investments are related with the promotion of renewable energy sources (RES), energy efficiency, sequestration of carbon, etc. These two mechanisms refer to the same nature of projects, but they are fundamentally different in the requirements for their implementation, the authorities and the bodies that are engaged (for supervision, verification and issuance of emission credits) and the participants. JI projects are co operations between countries listed in Annex B of the protocol. As for CDM, the host should be a developing country and the investor a developed country of Annex B. Emission credits coming from JI projects are named Emissions Reduction Units (ERUs), while from CDM, Certified Emission Reductions (CERs). ERUs will be issued only after 2008, while CERs may be used for the first commitment period.

International Emissions Trading (IET) will be launched in 2008 based on the domestic and commercial emissions trading systems that will be designed and established until then. A country may proceed in a direct emissions transaction if it has reduced its emissions by a higher percentage than the initially assigned one. The country earns the right to sell the surplus percentage to another. This right is also earned, when a country increases its emissions less than the assigned amount. Companies belong in the same framework.

Main conclusions and recommendations from ECCP for EU Initiatives in JI and CDM

- The credits from JI and CDM projects should be used for domestic obligations. The use of project mechanisms should be in accordance with State aid guidelines and public procurement rules.
- With respect to project implementation and national measures to promote JI/CDM projects, MS should report in accordance with the Monitoring mechanism.
- The EC could set up a fund for the acquisition of credits so as to provide incentives for the private sector to invest in these projects. The suitability of doing this should be decided with the Member States. There are existing EC programmes in the context of JI/CDM Themes/Activities such as the EC-China Environmental management Co-operation Programme.
- EU funds must follow strict rules in accordance with prevailing state aid and competition legislation in order to avoid any crowding out of private capital.
- The emerging Kyoto rules and modalities will be taken as a basis for further development of JI/CDM projects. Additional rules will not be required if environmental integrity is guaranteed.

The Final Report of ECCP gives specific guidance on the development of policies and measures at the EU level, including the issue of emissions trading. In March 2000 the Commission issued a Green Paper on greenhouse gas emissions trading. The aim of this



Green paper was to launch discussions on greenhouse gas emission trading within the European Union and on the relationship between emissions trading and other climate change policies and measures. In October 2001 a Draft Directive was announced and new discussions began. The European emissions trading scheme should fulfill environmental and financial objectives. For the period up to 2008 it will concern mainly the CO₂ emissions and after that period there is an intention to include all GHG emissions. The sectors that will participate are energy suppliers, energy intensive industries and sectors with fuel combustion. Until now UK and Denmark have established such schemes, while France and Sweden are in the process of doing so.

Energy policy must achieve two “priority orientations”: reducing the carbon content of each unit of energy supply; and increasing the efficiency of energy conversion to final use. The ECCP recommends that any efforts to reduce carbon emissions should be “equally distributed” through:

1. Early implementation of amended common rules for the internal electricity market
2. Early implementation of the amended Directive supporting renewables
3. Demands for a co-generation Directive supporting CHP expansion
4. Calls for industry to establish negotiated agreements in the form of long term commitments to energy efficiency improvements.

The Commission is currently reviewing its renewable energy policy. A new Directive is being prepared and will focus on ways by which Member States will be able to promote the deployment of renewable energy schemes within the context of the liberalized electricity market. The main elements of the current draft are:

- Broad definition of renewables, including many forms of biomass energy as well as energy produced from landfill gas.
- Updating MS targets at regular intervals. The ultimate aim is that renewables should apply for the 12% of EU energy consumption by 2010 (approximately double the current proportion).
- Measures to establish certification schemes for RES, although there are no plans to create a European level system of trade in certificates. Member States will be required to do this within two years of the Directive’s implementation. Green Certificates are an accounting mechanism for a certain amount of produced renewable electricity. The main objective of such a scheme is to stimulate the penetration of green electricity into the electricity market.
- Action to reduce barriers to renewable energy schemes. Member States will be required to carry out a number of activities to reduce barriers including fast track planning procedures, the identification of potential geographical sites for new generation and measures to ensure that transmissions system operators improve access for renewable energy generators.

Energy efficiency has been a focus of a variety of European policy initiatives for many years. The EU action plan is oriented especially towards the energy efficiency. This set of policy activities and proposals includes:

1. Measures to integrate energy efficiency into policies outside the energy and environmental field, i.e. transport policy, enterprise policy, regional and urban policy.
2. Measures to build on existing EU energy efficiency programmes. These include transport efficiency programmes, programmes focusing on households and commercial appliances, industry schemes (e.g. negotiated agreements and the promotion of combined heat and power), programmes to improve efficiency in buildings.



3. Horizontal measures concerning research and technology development programmes, support for the establishment of energy management agencies, financing schemes, information and training programmes and monitoring and evaluation activities.

IPPC is the most significant European level policy instrument for addressing industrial process energy use. Each installation operator will have to apply for an authorization to operate its plant. There are specific emission limit values for installations that may be achieved by using the recommended best available technologies. The EU Draft Directive for establishing MS emissions trading schemes is based on this instrument.


EMAS is the European Eco-management and Audit Scheme. It is a voluntary scheme for organisations willing to commit themselves in order to evaluate and improve their environmental performance. Originally, participation in EMAS was open only to the industrial sector. Today EMAS II is open to all sectors.

All the aforementioned measures are estimated to contribute significantly in EU common target. There are estimations on the share of each one in reducing GHG emissions.



European environmental policy issues


Mrs. Popi Konidari MSc.
Research Fellow



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Main environmental issues


- Climate change
 - Air pollution
 - Ozone depletion
- Nature and biodiversity
 - Nature conservation
 - Natural and technological hazards
- Environment and health
 - Water pollution
 - Noise pollution
- Management of natural resources and waste
 - Waste pollution



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Burden sharing agreement for the 2008-2012 period


Member State	GHG emission reduction under Burden Sharing Agreement (%)
Austria	-13
Belgium	-7.5
Denmark	-21
Finland	0
France	0
Germany	-21
Hellas	25
Ireland	13
Italy	-6.5
Luxembourg	-28
Netherlands	-6
Portugal	27
Spain	15
Sweden	4
United Kingdom	-12.5
EU-15	-8



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European Climate Change Programme


- Launched in March 2000
- Ended in July 2001
- Proposals
- Multi-stakeholder consultant process
- Six Working Groups
 - 1: Flexible mechanisms
 - Kyoto mechanisms
 - Emissions trading scheme
 - 2: Energy supply
 - 3: Energy consumption
 - 4: Transport
 - 5: Industry
 - 6: Research



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Kyoto mechanisms


- Joint Implementation
 - Projects
 - Developed countries
 - ERUs – credits
- Clean Development mechanism
 - Projects
 - Developed and developing countries
 - CERs - credits
- International emissions trading
 - Sell and buy percentages of GHG emissions
 - Countries, firms



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EU Initiatives in JI and CDM

- Recognition of JI and CDM credits
 - Domestic obligations
- Usage of JI and CDM projects
 - State aid guidelines
 - Public procurement rules
- Monitoring mechanism
 - Council Decision 99/296/EC
- Funding
 - Incentives for private sector
 - Decision of Member State
 - EC-China Environmental Co-operation Program
- Following strict rules
 - Prevail State aid
 - Avoid crowding out private capital
- Same international rules



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European emissions trading scheme

- Green paper
 - March 2000
 - Discussions
- EU Draft Directive
 - Objectives
 - Environmental
 - Financial
 - Coverage of gases
 - Mainly CO₂
 - Coverage of sectors
 - Energy Suppliers
 - Energy intensive industry
 - Sectors with fuel combustion
 - Member States
 - UK
 - Denmark
 - France and Sweden

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Energy policy and environment

- Reduction of carbon content of each unit of energy supply
- Increase efficiency of energy conversion to final use
- Early implementation
 - Internal electricity market
 - Renewables
- Directive supporting CHP expansion
 - Technology for co-generation of heat/cooling and power
- Negotiated agreements for energy efficiency by industries

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Renewable energy sources (RES)

- Aiming the 12% of EU energy consumption (double current proportion)
- Establishment of certification schemes
 - Green certificates
 - Accounting mechanism for a certain amount of produced renewable electricity
 - Stimulating the penetration of green electricity into electricity market
- Reduction of barriers
 - Fast track planning
 - Identification of potential geographical sites for new generation
 - Measures ensuring access for renewable energy generators by transmission system operators

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Energy efficiency

- EU action plan
 - Measures
 - to integrate energy efficiency
 - to build on existing EU energy efficiency programmes
 - to develop research and technology programmes
- IPPC Directive
 - Pollution
 - Energy-industrial sector
 - Best available technologies
 - Emission limit values
- EMAS
 - Voluntary
 - Verified, transparent environmental management systems

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Conclusions

EU mitigation policies and expected GHG reductions			
Sector	Policy	Reduction in CO ₂ equivalent	% reduction w.r.t. 1990
Energy	Energy efficiency plan	200Mton	5%
	CHP	65Mton	1.6%
	Renewables	400Mton	10%
Transport	Voluntary agreements	82Mton	2%
Industry	Reduction of fluorinated gas	20Mton	0.5%
Waste	Landfill Directive	95-150Mton	2-4%

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HELLENIC ENVIRONMENTAL POLICY

KEY ISSUES

by

Margarita Vlami MSc.

