Investments in energy sector in Serbia

Prof. Dr Nikola Rajaković
State Secretary
Ministry of Mining and Energy, Serbia
Mid-term Transmission Network Development Plan

Belgrade
November, 2010
Contents of the plan

- Load forecast
- Transmission network
  - Methodology
  - Data
  - The existing transmission network
  - The investment plan realization in 2010.
  - Perspective transmission network
- Generation adequacy
- Regulation
- Short circuit current
Data used for analysis

- Selection of the critical regime was based on:
  - data obtained by statistical analysis (N-1 security criterion)
  - operating events from the previous period

- Analysis of the existing transmission network of the Republic of Serbia was carried out for two typical operating regimes:
  - Winter peak – consumption of 7450 MW
  - Summer peak – consumption of 4150 MW
New internal elements till 2015.

- SS 400/110 kV Beograd 20 (2012)
- SS 400/220/110 kV Kraljevo 3 (2013)
- OHL 400 kV SS Kragujevac 2 – SS Kraljevo 3 (2013)
- SS 400/110 kV Vranje 4 (2014)
- SS 400/110 kV Srbobran (2014, upgrade from 220 kV)
- SS 400/110 kV Smederevo 3 (2014, upgrade from 220 kV)
Overview of the existing interconnection lines in the region
Overview of the planned interconnection lines in the region with details concerning Serbia

- OHL 400 kV Serbia – FYROM (SS Nis – SS Stip)
- OHL 400 kV Serbia – Romania (SS Pancevo – SS Resica)
- Ongoing System Studies:
  1. Western Serbia 400kV Transmission System Upgrade
  2. Serbia-Montenegro New 400 kV Interconnection Line
Ongoing System Studies:

1. Western Serbia 400kV Transmission System Upgrade
2. Serbia-Montenegro New 400 kV Interconnection Line

- Reasons:
  - Energy and economic development of the region of Western Serbia
  - DC cable Montenegro-Italy

- Feasibility study financing:
  - Western Serbia 400kV Transmission System Upgrade: **EU Commission (IPF)**
  - (Serbia-Montenegro New 400 kV Interconnection Line): **TERNA**

- Three scenarios
  - Single line SS B.Basta- SS Pljevlja
  - Double line SS B.Basta-SS Pljevlja
  - Double line SS B-Basta-SS Pljevlja-SS Visegrad
Existing interconnections (electrical transmission lines) in the region
Overview of the planned interconnection lines in the region with details concerning Serbia

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- OHL 400 kV Serbia – Romania (SS Pancevo – SS Resica)
- Ongoing System Studies:
  1. Western Serbia 400kV Transmission System Upgrade
  2. Serbia-Montenegro New 400 kV Interconnection Line
OHL 400 kV Serbia – FYROM
SS Nis 2 – SS Leskovac 2 – SS Vranje 4– SS Stip

- Reasons:
  - Safer,
  - Better voltage,
  - Reliable supply of electricity in the region of South Serbia and
  - Economic development of Southeast Serbia

- Investment:
  - EMS-MEPSO

- Project financing:
  - EU Commission (EAR and IPA) 70% + EMS 30%

- OHL:
  - single line

- OHL length: (150 + 70)km
OHL 400 kV Serbia – Romania
SS Pancevo – SS Resica

- Reasons:
  - increasing the bandwidth of the transmission network (East-west / southwest),
  - future integration of wind energy on the transmission network (and the Romanian and Serbian sides),

- Investment:
  - EMS-TRANSELEKTRICA

- Feasibility study financing:
  - EU Commission (IPA) 100%

- Double line
- OHL length: (60 + 60)km
EPS - Structure, Ownership & Activities

Structure

• Vertically organized company comprising of 11 corporate enterprises

Ownership

• 100% owned by the Republic of Serbia

Activities

• Electricity generation
• Distribution and distribution system control
• Electricity trading
• Coal production, processing and transport
• Steam and hot water generation in combined processes
EPS - Overview 2009

Installed Capacities
Hydro Power Plants 2,835 MW
Thermal Power Plants 5,171 MW
Combined CH Plants 353 MW
Total * 8,359 MW

Production 2009
Production 36,112 GWh
Production with K&M 41,122 GWh
Coal Production** 37.8 mil.T
Gross Consumption** 33,292 GWh
Number of Customers** 3.4 million

Number of Employees* 35,800
Business Assets ~ EUR 6.5 bil.
Turnover ~ EUR 1.6 bil.

* Including K&M ** Excluding K&M
As of June 1999, EPS cannot manage its facilities on the territory of Kosovo and Metohija (K&M)
Production & Consumption 2000 - 2009

- Gross Consumption increased for 13%
- EPS Production increased for 11%
- Import decreased 8x
Energy Efficiency Improvement in TPPs

In the period 2001-2008, modernization and general overhauls done on almost all TPPs:

- TPPs electricity production increase of 30%
- Thermal units reliability increase of 11%
- Coal specific consumption decrease
Ongoing Investment Activities

- Ongoing rehabilitation and modernization of HPPs will increase power capacity, production, efficiency and extend operational lifetime

- Increase of HPPs annual production
  - HPP Djeerdap + 80 GWh
  - HPP Bajina Basta + 60 GWh
  - HPP Zvornik + 70 GWh
  - HPP Potpec + 13.5 GWh
  - HPP Vlasina + 25.5 GWh

- Rehabilitation, modernization of network and improvement of metering in distribution system will generate additional energy savings

- Participation in the promotion of energy efficiency on demand/consumers side
Production & Consumption up to 2020

- In the period 2010-2020, EPS forecast indicates 13% increase in overall consumption.
Introduction of High Efficiency Technologies

- System efficiency improvement after decommissioning of outdated and introduction of new TPPs

![Graph showing specific heat consumption (MJ/kWh) from 2010 to 2025]
Prospective aging of EPS TPPs

Prospective Hours of work TPPs

- 2025: 215,061
- 2024: 217,024
- 2023: 187,257
- 2022: 166,853
- 2021: 200,000
- 2020: 200,000
- 2019: 200,000
- 2018: 200,000
- 2017: 200,000
- 2016: 200,000
- 2015: 200,000
- 2014: 200,000
- 2013: 200,000
- 2012: 200,000
- 2011: 200,000
- 2010: 200,000
- 2009: 200,000
Intensive Investment Activities

Main reason for initiation of PE EPS intensive investment cycle is to:

- Secure supply under conditions of growing electricity demand
  - Average growth rate of cca. 1% annually in the period up to 2025

- Replace the old, inefficient facilities at the end of operation life

- Meet environmental EU and national standards

- Achieve economic and financial sustainability
  - High efficiency with increase of competitiveness
Planned Investment Activities

Investment Plan

• Investment plan up to 2015 envisages over EUR 9 billion
• Strategic partnership cca. EUR 1.8 billion, loans cca. EUR 3.8 billion, own funds EUR 3.4 billion

Within Investment Plan

• Amount of EUR 1 billion is allocated for primary environmental protection measures
• Amount of EUR 0.5 billion is allocated for investments into renewable sources
Investment Activities up to 2015

According to the estimates up to 2015, in order to continue with the investment activities in the construction of new capacities and to maintain existing generation, some EUR 9 billion is needed:

- **Maintenance of existing system performance (ca. EUR 4 billion)**
  - HPP revitalisation cca. EUR 0.4 billion
  - TPP revitalisation cca. EUR 1.3 billion
  - Revitalisation and replacement of open cast mines cca. EUR 1.5 billion
  - Modernisation of ED network and meter replacement cca. EUR 0.7 billion
  - Other investments (TMS, IT, etc.) over EUR 0.1 billion

- **Generation increase (new capacities - ca. EUR 5 billion)**
  - HPPs cca. EUR 0.6 billion
  - TPPs cca. EUR 2.5 billion
  - Coal mines cca. EUR 0.6 billion
  - Other investments cca. EUR 1.2 billion

- Investment projects for further development of electricity trade

- Investment projects for GHG trading development
Financing sources

- **Anticipated funds over EUR 9 billion by 2015:**
  - EPS funds: cca. EUR 3.4 billion
  - Loans and anticipated loans: cca. EUR 3.8 billion
  - Strategic partner: cca. EUR 1.8 billion
  - Other funds: up to EUR 0.2 billion

- **Investments in the new facilities by 2015 do not include:**
  - TPP Kostolac B3
  - CO₂ measures
  - Some hydropower projects (Ibar, Velika Morava, Middle Drina, Djerdap III)
Priority Investment in Mining

• Coal is main energy resource

• New open pit mines opening is necessary from 2011 for the purpose of new planned thermo capacities

• Energy efficiency of the existing mines need to be increased

• Coal exploitation need to be harmonized with environmental protection requests

• New technology introduction is necessary
## Investments in open pit mines of EPS

<table>
<thead>
<tr>
<th>Open cast mines – for maintenance of achieved generation</th>
<th>Necessary equipment needed for completion of the existing</th>
<th>Class</th>
<th>Pcs.</th>
<th>Approximate value of the specified equipment (mil. €)</th>
<th>Total investment (mil. €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tamnava West Field</td>
<td>Bucket wheel excavator for coal</td>
<td>4800 m³/h</td>
<td>1</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Spreader for Interburden</td>
<td>12 000 m³/h</td>
<td>1</td>
<td></td>
<td>229</td>
</tr>
<tr>
<td></td>
<td>Coal belt conveyer system for coal</td>
<td>B=1600mm</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Quality management system</td>
<td></td>
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<tr>
<td></td>
<td>Bucket wheel excavator for overburden</td>
<td>6600 m³/h</td>
<td>1</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>Field „C“</td>
<td>Spreader for overburden</td>
<td>8500 m³/h</td>
<td>1</td>
<td></td>
<td>150</td>
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<tr>
<td></td>
<td>Belt conveyer system</td>
<td>B=2000 mm</td>
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<tr>
<td>Field „E“</td>
<td>Bucket wheel excavator for overburden</td>
<td>6600 m³/h</td>
<td>2</td>
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<td>210</td>
</tr>
<tr>
<td></td>
<td>Spreader for overburden</td>
<td>8500 m³/h</td>
<td>3</td>
<td></td>
<td>640</td>
</tr>
<tr>
<td></td>
<td>Belt conveyer system</td>
<td>B=1600 and 2000 mm</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Open cast mine – for generation increase</td>
<td>Completely new equipment</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Field „Radljevo“</td>
<td>Bucket wheel excavator for overburden</td>
<td>6600 m³/h</td>
<td>2</td>
<td></td>
<td>360</td>
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<tr>
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<td>Bucket wheel excavator for coal</td>
<td>4800 m³/h</td>
<td>5</td>
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<td>585</td>
</tr>
<tr>
<td></td>
<td>Spreader for overburden</td>
<td>8500 m³/h</td>
<td>3</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Bandwagens</td>
<td>4800 m³/h</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Belt conveyer system</td>
<td>B=1600 and 2000 mm</td>
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</tr>
</tbody>
</table>
## Investments in open pit mines of EPS

**Open cast mine** | **Equipment for generation increase** | **Class** | **Pcs.** | **Total investments (mil. €)**
--- | --- | --- | --- | ---
**Field „Drmno“** | Bucket wheel excavator for overburden | 6600 m³/h | 1 | 100
| Bucket wheel excavator for coal | 4800 m³/h | 1 |
| Spreader for overburden | 8500 m³/h | 1 |
| Bandwagens | 4800 m³/h | 1 |
| Belt conveyer system | B=1600 and 2000 mm |
Priority Investments in New Capacities

- **Projects with strategic partners selected on the basis of tendering procedures**
  TPP Nikola Tesla B3, Kolubara B, CHP Novi Sad

- **Projects based on the international agreement with Italy (SECI)**
  HPP Ibar, HPP Kupinovo

- **Projects based on the Cooperation Memorandum with RWE**
  HPP Velika Morava, PSHPP Djerdap III

- **Projects with the Republic of Srpska**
  HPPs Upper Drina – (EPS and RWE)
  HPPs Middle Drina – (EPS and SECI)

- **Independent project construction**
  Kostolac B3

- **Projects with Romania and Bulgaria on Danube**
  HPPs upstream from Olta
Priority Investment in Generation

Projects with strategic partners selected on the basis of tendering procedures

I. TPP Kolubara B
   700 MW (2x350 MW) lignite-fired (cca. EUR 750 million)

II. TPP Nikola Tesla B3 (TENT B3)
    700 MW lignite-fired with supercritical parameters (cca. EUR 900 million)

III. Reconstruction/construction of the new unit at CHP Novi Sad
    Optimization of existing CHP and/or construction of the new unit with the
capacity up to 450 MW gas-fired – combined production of heat and
electricity under the combined gas-steam cycle (up to EUR 200 million)
Status of the Projects