Research Fellow

National Emissions

During the last decade and particularly during 1990 and 1998 there was an increase in the greenhouse gas emissions in Hellas. However, since 1998, a decreasing trend in the emissions can be observed. This reduction is due to CO₂ abatement measures taken by the Hellenic government.

Carbon dioxide emissions present the same trend, as they constitute the majority of the total greenhouse gas emissions. More specifically, CO₂ emissions represent the 81% of all the greenhouse gas emissions. The trend of greenhouse gas and CO₂ emissions for the 1990-1999 period can be observed in the following figure:

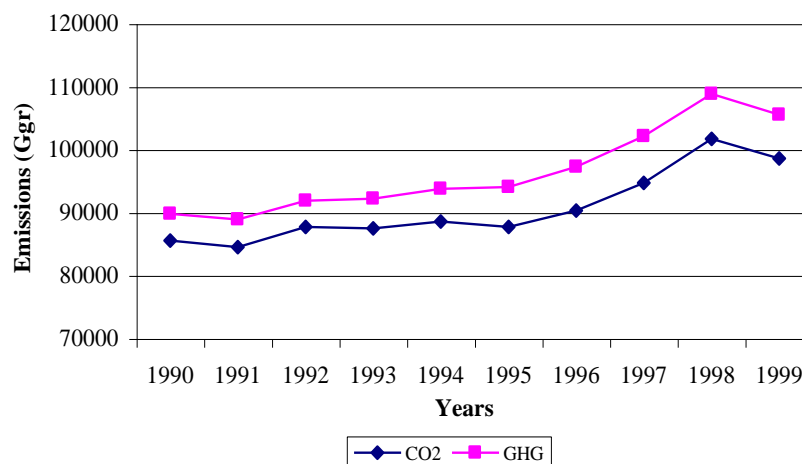


Figure. Annual changes of Greenhouse gas and Carbon emissions for the years 1990-1999

According to the latest emission data (year 1999) the majority of CO₂ emissions (51%) is produced by the electricity sector. The transport sector follows with a 22% share, while the industrial and residential sectors both have a 12% share to the emissions. Finally, the refineries contribute by 3% to CO₂ emissions. The emissions inventory is taken from the National Observatory of Athens and the most recent data come from the year 1999. Data from the year 2000 are expected to be published in 2003.

Obligations of Hellas

The United Nations Framework Convention on Climate Change (FCCC) established as a target for the industrialised/developed countries of the world the return of greenhouse gases emissions at 1990 levels, by the year 2000.

The Hellenic government signed the United Nations Framework Convention on Climate Change, in 1994. Under the requirements of the Convention, the Greek Action Plan (GAP) was submitted as the 1st National Communication to the FCCC, in February 1995. The objective set out in the Plan was to restrict the total increase of CO₂ emissions to 15%±3%, during the period 1990-2000, compared to 1990.



Following, with the establishment of the Kyoto Protocol on December 1997, and under the Burden Sharing Agreement (1998), Greece is allowed to increase the greenhouse gas emissions by 25%, during the period of 2008-2012.

National climate change policy

The National climate change policy that has been developed in the light of carbon dioxide emission reduction, involves the adjustment of the national legislation, as well as the implementation of programmes and plans. In the absence of any abatement measures, CO₂ emissions were estimated to have been increased by 27%, by the year 2000.

1. Laws

The legislative framework that determines the Hellenic environmental policy can be summarised in the following laws:

Law 2244/94: *Electricity generation from Renewable Energy Sources (RES) and conventional fuels*

This legislation makes available favourable electricity tariffs to self-producers and independent producers of electricity and combined electricity/heat. These tariffs are particularly advantageous in autonomous island grids, where the potential of renewable energy sources, such as wind, is significant. Furthermore, the law extends cogeneration investment opportunities to manufacturing units and enterprises of the tertiary sector.

Law 2364/95: *Introduction of natural gas and creation of Energy Control & Design Body*

The objective of this law is to promote the use of natural gas and renewable energy sources. The incentive provided for this purpose was the 75% tax reduction of the expenses for the purchase and installation of domestic appliances or systems using natural gas or renewable sources.

Law 2773/99: *Liberalisation of electricity*

This law promotes the transformation of the national electricity sector from a closed public industry, i.e. the public power corporation (DEI), to an industry open to competition. In the frame of this law a regulatory authority for the national electricity market (RAE) was established to control the operation of the liberalised electricity market.

In addition, the exercise of any electricity business, defined as the activities of generation, transmission, distribution and supply of electricity, requires a licence. The licences are granted by the Minister of Development with the recommendation of RAE. Finally, DEI retains the ownership and the right to operate and exploit the distribution network

2. Programmes – Plans

National Action Plan

The National Action Plan was elaborated under the responsibility and supervision of the Ministry of the Environment, Physical Planning and Public Works (MEPPPW), in collaboration with the Ministry of Development and the Ministry of Transport and Communications.

The most important measures concerned the sector of electricity generation (*supply-side*) and involved the introduction of natural gas, the modernisation of the existing power system, the development of cogeneration units in existing and planned power stations and the large-scale exploitation of renewable energy sources.

Other measures concerned the *demand-side* and were focused primarily on the introduction of natural gas in the industrial, tertiary and residential sector, energy conservation measures in buildings and manufacturing units – especially the ones with high energy consumption – as well as measures affecting energy consumption in the transport sector.



Energy 2001

The Energy 2001 programme was developed by the Ministry of the Environment, Physical Planning and Public Works and was launched in 1997. This programme, focused on energy conservation in the building sector. More specifically, it included measures for the promotion of renewable energy sources in household and commercial sectors, as well as energy savings in the energy sector, and particularly in DEI, refineries, and industries.

Attica SOS – Thessaloniki SOS

In these programmes the objectives were the improvement of the traffic conditions, the improvement of the public used vehicles, land and town planning for a viable city, and the control and reduction of urban pollution.

Various actions were taken for the above objectives. The major ones were the construction of new metro lines in Athens, the creation of new parks within the cities, and the imposition of fines to those that pollute, including industries and vehicles.

Operational Programme for Energy

The Operational Programme for Energy covered the period of 1994-1999 and was developed by the Ministry of Development. The objectives of the programme were energy efficiency and conservation in the energy sector, which represents installations of electricity generation, industries, heating in commercial, domestic and public buildings, and fossil fuel consumption in automobiles and other vehicles.

Some of the measures taken for the achievement of these objectives concerned the construction of electricity generation facilities and the upgrading of DEI, the support of energy conservation mainly in the industrial and tertiary sector and the exploitation of renewable energy sources. Finally, systematic research and investigation was carried out for the potential of the exploitation of mineral resources.

National Planning of Waste Management.

According to this plan, waste management is undertaken in the industrial and residential sectors, and in the hospitals. The main goals to be achieved are the prevention or reduction of the amount of the produced waste, and the minimisation of the hazardous content of waste. Other goals include the exploitation of waste, through recycling and energy recovery, the disposal of waste in a safe manner, as well as the restoration of landfills. Finally, the best available techniques (BAT) are applied in waste management, in cases where this is technologically and financially feasible.