TPP Kolubara B and TENT B3

- Qualification process completed in August 2009
- Tender documentation submitted to investors in September 2009
- Comments on the Implementation agreements received from the Bidders in December 2009
- Tender process restarted after the government adopted the Conclusion on June 3, 2010
- On July 29, 2010 the government adopted the draft Conferral Act for activities of general interest as well as relevant amendments and annexes to JP EPS founding acts, securing PE EPS’s ownership rights over the assets which are necessary for the realization of the Projects
- In September PE EPS will discuss the tender and the applicable Implementation agreements with the interested Bidders
- Submission of final tender documentation planned for November 2010
- Bid submission planned for December 2010
Company ENERGY NOVI SAD (ENS), established by city of Novi Sad and EPS in mid of 2009 with the goal to cover long term needs for electricity and heat for town’s district heating system from new CCGT CHP Unit. Financing of Project should be secured by the Strategic partner, selected in the ongoing tender procedure.

- Qualification process completed (four companies qualified) – March 2010
- Submission of Tender documents - May 2010
- Deadline for potential Strategic partners to submit a bid – December 2010
- Selection of Strategic partner – January 2011
**Distribution**

**Planned activities**

- reconstruction, replacement and construction of new substations and equipment on different voltage levels
- construction and replacement of distribution grid on different voltage levels
- Metering system improvement with replacement of over 2,400,000 metering devices in order to obtain remote monitoring and control
- acquisition, development and new software implementation for distribution grid management and billing monitoring

**Planned funds**

- approximately EUR 700 mil
Regulatory Framework

- Setting consumer tariffs
- Setting transmission tariffs
- Determining methodology for defining tariff elements / cost elements / eligibility
- Issuance of licenses

MEMBER OF ENERGY COMMUNITY OF SOUTH-EAST EUROPE

Towards a liberalised Electricity and Gas Market

- Setting legal framework
- Approval of tariff systems
- Approval of licensing system
- Security of supply
- Crisis management

01/2008:
- All non-household customers eligible

2015:
- Full market opening

Serbian Electricity and Gas sector

2007

2015
Energy Sector Reform Goals

Increasing overall sector efficiency and effectiveness

Environment, Kyoto and renewables

Security of supply

Stabilisation and Accession Process and regional integrations-compliance with the EU Acquis
Country Action Plan: Proposed Outline

Republic of Kazakhstan
Issues Raised / Expected Outcome

Discussion topics of the workshop included:
• Current policy, institutional and financial obstacles to local and foreign investment in electrification projects;
• Business opportunities and key policy strategies to attract power project investment.

Specific discussions included:
• Legal and regulatory frameworks
• Financial and energy policy environment
• Tariffs, subsidies and cost-reduction incentives
• Risk and liability mitigation
• Financial model options (joint ventures, CDM, PPPs, DI, etc.)
• Low and zero CO2 emitting technology options and associated costs
• Regional cooperation

Expected outcome: Country Action Plan
• Development and implementation of an action plan including strategies and specific policy options relative to the issues addressed, with the following overall objective:

Enhance the country's capacity to attract capital for the development and deployment of low-emitting power generation and transmission technologies and projects, through the establishment of appropriate regulatory frameworks and policies.
ACTION PLAN OUTLINE
Current Obstacles and Challenges

The power industry of Kazakhstan is characterized by (strengths):

- A high share of electricity generated at thermal power plants utilizing cheap coal (approximately 74% of the total generated in 2009)
- A well-developed scheme of the 220-500-1150 kV transmission lines
- A centralized system of operational dispatch control
- A considerable potential in renewable sources of energy
- Parallel operation of the Unified Power System of Kazakhstan with the Integrated Power System of Central Asia and the Unified Power System of Russia
- An established regulatory and legal framework for effective operation of the wholesale and retail electricity markets
- Electricity export capacity and availability of transit potential
- Availability of considerable energy reserves
Current Obstacles and Challenges (cont'd)

At the same time there are weak aspects:

- Significantly obsolete economic life of the generation equipment
- Shortage of the flexible generation capacity required to effectively cover peak loads
- A high rate of electric network amortization in regional network companies
- The lack of a mechanism that can stimulate the construction of new power plants
Current Obstacles and Challenges (cont'd)

Accordingly, there are threats of:

- A widening gap between the available and installed capacity and retirement of the primary equipment at the existing power plants
- An emerging electricity deficit that is not covered
Opportunities

• A clear development policy for the power industry as well as competitive electricity and capacity markets
• A specific, government-approved development programme for Kazakhstan’s power industry
• An action plan for implementation of the Power Industry Development Program, including a list of projects to be implemented within the timeframe approved by the government
• A well-developed legal framework providing favourable investment conditions
• A competitive electricity market (in operation since 1997)
• Experience of investment in the power industry and the implementation of large projects
Key Actions Required

Development of the legal framework:


• Improvement of the normative and regulatory documents concerning the use of renewables

• Commissioning of the capacity market
Key Actors to Be Involved

- The Ministry of Industry and New Technologies
- The Ministry of Finance
- The Ministry of Economic Development and Trade
- Agency for Regulation of Natural Monopolies
- Samruk-Kazyna National Welfare Fund
- KEGOC JSC
- Samruk-Energo JSC
- KOREM JSC
<table>
<thead>
<tr>
<th>Timeline</th>
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Areas Needing Assistance

- Information support of the legal database of UNECE countries pertaining to the attraction of investment to the power industry
- Information on the regulatory and legal framework of the UNECE countries supporting the use of renewables
- Information on normative and regulatory legal acts for operation of the capacity market, and the operational experience of such market
## Country Action Plan Summary

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<th>Current Obstacles and Challenges</th>
<th>Opportunities</th>
<th>Key Actions Required/Objectives</th>
<th>Key Actors to Be Involved</th>
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**Key Actors**
- The Ministry of Industry and New Technologies
- The Ministry of Finance
- The Ministry of Economic Development and Trade
- Agency for Regulation of Natural Monopolies
- Samruk-Kazyna National Welfare Fund
- KEGOC JSC
- Samruk-Energo JSC
- KOREM JSC

**Timeline**
- 2011-2012
- 2011-2013
- 2015
Focal Point Contact Information

Name/Title: Sergey Katyshev
E-mail: katyshev@kegoc.kz
Tel: +77172970109
Fax:+77172970680
UNECE-e8-EBRD-WEC
Fostering Investment in Electricity Generation in Central and Eastern Europe and Central Asia

Geneva, Switzerland
November 22-24, 2010

[Kyrgyz Republic]
Ministry of Energy of the Kyrgyz Republic
The Kyrgyz Republic owns 2% of Central Asia’s energy resources, including huge coal reserves and 30% of its hydro energy resources, of which only one tenth has been developed to date. In the structure of the country’s fuel and energy balance, the import is more than 50%.

There are 70 known coal fields in the territory of the Republic, with total coal reserves estimated at 1320 million tons. Today about 1,1 million tons of coal or about 78% of annual consumption volume is imported.

Forecast of standard fuel stock of undiscovered reserves is 289 million tons of fuel and gas. In general, self-sufficiency of the country with petroleum products is less than 30%.

Hydro energy potential of 252 large and medium rivers is estimated at 18.5 million kW of capacity and more than 160 billion kWh of electrical energy.

Large hydro energy resources is mainly focused in the basins of Naryn (average annual flow 3-4 billion cubic meters) and Sary Djaz (flow 3-4 billion cubic meters) rivers. Hydro energy potential of small rivers and water courses is about 5-8 billion kWh/year, only 3% of which is used.

Potential of solar energy: heating – 490 mln. kWh, electricity – 22,5 mln. kWh.

Wind power – 44,6 mln. kWh.
ACTIONS AND GOALS

- Reforming the system of management of the energy sector, improvement of management, establishment of necessary institutional frameworks and legal base.
- Introduction of Fuel and Energy Sector Transparency Initiative (FESTI), introduction of principals of public discussions in the process of FES management and regulation.
- Ensuring sustainable development of the energy sector and its technical reequipment.
- Commissioning of new generating and transmission capacities.
- Increasing renewable energy share in the structure of output, modernization of legal base for development of renewable energy in the country.
- Increasing efficiency through energy saving.
- Improving reliability of service to customers.
EXISTING RISKS

- **Macroeconomic risks.** Imbalanced indicators of macroeconomic stability in the result of huge external debt and consequent decrease of public investments funded mainly from external credit means.

- **Geopolitical risks.** Necessary conditions for economic development are social and political stability. For the Kyrgyz Republic the question of stability is become a burning issue since April 7, 2010 when the previous regime is forced to resign and new power set a course for strengthening of state institutions. In such conditions new democratic technologies of expression of people’s dissatisfaction as rallies and pickets has become an instrument that really influence on economic development of the country.
EXISTING BARRIERS

- **Imbalance in structure & location of generation units.** A geographical imbalance exists between the Republic’s demand (about % of which is in the north of the country) and its generating capacity of which 2920 MW or 80% is located in Jalalabad oblast in the south.

- **Delay in introducing new generating capacities.** There is a tendency observed that introduction of new generating capacities falls behind the annual growth in energy consumption.

- **Seasonal consumption.** Winter consumption is two times higher than in summer. This means the energy system’s load factor is uneven, which makes it difficult to ensure economic efficiency of operation.

- **Tariffs that don’t reflect market pricing.** With the cost of 1 kWh of electrical energy estimated to be 140 tyiyn/kWh in 2010, and the selling tariff of 70 tyiyn/kWh for the population, i.e. the current tariff covers only 60% of costs.

- **High level of equipment deterioration**
  At present the deterioration rate of general equipment and electric grids is 50%. Because of the deterioration of generating equipment, the available capacity of Kyrgyz energy system is 3135 MW, even though its installed capacity is 3680 MW.
PARTICIPANTS

- Ministry of Energy, Ministry of Finance
- Regulator
- FES Companies
- Investors
### DEVELOPMENT PRIORITIES

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<tr>
<th>Name of the project</th>
<th>Goal</th>
<th>Required investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion of Kambar-Ata HPS -2 (construction works on 2 and 3 hydro unit)</td>
<td>increase the base-load capacity of energy system</td>
<td>Estimated costs for completion of 2 and 3 hydro unit is USD 150 mln.</td>
</tr>
<tr>
<td>Reconsrtuction of Uchkurgan HPS</td>
<td>increase the base-load capacity of energy system</td>
<td>Estimated costs is USD 60 mln.</td>
</tr>
<tr>
<td>Modernization – reconstruction of Bishkek CHP</td>
<td>increase power capacity of CHP up to 400 MWt</td>
<td>Estimated costs is 150 mln.</td>
</tr>
<tr>
<td>Name of project</td>
<td>Goal of project</td>
<td>Required investments</td>
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<tr>
<td>Construction of Kara Keche CHP</td>
<td>increase the base-load capacity of energy system</td>
<td>Estimated costs is USD 120 mln.</td>
</tr>
<tr>
<td>Improvement of power supply for Bishkek (reconstruction of SS 220, 110 kW)</td>
<td>increase transmission capacity of energy system</td>
<td>Estimated costs is USD 17 mln.</td>
</tr>
<tr>
<td>Construction of small HPS (Sokuluk - 5 - 1,5 MWt, Chui oblast, Sokuluk river; Oy-Alma HPS - 7,7 MWt, Osh oblast, Karakuldja river; Orto-Tokoy – 20 MWt, Issyk Kul oblast, Orto-Tok reservoir; Tort- Gul HPS– 3 MWt, Batken oblast, Tort Gul reservoir)</td>
<td>development of small hyrdo energy</td>
<td>Estimated costs is USD 62 mln.</td>
</tr>
<tr>
<td>Introduction of Fuel and Energy Sector Transparency Initiative (FESTI)</td>
<td>Introduction of principals of transparency in the process of management and regulation of FES</td>
<td></td>
</tr>
</tbody>
</table>
THANK YOU!

Name/Title: Mazhitova Olga
Head of the division of planning and prognosis
Ministry of Energy of the Kyrgyz Republic

Email: ore-minprom@yandex.ru
Tel: +996 312 562151
Fax: +996 312 562028
UNECE-e8-EBRD-WEC
Fostering Investment in Electricity Generation in Central and Eastern Europe and Central Asia

Geneva, Switzerland
November 22-24, 2010

Country Action Plan—Proposed Outline

[POLAND]
Issues Raised/Expected Outcome

Discussion topics of the workshop included:
• Current policy, institutional and financial obstacles to local and foreign investment in electrification projects;
• Business opportunities and key policy strategies to attract power project investment.