Operational Programme “Railways, Airports, Urban Transport”

This programme was commenced in 2001, by the Ministry of Transport and Communications. The aim is to improve the functioning and the credibility of the means of transportation and at the same time achieve energy efficiency. Some of the measures taken for this purpose include the construction of new energy efficient buildings used by the Ministry of Transport and Communications, and the use of contemporary vehicles, such as buses and trains.

Conclusions

Concluding, the environmental policy that Hellas has adopted, resulted in the restriction of the increase rate of CO₂ emissions to 15.24% in 1999, compared to 1990. This percentage is within the predetermined national target.

Further to the aforementioned environmental measures and policies, Hellas has implemented and will implement the EU environmental policy. However, there is a need to introduce additional measures in order to comply with the future requirements of EU legislation.

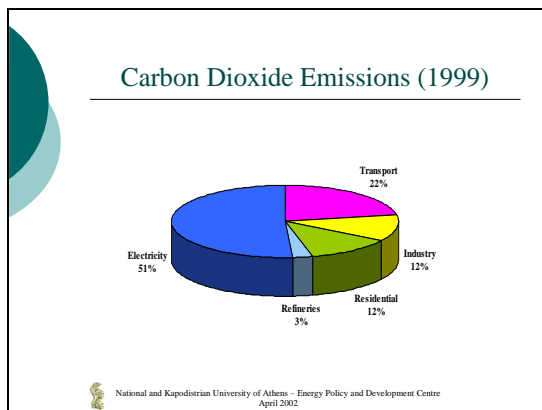
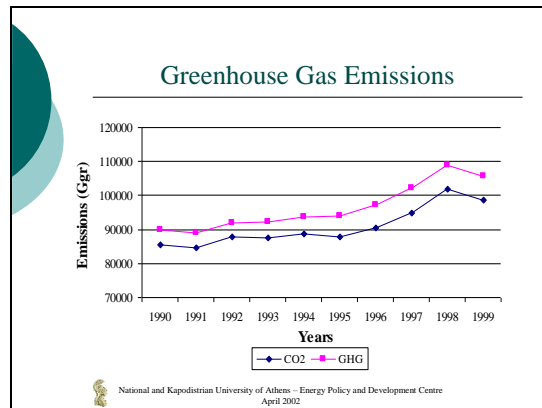


Hellenic environmental policy

Key Issues

Mrs. Margarita Vlami MSc.
Research Fellow

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- ### Obligations of Hellas
- Signed the UN Framework Convention on Climate Change in 1994
 - Developed the National Action Plan for the abatement of CO₂ and other GHG emissions in 1995
 - Restriction of the overall CO₂ emissions increase to 15% ± 3% during the period 1990-2000
 - Under the Burden Sharing Agreement (1998) Hellas is allowed to a 25% increase of GHG emissions by 2008-2012, compared to 1990 levels
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- ### National Climate Change Policy Laws
- Law 2244/94: Electricity generation from RES and conventional fuels
 - Favourable electricity tariffs to producers
 - Cogeneration investment opportunities
 - Law 2364/95: Introduction of natural gas and creation of Energy Control & Design Body
 - 75% tax reduction of purchase and installation costs of appliances using natural gas and renewable sources
 - Law 2773/99: Liberalization of electricity
 - Regulatory authority for electricity market (RAE)
 - License for any activity concerning generation, transmission, distribution and supply of electricity
 - Ownership, operation and exploitation of distribution network by the public power corporation (DEI)
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- ### National Climate Change Policy Programmes – Plans (I)
- National Action Plan (1995)
 - Introduction of natural gas
 - Electricity generation, industrial and residential sectors
 - Modernization of the existing power system
 - Development of cogeneration units in existing and planned power stations
 - Exploitation of RES
 - Energy conservation measures in buildings and manufacturing units
 - Energy consumption measures in transport sector
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National Climate Change Policy Programmes – Plans (II)

- Energy 2001 (1997)
 - Promotion of RES in household and commercial sectors
 - Energy savings in energy and building sectors
- Attica SOS - Thessaloniki SOS
 - Improvement of traffic conditions and public used vehicles
 - Land and town planning
 - Urban pollution control and reduction
- Operational Programme for Energy (1994-1999)
 - Construction of electricity generation facilities and DEI upgrading
 - Energy conservation in industrial and tertiary sectors
 - Exploitation of RES
 - Systematic research investigation for mineral resources exploitation

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National Climate Change Policy Programmes – Plans (III)

- National Planning of Waste Management
 - Prevention or reduction of produced waste and their concentration in hazardous substitutes
 - Waste exploitation
 - Recycling and energy recovery
 - Waste disposal, landfill restoration
 - Use of the best available techniques, where feasible
- Operational Programme “Railways, Airports, Urban Transport” (2001)
 - Improvements and energy efficiency in the transportation means
 - Energy efficiency in buildings
 - Technologically advanced public buses and trains

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Conclusions

- The environmental policy that Hellas has adopted, led to 15,24% increase rate of CO₂ emissions, for the year 1999 compared to 1990, which is within the predetermined target
- Hellas has implemented and will implement the EU environmental policy
- There is a need to introduce additional measures in order to comply with the future requirements of EU legislation

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THE OPENING OF THE ELECTRICITY MARKET IN EU

by

Mr. Spyros Vassos MSc.Eng

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1. Introduction

One of the most important economic measures taken by the European Union (EU) in recent years was the creation of a single market for electricity and gas, based on the principles of transparent regulation and open competition.

With a combined annual turnover of about Euro 170 billion, investments of more than Euro 25 billion per year, and an installed capacity of almost 650 GW, the power sector is one of the largest sectors in the European Union Single Market.

An important factor behind the decision to liberalize this market was the realization that EU companies were paying up to 40 percent more for electricity and gas than their competitors in the USA, Canada and Australia. If energy intensive industries in the EU were to remain competitive in the global economy, energy costs had to be brought down through increased efficiency and more dynamic competition.

The Internal Market Directive for Electricity (96/92), which has triggered an unexpectedly rapid and far-reaching restructuring of EU power markets, entered into force in February 1999.

The Commission's approach to electricity liberalization has been to define a common set of regulatory principles, while leaving their detailed implementation to individual EU governments and the resolution of many technical issues to industry participants. In practice, the minimum standards set by the European Commission (EC) have led to a process of "*competitive liberalization*", as most countries have already fully liberalized their power markets or are committed to go far beyond the minimum standards set by the EC.

In early 2000, only one year after the Internal Electricity Market Directive became effective, its economic impact had already been significant. Throughout the EU, competition is eroding monopoly rents and lowering electricity prices for consumers. This trend shows price reductions in the individual Member States between 1996 and 2000. In most countries, prices have fallen further since, even though rising oil prices could reverse that trend. At the beginning of 2000, prices in Germany, for instance, had fallen by about 20 per cent for households and up to 60 percent for industrial users. As utilities are restructuring rapidly to save costs and compete, consolidation within national markets and across borders is accelerating.

2. Global trends in electricity sector

Energy markets worldwide are currently in the middle of a fundamental transformation, as a result of technological change and policy reforms. The objectives of these reforms are: to enhance efficiency, to lower costs, to increase customer choice, to mobilize private investment, and to consolidate public finances.

The mutually reinforcing policy instruments to achieve these objectives are the introduction of competition and the introduction of private participation. As a large number of developed and developing countries have successfully restructured their electricity markets, an international "*best practice*" for the design of the legal, regulatory, and institutional sector framework has emerged, it includes:

- the corporatization and restructuring of state-owned energy utilities;



- the separation of regulatory and operational functions, the creation of a coherent regulatory framework, and the establishment of an independent regulator to protect consumer interests and promote competition;
- the vertical unbundling of the electricity industry into Generation, Transmission, Distribution, and Trade;
- the introduction of competition in Generation and Trade and the regulation of monopolistic activities in Transmission and Distribution;
- the promotion of private participation in investment and management through privatization, concessions, and new entry; and
- the reduction of subsidies and tariff rebalancing in order to bring prices in line with costs and to reduce market distortions.