Specific discussions included:
• Legal and regulatory frameworks;
• Financial and energy policy environment;
• Tariffs, subsidies and cost reduction incentives;
• Risk and liability mitigation;
• Financial model options (Joint Ventures; CDM; PPPs; DI etc.);
• Low and zero CO2 emitting technology options and associated costs;
• Regional cooperation

Expected outcome: Country Action Plan
• Development and implementation of an action plan including strategies and specific policy options relative to the issues addressed, with the overall objective to:

Enhance the country's capacity to attract capital for the development and deployment of low-emitting power generation and transmission technologies and projects, through the establishment of appropriate regulatory frameworks and policies.
ACTION PLAN OUTLINE

BASIC DOCUMENTS:

1. ENERGY POLICY OF POLAND UNTIL 2030

2. ACTION PLAN FOR THE YEARS 2009 - 2012

Current Obstacles and Challenges

- FUEL MONOCULTURE (COAL) = PROBLEM? OR INDEPENDENCE ON GENERATION OF ELECTRICAL ENERGY AND THERMAL ENERGY (DISTRICT HEATING SECTOR)
- INCREASE IN DEMAND OF ENERGY (FROM 150 TWh TO 217 TWh)
- INADEQUATE FUEL AND ENERGY GENERATION AND TRANSMISSION INFRASTRUCTURE
- SIGNIFICANT DEPENDENCE ON EXTERNAL SUPPLIES OF NATURAL GAS
- FULL DEPENDENCE ON EXTERNAL SUPPLIES OF CRUDE OIL
- EU CLIMAT AND ENERGY PACKAGE (3 X 20%, ETS, IED DIRECTIVES)
Opportunities

- EXISTING NATIONAL PROGRAMME
- SIGNIFICANT RESERVES OF HARD COAL AND LIGNITE (50 – 100 y)
- RENEWABLE ENERGY POSSIBLE: SHARE TO 15 % AND BIOFUEL
- SHELL GAS RESERVES ??
- OWN, TECHNICAL, INELLECTUAL AND PRODUCTIVE POTENTIAL
Key Actions Required

• IMPROVEMENT OF ENERGY EFFICIENCY
• ENHANCEMENT OF THE SECURITY OF FUEL AND ENERGY SUPPLIES
• RETROFIT OF THE CURRENT ENERGETIC BASE (ADVANCED TECHNOLOGIES, COGENERATION, CCS, others)
• DIVERSIFICATION OF THE ELECTRICITY GENERATION STRUCTURE BY INTRODUCING NUCLEAR ENERGY
• DEVELOPMENT OF THE USE OF RENEWABLE ENERGY SOURCES, INCLUDING BIOFUELS
• MODERNIZATION OF THE TRANSMISSION INFRASTRUCTURE
• DEVELOPMENT OF THE COMPETITIVE FUEL AND ENERGY MARKETS
• REDUCTION OF THE ENVIRONMENTAL IMPACT OF THE POWER INDUSTRY.

INTERNATIONAL, NATIONALL AND LOCAL LEVELS
Key Actors to be Involved

RESPONSIBLE BODIES

- MINISTER COMPETENT FOR THE ECONOMY
- MINISTER COMPETENT FOR THE TREASURY
- BODY DESIGNATED BY THE ACT ON ENERGY EFFICIENCY
- PRESIDENT OF THE ENERGY REGULATORY OFFICE
- COMMUNES
- PROVINCE AUTHORITIES
- MINISTER COMPETENT FOR CONSTRUCTION, SPATIAL AND HOUSING MANAGEMENT
- MINISTER COMPETENT FOR PUBLIC FINANCE
- MINISTER COMPETENT FOR ENVIRONMENT
- MINISTER COMPETENT FOR FOREIGN AFFAIRS
- MINISTER COMPETENT FOR REGIONAL DEVELOPMENT
- MINISTER COMPETENT FOR SCIENCE
- NATIONAL FOUN FOR ENVIRONMENTAL PROTECTION AND WATER MANAGEMENT
- PRESIDENT OF THE GOVERNMENT LEGISLATION CENTRE
Key Actors to be Involved

COMMERCIAL ENTITIES RECOMMENDED FOR IMPLEMENTATION

- POWER ENTERPRISES
- COAL COMPANIES
- COMMERCIAL ENTERPRISES
- BANKING SECTOR
- PGNiG SA
- OGP GAZ SYSTEM SA
- POLSKIE LNG Sp. Z O.O.
- SEA PORT MANAGING COMPANIES.
- OPERATORS OF TRANSMISSION, STORAGE AND DISTRIBUTION SYSTEM
- INTERNATIONAL PIPELINE COMPANIES
- OIL SECTOR COMPANIES
- INVESTORS SELECTED TO BUILD NUCLEAR POWER PLANTS
- ELECTRICITY SELLERS AND ENTITIES MANAGING TRADING PLATFORMS
- OPERATORS OF GAS SYSTEMS
- FUEL SECTOR COMPANIES
Timeline

2009 – 2012

• LEGISLATIVE CHANGES INCLUDING IMPLEMENTATION OF THE POLISH NUCLEAR POWER PROGRAMME
• SUPPORTING RESEARCH AND DEVELOPMENT ON NEW SOLUTIONS AND TECHNOLOGIES
• FINANCIAL ENGINEERING OF INVESTMENT
• BEGINNING OF INVESTMENT PROJECTS

2013 – 2016

INVESTMENTS – REALIZATION OF PROJECTS

• ENERGY SECTOR (GENERATION)  av.  25 BLN Euro
• MINING SECTOR               av.    6 BLN Euro
### BASIC INDICATORS OF ENERGY POLICY

<table>
<thead>
<tr>
<th></th>
<th>BASELINE</th>
<th>EXPECTED VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VALUE 2007</td>
<td>BY 2030</td>
</tr>
<tr>
<td>ANNUAL av. CHANGE IN PRIMARY ENERGY CONS. %</td>
<td>2,7</td>
<td>&lt; 1</td>
</tr>
<tr>
<td>HARD COAL AND LIGNITE EXTRACTION – RATIO %</td>
<td>105</td>
<td>100</td>
</tr>
<tr>
<td>MAX SHARE OF GAS AND CRUDE OIL</td>
<td>85</td>
<td>&lt; 73</td>
</tr>
<tr>
<td>SHARE OF NUCLEAR ENERGY</td>
<td>0</td>
<td>&gt; 10</td>
</tr>
<tr>
<td>SHARE OF RENEWABLE ENERGY</td>
<td>7,7</td>
<td>&gt; 15</td>
</tr>
<tr>
<td>ANNUAL EMISSION CO2 REDUCTION</td>
<td>0,95</td>
<td>0,70</td>
</tr>
</tbody>
</table>
Areas where Assistance Needed

- NUCLEAR POWER PLANTS CONSTRUCTION AND EXPLOITATION - INCLUDING EDUCATION OF PERSONNELS
- CLEAN COAL ADVANCED TECHNOLOGIES
- CCS TECHNOLOGY
- SMART GRIDS
- FINANCING
## Country Action Plan Summary

<table>
<thead>
<tr>
<th>Current obstacles and challenges</th>
<th>Opportunities</th>
<th>Key Actions Required/Objectives</th>
<th>Key Actors to be Involved</th>
<th>Timeline</th>
<th>Areas of Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Focal Point Contact Information

Leon Kurczabinski/Ph D:
Email: l.kurczabinski@khw.pl

Tel: 0048327573178
Fax: 0048327573040
TURKISH ENERGY SECTOR

UNECE-e8-EBRD-WEC
Fostering Investment in Electricity Generation in
Central and Eastern Europe and Central Asia

Hayati CETİN
Deputy of General Director
Ministry of Energy and Natural Resources

Geneva, Switzerland
November 22-24, 2010
OUTLINE

• Energy Policy, Strategies – energy security –

• Legislations, Market Regulations

• Renewable Developments in the Sector – hydro-wind-biomass ...

• Energy power plants,

• Conclusion
Highlights on Past Decade

OVER THE LAST DECADE

• Rapidly growing economy,

• The economy expanded on average by 4.9% a year 2000-2007,

• The 17th largest economy of the world.

• Turkey’s total primary energy supply (TPES) was 99.5 million tonnes of oil equivalent in 2008.

• From 1990 to 2008, TPES increased by 87%, while the economy doubled.

• Turkey depends on imports for 73% of its TPES, including for practically all oil and natural gas and most coal.

• in 2009, Total final electricity demand reached 196 TWh. Demand has grown very rapidly in the past two decades.

• Strong growth particularly from 2001 to 2008, averaging 8.8% per year
Strategies in The Energy Sector: “Major Aspects”

- Further diversification in primary energy supply, in terms of energy sources, imports, technologies and infrastructures
- Development of renewable and introduction of nuclear power
- Competition oriented market structures in electricity, natural gas and petroleum sectors
- Energy efficiency along the supply-demand chain
- Mitigation of GHG emissions from the energy sector
- Oil and gas pipelines (domestic and cross-border)
- & electricity interconnections
Since taking effect of Law No. 4628 on March 3, 2001, our country has taken substantial steps toward creating a competitive and functioning market in the electricity energy sector, restructuring public institutions operating the sector, and implementing those market rules that will ensure liberalization of the sector.


*Liberalization in the electricity energy sector,* the main purpose of the restructuring initiative is to create an investment environment which allows for those investments that are required for supply security, and to reflect onto consumers all gains that will be made through efficiency increase to be brought about by a competitive environment.
Legislation (1/3)

- **2001**:  
  - Electricity Market Law (No: 4628)  
  - Natural Gas Market Law (No: 4646)

- **2003**:  
  - Petroleum Market Law (No: 5015)

- **2004**: Strategy Paper as Road Map of the Electricity Market Reform & Transition

- **2005**:  
  - LPG Market Law (No: 5307)  
  - Law on Utilization of Renewables in Electricity Generation

- **2007**:  
  - Energy Efficiency Law (No: 5627)  
    - Amendments to the Law on Utilization of Renewables in Electricity Generation

- **2007**: Geothermal Law (No: 5686)

- **2007**: Nuclear Investments Law (No: 5710)

- **2008**: Significant Amendments to the Electricity Market Law (No: 5784)

- **2009**: **Strategy Paper on Electricity Market Reform, & Security of Supply**  
  - Draft Amendments to the Law on Utilization of Renewables in Electricity Generation
Definitions and Abbreviations.

“Renewable Energy Sources” means such non-fossil energy sources as hydro, wind, solar, geothermal, biomass, biogas, wave, flow and tidal energy.

“Biomass” means the solid, liquid or gaseous fuels obtained from organic wastes agricultural and forestry products including waste products of agricultural harvesting and vegetal oil waste as well as from the by-products formed after their processing.
The legal framework for promoting electricity generation from renewable sources and include the following main instruments:

- Feed-in tariffs and purchase obligations
- Reduced license fees
- Connection priority
- Reduced fees related to project preparation and land acquisition
- Since 2007, all these support mechanisms are in force for ten years.
- License obligation exemptions for small-scale generators
- The tariff: EUR 5.5 cent per kWh.
Strategies in The Energy Sector-1

• **OBJECTIVE AND PRINCIPLES**

To ensure delivery of electricity, which plays an undisputable role in our economic and social lives, to consumers in an adequate, high-quality, uninterrupted, low cost, and environment-friendly manner.

Efforts will continue for creating a competitive market; effectiveness will be brought to initiatives aiming at making new demand-driven electricity production investments sustainable, compatible with market structure, and harmonized with resource priorities of energy policy;

Measures will be taken to ensure that electricity transmission and distribution services are offered at such quality and in such amounts as to guarantee consumer satisfaction;

• Production and distribution privatizations, which are among tools for creating a competitive market, will be finalized;

• A competitive electricity energy market which functions according to free market rules will be created.

• Physical integration with the EU internal energy market
  – Harmonization
Strategies in The Energy Sector-2

In structuring of the electricity energy sector, and functioning of the market, the following principles will be adhered to:

- Creation and maintenance of market structure and market activities in a way to ensure supply security;

- Toward the target of creating a sustainable electricity energy market, taking into consideration climate change and environmental impacts in activities in all areas of the industry;

- Minimizing losses during production, transmission, distribution and utilization of electricity energy; increasing efficiency; reducing electricity energy costs by building a competitive environment based on resource priorities of energy policy; and using such gains to offer more reasonably priced electricity service to consumers;

- Encouraging new technologies, ensuring diversity of resources, and maximum use of domestic and renewable resources in order to reduce external dependency in energy supply;

- Increasing the share of domestic contribution in investments to be made in the sector.
Adequacy of the transmission infrastructure is one of the most important factors for ensuring electricity supply security and maintaining a well-oiled electricity market.