The electricity industry has gone through three major phases over the last century, and is now entering a fourth one. Until recently the power sector and other network industries (oil, gas, water and telecommunications) were considered to be “*natural monopolies*”. Due to technological progress and the development of new regulatory instruments, however, the introduction of effective market mechanisms is now possible.

The exact evolution of the industry has varied from country to country, but the following pattern in the development of the electricity and downstream gas markets has been observed.

Private sector investment and monopolistic market behaviour

The infrastructure investments in the late 19th century and early 20th century were largely undertaken by private companies. Private firms developed and commercialized the technologies for the production and delivery of electricity and natural gas. Local monopolies, and national and international oligopolies that used their market power to extract economic rents from captive customers, dominated the new industry. Delivery to users was generally confined to urban communities, with limited development of distribution grids in rural areas. There was little competition in the sector during this period of rapid innovation and industry expansion.

Public sector intervention and inefficiency

Around the time of World War II, a trend towards the nationalization of energy assets or at least strong government regulation of privately-owned monopolies became the norm, in an attempt to limit abuses of market power. In many countries, governments also played an important role in rural electrification, since returns were too low to attract private capital.

Throughout the EU and elsewhere, state-ownership of the electricity industry became the rule. Over time, however, public ownership and the absence of competition increasingly undermined effective management, innovation and operational efficiency. Governments used the power sector, like other state-owned industries, to artificially create employment and as an instrument to deliver hidden subsidies to parts of the economy.

Unbundling, competition, regulation and privatization

The economic costs of public ownership and monopolistic market structures became more and more apparent. In the 1970s the United States began to experiment with power sector reform. By the 1980s policy-makers in the EU, the Americas and elsewhere realized that electricity, natural gas and telecommunications were no longer natural monopolies.

Thanks to advances in technology, economic theory, and increasingly sophisticated regulatory instruments, it became feasible to introduce competition with the same effect as in other industries. Substantial improvements in operational and investment efficiency, the reduction of costs to end-users, an improvement of services, and a higher rate of innovation thus became possible. During the 1990s, electricity and natural gas sectors have been transformed through the overhaul of regulatory frameworks, the introduction of competition,



and increasing private participation. These policy reforms have been implemented in developed and developing countries alike.

Industry convergence and globalization

The fourth phase, which is now overlapping with the third, is characterized by convergence in the electricity, natural gas, and more generally the utility sector. “*Multi-utilities*” are being formed to offer comprehensive service-packages to clients and reap the associated economies of scope. As liberalization and privatization are taking hold, the industry is rapidly globalizing through international mergers and acquisitions, cross-border trade, and the creation of regional power pools. Another facet of the fourth phase is the emergence of a new “*service*” sector in the power industry, quite distinct from physical distribution, classified now as the “wires” business.

The trends outlined above have been global, but developments have been uneven across regions. North America pioneered reforms in the 1980s, but due to its federal structure has not yet completed the process in all states.

Except for the UK and the Nordic countries, Europe embraced reforms relatively late but vigorously so and is now arguably the fastest reforming continent. Latin America, the first developing region to liberalize and privatize its energy sector, has largely completed the reform agenda.

Many countries in Asia that introduced IPPs without liberalization, suffered from the consequences during the recent financial crisis, and are now moving toward the Latin American model

Probably, the two regions, whose developments are of the most significance, are Europe and Latin America. The countries of Latin America are 10 to 20 years ahead of EU states in terms of sector reform. They have experimented with different reform models and accumulated a wealth of experience, from which many states can benefit.

3. Electricity sector in the European Union

Power markets across the European Union (EU) are currently undergoing dramatic structural change triggered primarily by the European Commission Single Market Directive for Electricity (96/92). The directive, which entered into force in February 1999, obliges EU Member States to gradually open their power sectors to competition; to vertically unbundle the sector; and to ensure non discriminatory access to the transmission network.

In practice, the minimum standards set by the European Commission have led to a process of “*competitive liberalization*” across the EU, as most of the countries are going far beyond the minimum. In parallel, the trend towards privatization is gathering momentum, as an increasing number of EU governments are withdrawing from operational involvement in the sector.

Only one year after the electricity directive became effective, its economic impact had already been dramatic. In Germany, one of the most competitive markets in the EU, prices fell by about 20 percent for households and up to 60 per cent for industrial users. European cross-border mergers and acquisitions amounted to more than Euro 20 billion in 1999 alone, more than in any other region of the world.

In response to competition and new market opportunities, energy companies are restructuring, cutting costs, and offering improved services to customers. Modern power markets and innovative trading instruments are being developed across the continent and previously segmented national markets with a combined annual turnover of Euro 170 billion are integrating rapidly.

Similar developments are now under way in the market for natural gas. According to the Single Market Directive for Natural Gas, Member States (with the exception of emerging gas market countries Greece and Portugal) had to phase in competition as of August 2000. Like in



the case of the electricity directive, most Member States are opening a far greater share of the market to competition than required. The European Commission has estimated that 78 per cent of EU gas markets were nominally open when the directive became effective.

Energy markets across the EU are expected to be fully liberalized, privatized and integrated across borders within the next 5 years. European companies and households will benefit from lower prices, better services, and free choice between alternative providers. European utilities will be highly competitive as a result of cost cutting and consolidation. The EU Single Market for energy is expected to be the largest in the world, comprising not only the current 15 Member States, but also up to 13 accession countries, with a total of more than 400 million consumers.

In the last years, major changes have occurred in both the institutional framework and the organisation of the electricity sector all around Europe. As concerns the European Union the major issue has been the implementation of the Internal Electricity Market (IEM) Directive. The Directive, whose formal implementation started February 1999, integrated the huge evolution of the electricity sector already experienced in the last years in the EU.

The main provisions of the IEM Directive are as follows:

- A *full competition* in new generation capacity has been introduced. Two alternative procedures, both based on objective, transparent and non-discriminatory criteria are admitted Authorisation and Tendering.
- A gradual *opening of the generation market* to Eligible Customers, which are able to choose their electricity Supplier and have the access to the network, even if they do not own it.
- The creation of an independent *Transmission System Operator (TSO)*, which is the entity responsible for running the high voltage transmission grid.
- The *Third Part Access (TPA)* to the network can be Negotiated, Regulated and, as far as non-eligible customers are concerned, through a Single Buyer with repurchasing obligations.
- The electricity undertakings are required to provide, at least, a *Management Unbundling* of TSO from the other activities in order to increase transparency, to prevent cross-subsides and to identify eventual abuse of dominant position. Different degrees of unbundling have been selected by the Member States.
- The set up of an *Independent Dispute-settlement Authority* in order of assuring equal and fair application of the new market rules.
- Transitional measures of *Reciprocity* between member states can be applied in case of progressive opening, differences in market opening, imbalances in rights and obligations of the electricity companies.
- *Public Service Obligations (PSO)*, which must be objective, transparent, non-discriminatory, verifiable and published, allow for derogation from the directive provisions concerning construction of new capacity, TPA and construction of direct lines. PSOs include matters as the security and regularity of supply, the quality of the service, prices and tariffs, environmental aspects.

As concerns the remaining issues for a full implementation of the EU Internal Electricity Market (IEM), they deal with the cross-border trade, like tariffs and congestion management as well as other concerns, like energy taxes, renewables, environment, and others.

The current electricity and gas Directives provide for partial opening of European Union energy markets, extending customer choice to larger energy users. However, the ultimate objective of Member States, voiced at the European Council at Lisbon, is the development of a single internal market for energy in Europe with full market opening.



The opening of the electricity market in EU

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Electricity market in Europe

- One of the most important economic measures taken by the European Union in recent years was the creation of a single market for electricity and gas, based on the principles of **transparency** and open **competition**.
- With a combined annual turnover of about Euro **170** billion, investments of more than Euro **25** billion per year, and an installed capacity of almost **650** GW, the Electricity sector is one of the largest sectors in the European Union.

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Power Market Structure Historical developments

Electricity:

- Is not a primary source of energy
- Cannot be stored economically in large quantities
- Transmission over long distances requires capital-intensive infrastructure
- Is a clean form of energy at the final point

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Global trends in electricity sector

- Private Sector Investment and Monopolistic Market Behaviour
- Public Sector Intervention and Inefficiency
- Unbundling, Competition, Regulation and Privatization
- Industry Convergence and Globalization

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Global reform trends in the power sector

Source: Hagler Bailly.