In order to allow for connection of ongoing and future production investments to the network, required budget appropriations will be made with priority and in line with the transmission planning to be made by TEIAS. For reducing system losses and increasing system reliability, transmission pricing will take into account regional supply-demand balances with the exclusion of production facilities based on natural resources; and in order to ensure an increase of production in regions with intensive consumption, transmission tariffs will be encouraging for power plants to be built in those regions that are in high need of production.

**INTERCONNECTIONS WITH NEIGHBORING COUNTRIES, CONNECTION TO THE EUROPEAN TRANSMISSION NETWORK (UCTE), AND IMPORTS/EXPORTS**

In order to improve our electricity import and export potential, international transmission connections to neighboring countries will be made, and their capacities will be improved.
RESOURCE UTILIZATION TARGETS
To increase share of domestic resources in production of electricity energy. To that end, measures for directing the market will be taken in order to encourage the use of domestic resources.

DOMESTIC LIGNITE AND HARD COAL
Proven lignite deposits and hard coal resources will be put to use by 2023 in electricity energy generation activities. To that end, efforts will continue for making good use of exploitable domestic lignite and hard coal fields in electricity generation projects.

NUCLEAR ENERGY
Activities initiated for use of nuclear power plants in electricity generation will continue. Our target is to increase the share of these power plants in electricity energy up to at least 5% by the year 2020, and to increase it even further in the longer run.
SHARE OF RENEWABLE ENERGY RESOURCES IN PRODUCTION OF ELECTRICITY ENERGY

To ensure that the share of renewable resources in electricity generation is increased up to at least 30% by 2023. This target will be subject to revision based on potential developments in technology, market, and resource potential.

*Long term works* will take into consideration the following targets:

- **HYDROELECTRIC**
  - by 2023, that our technically and economically available hydroelectric potential is entirely put to use in electricity generation.

- **WIND**
  - To increase installed wind energy power to 20,000 MW by the year 2023.

- **GEOTHERMAL**
  - To ensure that our geothermal potential of 600 MW, which is presently established as suitable for electricity energy production, is entirely commissioned by 2023.
**SOLAR**

To generalize the use of solar energy for generating electricity, ensuring maximum utilization of country potential. Regarding the use of solar energy for electricity generation, technological advances will be closely followed and implemented. Law No. 5346 will be accordingly amended in order to encourage generation of electricity using solar energy.

**OTHER RENEWABLE RESOURCES**

Preparation of production plans will take into account potential changes in utilization potentials of other renewable energy resources based on technological and legislative developments, and in case of increases in utilization of such resources, share of fossil fuels, and particularly of imported resources, will be reduced accordingly.

**NATURAL GAS**

Through measures for utilization of our domestic and renewable resources, share of natural gas in electricity generation will be reduced down to below 30%.

**IMPORTED COAL**

While domestic and renewable resources are given precedence in meeting the need for electricity energy, power plants based on high-quality imported coal will also be made use of, taking into consideration supply security and developments in utilization of such resources.
EFFICIENCY AND SAVINGS

Toward the goals of ensuring energy supply security, reducing risks associated with external dependency, increasing the effectiveness of fight against climate change, and protecting the environment, it is important that we increase efficiency from the production to the consumption of energy, that we prevent waste, and reduce energy intensity both on sector basis and at a macro level.

Regulatory work relating to enhancement of energy efficiency at electricity production facilities and along transmission and distribution networks; demand side management; open area lighting; and generalization of high-efficiency cogeneration applications will be performed by ETKB.

PRIVATIZATION OF PRODUCTION FACILITIES

Privatization of production facilities aims at enhancing the electricity production capacity, increasing the availability of existing production facilities, increasing capacity utilization factors, and mobilization of private sector resources for increasing competition across the sector.

In determining the privatization method, consideration will be given to performing the rehabilitations needed by existing power plants, and to making new investments for increasing installed power at facilities with sufficient fuel resources.
Firewood was the largest source of heat from renewable sources. 5.0 Mtoe of firewood was used for residential heating in rural areas. In 2008, the use of fuel wood for heating slowly declining,
Primary energy demand will increase by 160% by 2020

Import Dependency will keep its level of over 70%
• Generation was expected to increase by some 300 TWh from 2008 to 2020.

• New scenario will be updated in the near future on the basis of new targets included the May 2009 Electricity Market and Security of Supply Strategy.

• The strategy foresees
  – rapid economic growth and
  – large increases in supply from the currently dominant sources, especially hydropower and lignite, also from wind and nuclear power, a new entrant-to-be to the power mix.
## Generation Capacity-Electricity

### 24 Nov 2010

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity MW</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>15292</td>
<td>250</td>
</tr>
<tr>
<td>Thermal</td>
<td>31543</td>
<td>289</td>
</tr>
<tr>
<td>Wind</td>
<td>1228</td>
<td>36</td>
</tr>
<tr>
<td>Jeothermal</td>
<td>94</td>
<td>6</td>
</tr>
<tr>
<td>Waste</td>
<td>98</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>48254</strong></td>
<td><strong>596</strong></td>
</tr>
</tbody>
</table>

### THE YEAR-END 2009

<table>
<thead>
<tr>
<th>Energy source</th>
<th>Generation, TWh</th>
<th>Share, %</th>
<th>Capacity, MW</th>
<th>Share, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural gas</td>
<td>94.4</td>
<td>48.6</td>
<td>16</td>
<td>345.2</td>
</tr>
<tr>
<td>Domestic coal</td>
<td>42.2</td>
<td>21.7</td>
<td>8 691.3</td>
<td>19.4</td>
</tr>
<tr>
<td>Imported coal</td>
<td>12.8</td>
<td>6.6</td>
<td>1 921.0</td>
<td>4.3</td>
</tr>
<tr>
<td>Hydropower</td>
<td>35.9</td>
<td>18.5</td>
<td>14 553.4</td>
<td>32.5</td>
</tr>
<tr>
<td>Liquid fuels (oil)</td>
<td>6.6</td>
<td>3.4</td>
<td>2309.7</td>
<td>5.2</td>
</tr>
<tr>
<td>Wind, geothermal, biogas</td>
<td>2.2</td>
<td>1.1</td>
<td>961.2</td>
<td>2.1</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>194.1</strong></td>
<td><strong>100</strong></td>
<td><strong>44 782</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Turkey has been using decentralised energy since early 90ies; 2005-2010 period has been a milestone.
### 24 Nov 2010, Installed Capacity - MW