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Power Market Structure Vertical Integration


- An electricity company is said to be Vertical Integrated if at least two of the main functions of the electricity undertaking, namely generation, transmission, distribution and supply of electricity to the end-users fall under the responsibility of the same company
- Loose Vertical Integration types are:
 - Generation and Transmission
 - Generation and Distribution
 - Transmission and Distribution

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Internal Electricity Market in EU (I)

- Main provisions of the **IEM** Directive are:
 - Full competition in new generation capacity has been introduced
 - Gradual opening of the generation market to Eligible Customers
 - Creation of an independent Transmission System Operator (TSO)
 - Third Part Access (TPA) to the network can be Negotiated, Regulated and, as far as non-eligible customers are concerned, through a Single Buyer

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Internal Electricity Market in EU (II)


- The electricity undertakings are required to provide, at least, a Management Unbundling of TSO from the other activities
- The set up of an Independent Dispute-settlement Authority in order of assuring equal and fair application of the new market rules
- Transitional measures of Reciprocity between member states
- Public Service Obligations (PSO)
- Stranded costs claims

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Internal Electricity Market in EU (III)

Framework of the provisions (1)

1. New generation capacity
 - For the construction of new generating capacity Member States may choose between two approaches:
 - Authorisation
 - Tendering procedures
 - Both approaches are to be objective, transparent, and non discriminatory

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Internal Electricity Market in EU (IV)

Framework of the provisions (2)


2. Methods of system access
 - The Directive allows two approaches to system access:
 - Negotiated access
 - Single buyer procedure
 - Whichever approach is adopted, it must lead to equivalent economic results and a directly comparable level of opening up of markets and a directly comparable degree of access to electricity markets

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Internal Electricity Market in EU (V)

Framework of the provisions (3)


3. The extent of market opening
 - The Directive provides that Member States shall:
 - Ensure that electricity undertakings operate in accordance with the Directive with a view to achieving a competitive market in electricity
 - Not discriminate between undertakings as regards their rights or obligations

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Internal Electricity Market in EU (VI)

Other supporting provisions

1. Transmission System Operator (Article 7)
 - Member States shall designate a system operator responsible for operating, maintaining, and developing the transmission system
2. Distribution System Operator (Article 11)
 - Member States shall designate a distribution system operator responsible for maintaining a secure, reliable and efficient system
3. Unbundling (Article 14)
 - Integrated utilities are required to keep separate accounts for generation, transmission and distribution activities, as if they were separate activities

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Implementation of the Electricity Directive

	Declared market opening	Full opening date	Unbundling of TSO?	Regulator	Network tariffs	Balancing market	Biggest three generator share (%)	Obstacles to competition (responses mentioning?)
Austria	100%	2001	Y	in-situ	high	Y	63	X
Belgium	100%	2007	Y	in-situ	medium	Y	75(2)	D, B, R, X
Denmark	90%	2003	Y	in-situ	low	Y	7(2)	D, X
Finland	100%	1997	Y	in-situ	low	Y	12	U (for DSOs)
France	100%	none	N	in-situ	medium	shared	62(1)	D, B, U, X, R
Germany	100%	1998	Y	in-situ	high	BYN 2/4/18(1)	13	U, R, X, T
Greece	100%	1996	N	in-situ	n.a.	Y	100(1)	no responses
Ireland	100%	2000	Y	in-situ	medium	Y	75(1)	D, B, U, X
Italy	60%	none	Y	in-situ	medium	shared	60(2)	D, B, X
Neth	100%	2000	Y	in-situ	medium	Y	64	X, D
Portugal	100%	1996	Y	in-situ	high	Y	100	D, X
Spain	100%	1991	Y	in-situ	high	Y	100	D, X, R
Sweden	100%	1996	Y	in-situ	low	Y	100	D, B
UK	100%	1998	Y	in-situ	low	Y	100	U/(Scott, X (NI))

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Electricity prices in EU (1.1.2001) (EUROc/kWh)

	RESIDENTIAL	INDUSTRIAL	IND TO RES RATIO
AUSTRIA	12.36	-	-
BELGIUM	13.20	6.73	50.98
FINLAND	7.06	4.82	68.27
FRANCE	10.81	5.67	52.45
DENMARK	17.71	5.70	32.19
GERMANY	12.52	5.78	46.17
HELLAS	6.81	5.67	83.26
IRELAND	8.08	6.18	76.49
ITALY	18.48	8.66	46.86
LUXEMBOURG	10.86	5.43	50
NETHERLANDS	13.30	-	-
PORTUGAL	11.17	6.44	57.65
SPAIN	10.01	6.26	62.54
SWEDEN	-	-	-
UK	10.92	7.50	68.68
AVERAGE EU	10.89	6.24	

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THE HELLENIC ELECTRIC POWER SYSTEM

by

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The Power Generation

The Hellenic electric power generation system consists of an interconnected system of generation units on the mainland, with the islands linked to that, and the independent power generation systems of Crete, Rhodes and the rest of the smaller islands.

The total installed capacity reached 11,000 MW (9830 MW in the mainland and 1170 MW in the islands) in 2000, while the net production, in GWh, was in excess of 48,400 in the same year.

The power generation system consists of thermal and hydroelectric stations, as well as a small number of units using renewable energy sources. More specifically:

- The interconnected generation system of the mainland consists mainly of lignite-fired stations which are the basis of the system. In addition, there are natural gas, oil-fired, and hydroelectric stations, as well as some small wind parks.
- The Crete generation system consists almost entirely of oil-fired stations (steam turbines, internal combustion engines, gas turbines, and one combine cycle unit). The system also includes two small hydroelectric stations and a serious number of wind-powered generators.
- The Rhodes generation system consists of oil-fired stations (steam turbines, internal combustion engines, gas turbines) and a few wind-powered generators.
- The rest of the smaller islands have their own autonomous production stations (oil-fired and some wind-powered generators and photovoltaic parks) except for those that are linked to the mainland system by submarine cables.

The Transmission System

The system for the transmission of the electric energy -from the generating stations to the major urban centers and large industrial units which are major consumers of electricity- consists of high voltage -3 phase- transmission lines. The voltage levels are 380 kV, 150 kV and a few lines 66 kV. The total length of the transmission lines is approximately 10,500 km.

In the interconnected system of the mainland, there are transmission lines of 380 kV and 150 kV. The 380 kV network, which has been developed consistently in the recent years, forms the “backbone” for the transmission of electric energy from Northern Hellas, where the majority of power stations are located, to the broader Athens area, where the demand is more than 32% of the demand in the mainland system.

The Distribution System

The Distribution System includes medium and low voltage lines with a total length over 185,000 km. The voltage levels are 20 kV, 15 kV and 220/380 V.

The Interconnections

The Hellenic Transmission System is already connected with the networks of Albania, Ex Yugoslavia (FYROM) and Bulgaria, through transmission lines of 150 kV and 380 kV. Additionally, an interconnection of 380 kV with Turkey has been launched and it is under scheduling.



Another important interconnection is with Italy, through a 400 kV DC submarine cable, which is going to be in operation at the end of this year.

Although the total capacity of the above interconnections reaches the 3000 MVA level, the total load ability is limited up to 700÷800 MVA because of stability and security of supply reasons.

Besides improving the reliability of the system, the electrical energy exchanges of the Hellenic system with the neighboring ones, via the above interconnections, are of the following types:

- Economy interchanges
- Maintaining hydraulic reserves
- Electricity deficits due to reasons of “*force majeure*”

The Union for the Coordination of Transmission of Electricity (UCTE)

The Hellenic Power System is operating under UCTE standards and norms. UCTE provides the framework of the interconnected operation of West European electric networks and was founded in 1951.

All electricity companies in UCTE participating countries are connected to their neighbors via three-phase high voltage power lines of 220 and 380 kV. In addition to this, there are also direct interconnections with other countries which operate their networks asynchronously with the UCTE network, with their own frequencies.

Thus, the European interconnected electrical network has optimized the benefits of interconnecting networks between them and has achieved the main objective of the UCTE, which has always been to make the most possible efficient use of energy within its sphere of influence and to increase the reliability and security of supply.