<table>
<thead>
<tr>
<th>Type</th>
<th>Capacity MW</th>
<th>Plant num</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas</td>
<td>1,20</td>
<td>2</td>
</tr>
<tr>
<td>Waste</td>
<td>15,566</td>
<td>3</td>
</tr>
<tr>
<td>Gas</td>
<td>1571,668</td>
<td>20</td>
</tr>
<tr>
<td>Hydro</td>
<td>754,518</td>
<td>45</td>
</tr>
<tr>
<td>Export cola</td>
<td>760,000</td>
<td>1</td>
</tr>
<tr>
<td>Jothermal</td>
<td>17,000</td>
<td>2</td>
</tr>
<tr>
<td>Lignite</td>
<td>30,000</td>
<td>2</td>
</tr>
<tr>
<td>Wind</td>
<td>436,000</td>
<td>15</td>
</tr>
<tr>
<td>Gas/fueloil/Fo</td>
<td>10,000</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3595,948</strong></td>
<td><strong>91</strong></td>
</tr>
</tbody>
</table>
Installed capacity requirement (2020)

High scenario

• ~ 57,000 MW additional capacity needed

Low scenario

• ~ 41,000 MW additional capacity needed
THE NUMBER of POWER PLANT LICENCESES in PIPELINE BY SOURCES: TOTAL 638  (30359 MW)

In place : 550  46 500 mw
In pipeline : 638    30 359 mw

The Total Number of Licenses:

- Fossil: 65
- Hydro: 490
- Wind: 67
- Bio-gas: 65
- Bio-mass: 3
- Landfill gas: 3
- Geothermal: 2
Domestic Generation Potential

Under high import dependency and volatile fuel prices, local energy production options: coal, renewable

<table>
<thead>
<tr>
<th>Resource</th>
<th>Potential (MW)</th>
<th>In place</th>
<th>Remaining, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lignite</td>
<td>17,470</td>
<td>8,111</td>
<td>54</td>
</tr>
<tr>
<td>Hardcoal</td>
<td>1,535</td>
<td>335</td>
<td>78</td>
</tr>
<tr>
<td>Hydro</td>
<td>35,440</td>
<td>13,602</td>
<td>62</td>
</tr>
<tr>
<td>Wind</td>
<td>20,000</td>
<td>1,000</td>
<td>96</td>
</tr>
<tr>
<td>Geothermal</td>
<td>500</td>
<td>90</td>
<td>82</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td><strong>73,008</strong></td>
<td><strong>23,138</strong></td>
<td></td>
</tr>
</tbody>
</table>

Biomass: 1,5-2 mtoe
“Targets for the electricity generation mix by 2023”

- renewables in electricity generation ➔ at least %30
  - wind installed capacity ➔ 20.000 MW

- introduction of nuclear power ➔ at least %5

- utilization of the remaining hydro and lignite reserves

2000-2007: Per cent increases in electricity and gas consumption
Kurulu Gücü 15MW'yi düşük olan izole kömür santralları dikkate alınmamıştır. (Toplam Kurulu Gücü: 172 MW)
Hydro-power Licences

- 2007: 1
- 2008: 3
- 2009: 30
- 2010: 112
- 2011: 147
- 2012: 70
- 2013: 114
- 2014: 21
- 2015: 3
- 2016: 4
HYDRO-POWER PROJECTS IN TRABZON
### HYDRO POWER PLANT PROJECTS in RİZE

<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adacami HES</td>
<td>35.76</td>
</tr>
<tr>
<td>Ambarlık HES</td>
<td>9.45</td>
</tr>
<tr>
<td>Ar Any HES</td>
<td>9.45</td>
</tr>
<tr>
<td>Ayasal Regulator ve HES</td>
<td>2.63</td>
</tr>
<tr>
<td>Başköy Reg. ve HES</td>
<td>14.78</td>
</tr>
<tr>
<td>Cevizlik HES</td>
<td>10.40</td>
</tr>
<tr>
<td>Çatak Reg. ve HES</td>
<td>10.50</td>
</tr>
<tr>
<td>Giderli Regulator ve HES</td>
<td>2.51</td>
</tr>
<tr>
<td>Dikmen Regulator ve HES</td>
<td>25.53</td>
</tr>
<tr>
<td>Durankaya HES</td>
<td>24.24</td>
</tr>
<tr>
<td>Gümrük Reg. ve HES</td>
<td>28.53</td>
</tr>
<tr>
<td>Incirli Regulator ve HES</td>
<td>39.15</td>
</tr>
<tr>
<td>Karaağaç Reg. ve HES</td>
<td>41.50</td>
</tr>
<tr>
<td>Koyalar HES</td>
<td>1.26</td>
</tr>
<tr>
<td>Paşalar HES</td>
<td>11.73</td>
</tr>
<tr>
<td>Rüzgarlı ve II HES</td>
<td>10.13</td>
</tr>
<tr>
<td>Selin I HES</td>
<td>23.00</td>
</tr>
<tr>
<td>Selin II HES</td>
<td>25.00</td>
</tr>
<tr>
<td>Tepe HES</td>
<td>15.00</td>
</tr>
<tr>
<td>Turhan HES</td>
<td>9.44</td>
</tr>
<tr>
<td>Uzundere I HES</td>
<td>20.42</td>
</tr>
<tr>
<td>Uzundere II HES</td>
<td>43.68</td>
</tr>
<tr>
<td>Yeşilköy Reg. ve HES</td>
<td>34.00</td>
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<td>Yokuşu Kalkandere HES</td>
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Conclusions

• A window of opportunity now exists to push for a cleaner and more efficient generation portfolio that will have significant impact on the energy sector and the environment in the coming decade in Turkey.

• The recent liberalization of markets delivers considerable benefit.

• Government significantly reduces regulatory uncertainty.

• Power plant licensing procedures and approval of new generation units are clear and simple.
Thank you for your attention!

hcetin@enerji.gov.tr
hycetin@gmail.com