Energy interchange, as well as the network techniques that this requires, have been duly developed. In this context, it is worth noting that the exchange of electricity within the UCTE had already been totally liberalized when all international commerce was still subject to limitations and controls.

Since today's interconnected network is very heavily meshed, the various load dispatching centers responsible for operation within their region have to be in full control of their own network and at the same time have a good knowledge of the operating situation in neighboring networks. The operating decisions taken within each network must not cause unacceptable disruption in neighboring networks.

This does not, however, mean that a central organization is needed to co-ordinate, manage or control operation. It merely requires the load dispatching centers to keep one another permanently informed by exchanging, for example, the values of operating parameters for their networks.

This cooperation assumes that recommendations have been jointly prepared for this purpose and they constitute the basis of the interconnected mode of operation practice today.

The most important prerequisites for a member-country, included in UCTE rules and recommendations cover all issues related to:

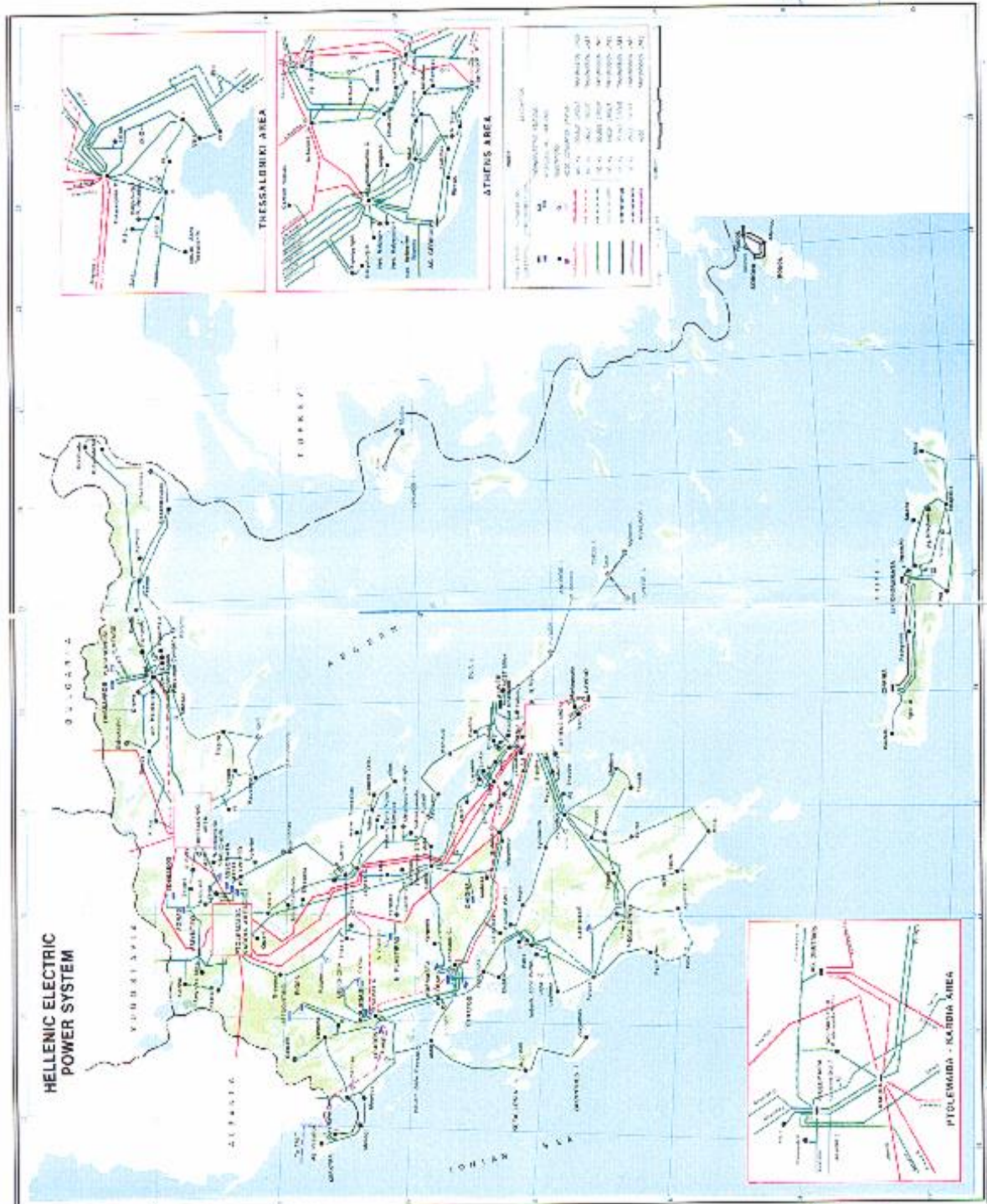
- Security of supply
- Self sufficiency of each electric power system
- Primary, secondary and tertiary active power control
- Reactive power and voltage control
- Satisfaction of n-1 criterion and stability of each network



- Requirements for new power plants
- Measures to avoid major incidents
- Measures affecting energy economy
- Other issues (organizational, legal, commercial, etc.)







The Hellenic electric power system

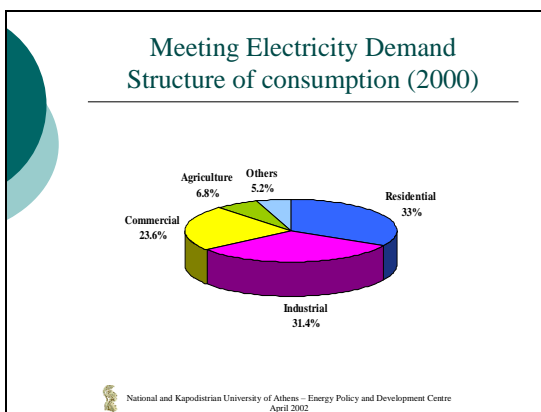
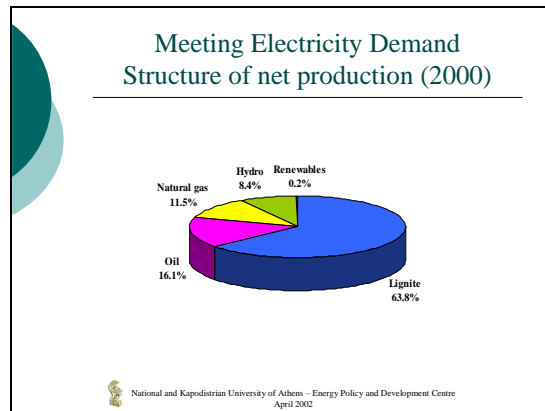
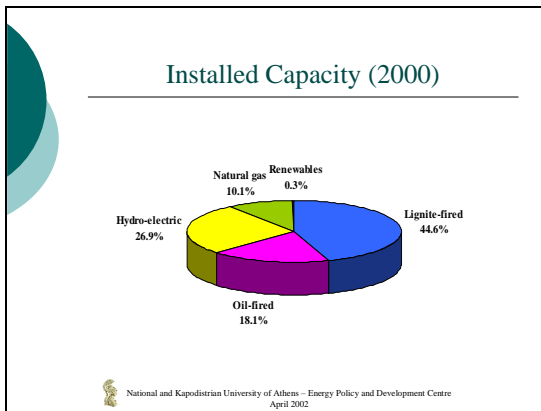
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Installed Capacity (2000)

Mainland	9830 MW
Islands	1170 MW
Total installed capacity	11,000 MW
Net Production	48,400 GWh

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RESTRUCTURING OF THE HELLENIC ELECTRICITY SECTOR


by

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Restructuring of the Hellenic electricity sector


Dr. Evangelos Lekatsas
Senior Expert



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Introduction


- The Internal Electricity Market Directive 96/92
- Eligible Customers
- Uncertainties due to market liberalisation
- Increase of entrepreneurial risks



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Prerequisites for new entrants to join the Market (I)

- **Authorities**
 - Competition Committee
 - Regulatory Authority of Energy (RAE)
 - Independent System Operator (ISO)
- **Market Participants**
 - Eligible Customers
 - Independent Generators
 - Traders



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Prerequisites for new entrants to join the Market (II)


- **Clear and well defined rules for the Market**
 - Free access to the network
 - Unbundling rules of the Accounts of all activities of Integrated Utilities
 - Impartial and nondiscriminatory System Operation by ISO
 - New laws to clearly define the market rules
 - Licensing of market participants
 - Establishment dispute resolution procedures



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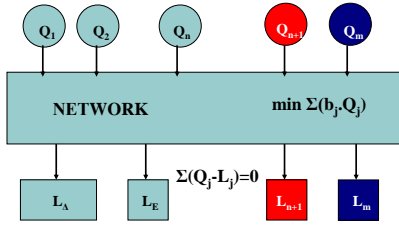

Basic Problems

- Impartial **Load Dispatch** to available Generating Units participating in the market
- **Market Clearing**
- Development of new **Generating Capacity**
- Definition of **Rights and Obligations** of all market participants
- Definition of **Eligibility Criteria** for Customers
- Establishment of new rules for the **Management of Interconnections** with neighboring countries



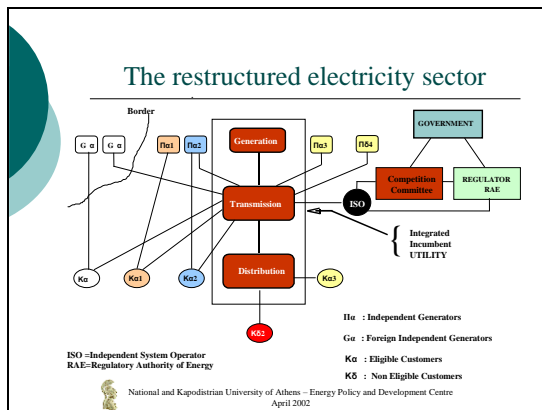
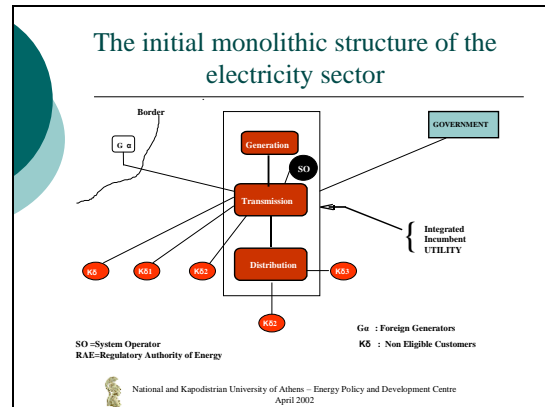
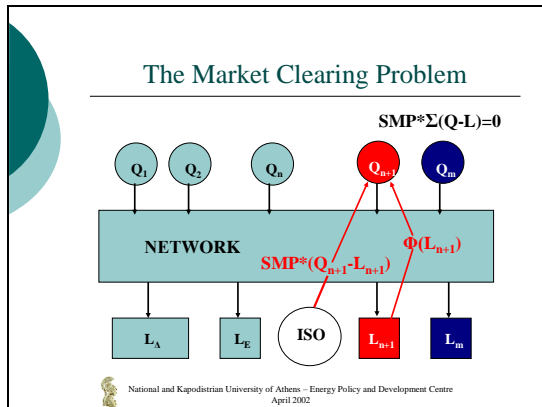
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The Load Dispatch Problem

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- ### RAE: Regulatory Authority of Energy (I)
- RAE is authorized to:
 - Secure impartial treatment of all market participants
 - Secure transparency of market operations
 - Regulate Public Service Obligations in a competitive environment
 - Resolve disputes between market participants
 - Edit licenses to Generators and Traders
 - Prepare and monitor all call of bids for new capacity
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- ### RAE: Regulatory Authority of Energy (II)
- Establish, enhance and monitor the competition rules
 - Protect the customers, especially the non-Eligible ones
 - Control any cross subsidization between activities of Integrated Power Utilities
 - Monitor of the unbundling of the activities of Integrated Power Utilities
 - Control any improper behavior of market participants (limit pricing, predatory pricing, unjustified withdrawal of power units etc.)
 - Penalize any improper behavior of market participants
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- ### ISO: Independent System Operator (I)
- Organization and Monitoring of the Daily Short Term Market
 - Ensure the scheduling and dispatch of power units according to the approved rules and procedures
 - Bill and settle all payments in respect of the power bought and sold by market participants
 - Secure proper and stable operation of the system by purchasing any necessary ancillary services (voltage and frequency control, reactive power compensation, spinning reserve margin etc.)
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ISO: Independent System Operator (II)

- Operation and Planning of the Transmission System
 - Operates the system and estimates its future needs
 - Pays a leasing fee to the owner of the transmission system, i.e. Public Power Corporation (the Incumbent Integrated Utility), for the use of the network assets
 - Charges all system users with all transmission costs
 - The owner of the transmission system, not ISO, is responsible for the construction of new transmission lines or new substations and for the maintenance of the system's equipment

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ESTABLISHING A REGIONAL ELECTRICITY MARKET IN S.E. EUROPE

by

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Director of KEPA

Introduction

The establishment of a Regional Electricity Market among sovereign countries is a complicated process that increases exponentially when the power sectors of the participating countries pass through the restructuring process from state owned vertical integrated monopolies to national power markets. In the whole planet, there are only few examples of active Regional Electricity Markets and this makes the undertaking much more difficult.

A Regional Electricity Market prerequisites the existence of strong political commitment at the first stages of its development and is consisted of the appropriate technical infrastructure, a set of rules and the market participants.

Although the main principles of operation seem to be commonly accepted, each Market has its own characteristics and peculiarities. In this respect, policy makers should be very careful to avoid mistakes at the various stages of planning and implementation.

Market designers, should keep in mind that although they have all the time for a careful design before the beginning of a market's implementation, once it starts they must be ready for quick and resulting decisions regulating its proper functioning.

Political commitment

The Regional Electricity Market (REM) in S.E. Europe is an effort of eight countries (six initially) to proceed in its establishment. The participating countries are Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Federal Republic of Yugoslavia, Former Yugoslav Republic of Macedonia, Hellas and Romania.

The origin of the initiative goes back in 1995, when the Energy Policy Group of our Centre carried out a study on the "*Prospects for the Development of a Peripheral Electricity Market in the Balkan Region*". The study dealt with the existing, at that time, power systems and networks in the Balkan countries and examined the perspectives of establishing such a Market.

In 1996, on the occasion of the "*Balkan Energy Interconnection Task Force*", a political initiative of the European Commissioner, our Energy Policy Group raised for the first time the issue of establishing a Regional Electricity Market to the Ministers responsible for energy issues of the participating countries.

In November 1997, the issue of the Regional Electricity Market was included for the first time in the Memorandum of Understanding that was signed among the Ministers of the Black Sea countries.

It took two years and a number of studies and political deliberations, carried out mostly by our Energy Policy Group, before six countries of the region and the European Commissioner signed the "*The Declaration of Intent for the establishment of a competitive Regional Electricity Market in S.E. Europe*", in September 1999.

What the six at the beginning and the eight later, signatory countries declare in this document may be summarized in three sentences.

First, they declare their intention to proceed establishing a competitive Regional Electricity Market in the frame of the European Union policies.



Second, they express their will to interconnect their power systems with the rest power systems of Europe (UCTE).

Third, they appoint a Management Committee (REM – MC) with the mandate to represent the countries involved in the market, to approve the rules of the Market, to agree upon the overall policy and management and to establish the short, medium and long term initiatives which need to be pursued on a priority basis, in order to achieve the Market's objectives within a specified time table while the year 2005 is set as the target year for the Market's operation.

These sentences constitute the hard core of the Declaration and offer the necessary political background for the further promotion of the REM.

Due to its contribution for the establishment of the REM, the Head of Energy Policy Group was included in the REM – MC as the Committee's Coordinator.

Almost one year later in June 2000, a Memorandum of Understanding was signed among the REM Ministers offering the appropriate framework for coordination for the various international initiatives that have been undertaken in the region in the frame of the Stability Pact activities.

Problems in securing the financing of the REM – MC activities for almost two years, have delayed the implementation of the action plan for the next stages of the REM development.

A recent meeting in Brussels, on March 5th 2002, among the Stability Pact donors has reinvigorated the involvement of the European Union and the rest donors of the Stability Pact to development of the REM.

A REM ministerial meeting is expected to take place in late 2002, in order to resume the situation and offer the necessary political increment for the further development of the REM.

In conclusion,, I have spent most of the time of my presentation not only to show you our role in establishing this Market, something that makes us feel proud, but also mainly to show that the existence of strong and continuous political commitment is a prerequisite for the first stages of a Regional Electricity Market's development.

Technical Infrastructure

A Regional Electricity Market cannot be developed unless the participating systems can be interconnected in synchronous and parallel mode. This requires an agreement on certain common rules concerning the operation modes of the participating networks. Especially those associated with the frequency and voltage regulation. The contributing power systems may be interconnected in a tight or loose pool scheme depending on the market's characteristics, but the proper function of the market requires at least their parallel and synchronous interconnection.

In the past, the power systems of the REM countries were divided in two groups following their political orientations while Albania remained isolated.

The new political landscape that emerged after 1989, gave a strong impetus towards the interconnection of all power systems in the region with those of west Europe.

In 1995, the state owned power utilities of the region decided to interconnect their systems in synchronous and parallel mode of operation with the perspective of their interconnection of the whole region with the rest grid of UCTE. At that time Hellas and the Former Yugoslavia were already members of UCTE.

The war hostilities that followed in the region, resulted in the destruction of transmission lines and substations and disconnected the region from UCTE.

The intensive efforts that follow the period of war hostilities resulted in the reconstruction of the destroyed infrastructure. Furthermore, two countries of the region, Bulgaria and



Romania made decisive steps towards their interconnection to UCTE, but still a considerable amount of technical assistance is necessary before the proper functioning of the interconnected power systems.

In conclusion, the existing technical infrastructure of the REM satisfies a minimum level that allows to proceed in establishing the Market, but certain works are necessary if the countries of REM want to improve the standards of their operation and to be interconnected with the grid of UCTE.

Set of rules

Provided that the necessary political commitment is secured and the minimum technical infrastructure exists, then the next crucial issue for the development of a REM is the agreement on the rules that will govern the market and the procedures for their implementation.

Two at least issues should be resolved sufficiently before the market starts its functioning. These are related with the wheeling conditions among the interconnected networks and with the allowed access to the national markets.

In our case, the situation is more complicated since these issues have to be resolved at national level before the participating countries proceed with the necessary legislative harmonization at regional level.

Having in mind that the starting point for all of them was the state own vertical integrated monopolies, the countries of REM are involved in a parallel effort attempting to create their own national power markets with the minimum social and economic costs while at the same time, they try to be in compliance with the trends that emerge in EU directives.

In the recent years, a considerable progress has been achieved concerning both issues mainly due to the positive influence of EU policies. Most of the REM countries have started restructuring their power sectors by separating power production from transmission network. The development of National Transmission System Operators (TSO) created the environment where both producers and consumers may have access to the network and consequently ask for the execution of contracts that they may freely negotiate.

In addition, a national Regulator who more or less is compatible with the basic model that is promoted by EU regulates almost every national market.

Of course a REM is much more than an agreement on establishing a TSO and a Regulator. In our case, a lot of problems should be resolved before the proper functioning of the Market. I would not take your time mentioning these problems, but we are optimistic that these problems will be resolved gradually in the coming years.

Nevertheless, we consider that the appointment of a Management Committee of the REM, consisted of high-level representatives of their Energy Ministers with the mandate to oversee the establishment of the REM creates the mechanism that allows the REM countries to take the necessary decisions through the REM ministerial meetings.

Market participants

A Market cannot operate without its participants. The more they are the better the market is functioning. Moving from state monopoly to competitive market conditions it is expected that the final consumers will have access to as many as possible producers and this through the competition will result in low prices for them. On the other hand, the larger the Market the better the scale of economy for the producers and the lower the prices they offer, not to mention the issues related to the optimum use of available resources.

Opening in the production of former monopolies is expected to attract new and private investments, while opening in consumption is expected to lead to lower electricity rates through competition. But this is only theory. The reality is somehow more complicated.



Private investors are not interested to enter in the production, unless they have sound expectations for attractive profits. The ground for such expectation is the demand magnitude of the market and the established price mechanisms.

The later, is the most crucial issue in the whole procedure. The reason is that in all countries of the REM the price of kWh has been defined in the past, with political and social criteria. This policy has created a certain social behavior among the consumers according to which electricity is a social good rather than a commodity.

In this respect, consumers behave rather as citizens enjoying a social good than as consumers who have to pay for the consumed commodity. Further to that, in all countries of the region, with the exception of Hellas, the present state of national economies does not allow the governments to proceed with drastic increases in the tariffs that their people have got used to in the past without having serious social and political problems.

On the other hand, if the prices do not reflect the real costs, the private investors will refuse to invest in power production regardless of the market settlements, unless the Government guarantees buying their production at certain prices. But in this case, we are not talking about competition and Market's operation.

In conclusion, defining the market participants in both the production and the consumption plus establishing cost reflecting tariffs are the most delicate and complicated issues that the countries of REM should resolve in their way towards their integration with the rest economies of the European Union.

Conclusions

Although the main principles governing a REM seems to be commonly accepted, each Market has its own characteristics and policy makers should be very careful to avoid mistakes that may create serious problems in the smooth operation of the whole power sector.

The Regional Electricity Market (REM) in S.E. Europe is an effort of eight countries to proceed in its establishment. The participating countries are Albania, Bosnia & Herzegovina, Bulgaria, Croatia, Former Yugoslav Republic of Macedonia, Hellas, Serbia & Montenegro, Romania. Strong political commitment, at the highest political level is a prerequisite for the first stages of a Regional Electricity Market's development.

The existing technical infrastructure of the REM satisfies a minimum level that allows to proceed in establishing the Market, but certain works are necessary if the countries of REM want to improve the standards of their operation and to be interconnected with the grid of UCTE.

The institutional part of a REM is much more than an agreement among national TSOs and Regulators. A lot of problems should be resolved before the proper functioning of the Market.

The appointment of a Management Committee of the REM, consisted of high-level representatives of their Energy Ministers with the mandate to oversee the establishment of the REM creates the mechanism that allows the REM countries to take the necessary decisions through the REM ministerial meetings.

Defining the market participants in both production and consumption plus establishing cost reflecting tariffs are the most delicate and complicated issues that the countries of REM should resolve in their way towards their integration with the rest economies of the European Union.

Our Energy Policy Group has contributed in establishing this REM and it will continue its efforts for the benefit of the countries of the region.

Before closing my presentation, let me repeat that we are honored from your visit and that we will be glad to find ways of cooperation and that for this reason we will be glad to receive




postgraduate students or to host, for short visits, Chinese energy policy makers or scientists involved in energy policy issues.




Establishing a Regional Electricity Market in S.E. Europe

Prof. Dimitrios Mavrakis
Director of KEPA

 National and Kapodistrian University of Athens – Energy Policy and Development Centre
April 2002


Prerequisites for REM

- Political commitment
- Technical infrastructure
- Set of rules
- Market participants

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REM in S.E. Europe (I)

- An initiative of eight countries of the eight countries of the region in co-operation with EU
- The countries of the REM are:
 - Albania
 - Federal Republic of Yugoslavia
 - Bosnia and Herzegovina
 - FYROM
 - Bulgaria
 - Hellas
 - Croatia
 - Romania

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REM in S.E. Europe (II)

- Studies financed by EC
- Political initiatives
- Role of EPG-NKUA
- REM's founding Declaration

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REM's main characteristics

- Compliance with EU policies
- Compliance with UCTE rules
- Gradual development
- Target year 2005

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Political Commitment

- Ministerial meetings
 - Declarations
 - Memorandum of Understanding
- EU contribution
- Stability Pact-Assistance

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Technical Infrastructure

- Parallel and synchronous operation
- Reconstruction of transmission lines
- Improvement of infrastructure
- International assistance



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Set of rules

- Developing national power markets
- Harmonising their operation
- Gradual development of REM mechanisms
 - T.S.Os
 - Regulators



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Market participants

- Transition problems
- Opening production to private sector
- Eligible customers
- Price mechanisms



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Conclusion

- The establishment of a REM is a complicated procedure reflecting the special characteristics at the participating markets



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