South East Europe Regional Electricity Market

Belgrade, 01 November 2007
Main Purpose of the presentation

- Brief info on the energy sector of the Western Balkans about the present energy situation in SEE region (Generation adequacy in SEE)
- To present indicatives for energy demand in SEE till 2016 (results of GIS update)
- To present actual situation in electricity transmission grid in SEE
- To present regulatory initiatives on TSOs mechanisms, developed by SEE TSOs and their consultants, which are essential prerequisite for SEE regional electricity market creation and opening of individual SEE electricity markets
- To explain each TSOs mechanism’s goal, purpose, status of play and time scale for its real implementation, which will support, enable and enhance opening of the market
- To present regulatory involvement and impact within the process and other stakeholders participation
Contents

- Intro: Energy situation and perspective in SEE
- Organizational framework: ECRB EWG and CAO IG, WG Customer Protection
- Scope of work - Electricity Working Program
- Electricity Issues - Status of play:
  - Congestion Management
  - Inter TSO Compensation
  - Regional Balancing
  - Wholesale Market Opening
Generation and Transmission Adequacy in SEE region
# SEE Generating Sources - 2005

<table>
<thead>
<tr>
<th>Source</th>
<th>Total</th>
<th>42.8 GW</th>
<th>167 TWh</th>
<th>100 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydro</td>
<td>HPP+PS</td>
<td>18.2</td>
<td>47.6</td>
<td>28.5</td>
</tr>
<tr>
<td>TPP</td>
<td>Lignite + Brown coal</td>
<td>12.8</td>
<td>74.6</td>
<td>44.7</td>
</tr>
<tr>
<td></td>
<td>Coal domestic and imported</td>
<td>3.7</td>
<td>18.4</td>
<td>11.0</td>
</tr>
<tr>
<td></td>
<td>Oil</td>
<td>2.7</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td></td>
<td>Gas</td>
<td>1.8</td>
<td>2.8</td>
<td>1.7</td>
</tr>
<tr>
<td>Nuclear</td>
<td></td>
<td>3.5</td>
<td>23.4</td>
<td>14.0</td>
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</tbody>
</table>
SEE Peak demand and sources: 2005-2020

[Graph showing the trend of capacity (GW) from 2005 to 2020, with categories for Hydro, Nuclear, Imported Coal, Lignite+Brown Coal, Coal, Gas, Oil, and Peak Load.]
# Results of GIS Update

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Rehab (MW)</th>
<th>New (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Official plan:</td>
<td>11,574</td>
<td>11,000</td>
</tr>
<tr>
<td>Baseline Justified:</td>
<td>9,361</td>
<td>12,696</td>
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<tr>
<td>High electricity imports</td>
<td>9,361</td>
<td>6,936</td>
</tr>
<tr>
<td>High oil/gas prices:</td>
<td>10,061</td>
<td>12,494</td>
</tr>
<tr>
<td>Low oil/gas prices:</td>
<td>6,814</td>
<td>14,712</td>
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<tr>
<td>€20/ton of CO2:</td>
<td>4,573</td>
<td>16,634</td>
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<tr>
<td>€30/ton of CO2:</td>
<td>Zero</td>
<td>21,259</td>
</tr>
<tr>
<td>High gas/CO2 prices</td>
<td>10,061</td>
<td>13,926</td>
</tr>
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</table>
SEE Generation mix in 2020

Official Rehabilitation

- Nuclear: 14.8%
- Hydro: 20.0%
- Pumped-storage: 0.3%
- Imported Coal: 10.2%
- Coal: 4.4%
- Gas: 3.7%
- Fuel Oil: 0.3%
- Lignite: 46.3%

Justified Rehabilitation

- Nuclear: 14.8%
- Hydro: 20.0%
- Pumped-storage: 0.5%
- Imported Coal: 11.5%
- Coal: 3.3%
- Gas: 4.9%
- Fuel Oil: 0.2%
- Lignite: 44.8%
State of play on Generation in SEE

- There is lack of energy in SEE region (present generation vs. consumption growth)
- South of SEE is facing the greatest energy deficit (Albania, Greece, Montenegro, FYROM, UNMIK)
- Clear indicatives for consumption/energy demand growth from 2005-2020

Clear conclusions:

- There is an urgent need for generation capacities investments in SEE region
- Lack of energy in SEE is provided through electricity import (present and in near future)
- High Electricity Import prices (40-45 €/MWh vs. 70-80 €/MWh in SEE)
Situation in Electricity Transmission Grid in SEE region

- Huge Electricity imports in SEE started in 2007 (due to NPP Kozlodyi closure of 2 units, 2x440 MW, in January 2007)
- Huge Electricity Transit flows from North (energy sources) to South (area which faces deficit)
- National Electricity Transmission grids (interconnection and internal lines) were not designed for such immense transits from North to South in SEE region
- Therefore, SEE region is facing congestions on almost all electricity borders

**Clear Conclusions:**

- There is an urgent need for investment in:
  - Construction of new interconnection lines, which are congested
  - Construction of new internal lines, which have influence on congestions
  - Upgrade or rehabilitation of the existing OHLs and internal grid
- Thus, the larger electricity flows in SEE would be enabled
Final Goals

- Creation of SEE Regional Electricity Market and its inclusion within EU Internal Electricity Market
- Opening of Electricity Market in all SEE countries, including Serbia
- Provide reliable and secure electricity supply for over 50 million people (consumers) in SEE
ECRB WGs
Organizational framework
ECRB EWG
Activities and Tasks
Congestion Management
Transmission Capacity Allocation

- Elaboration of the Coordinated flow based transmission capacity auctions mechanism in SEE through the joint work with other stakeholders, donors and consultants (ETSO/SETSO TF, EFET, EURELECTRIC, EBRD, USAID, CONSENTEC, APCS)
- Resolving technical, financial and legal issues relevant for developing the joint coordinated mechanism for transmission capacity allocation within SEE
- Evaluation of results of Coordinated Auctions (CA) Dry-run and consequent implementation in cooperation with ETSO/SETSO TF
Inter TSO Compensation (ITC) mechanism

- Establish one single ITC mechanism within EU pursuant to the Comitology procedure
- Single EU-SEE ITC fund was created in June 2007
- Monitor ITC process
- Cooperation with ETSO/SETSO TF
- Looking forward for ITC Guidelines
Regional Balancing Mechanism (RBM)

- Assessment Report and concept paper of way forward on regional balancing
- Cooperation with ETSO/SETSO TF on development and implementation of the regional balancing energy mechanism
Elements of Market Design in SEE

- Elements of Market Design in SEE
- Proposals on effective wholesale market opening as of 1 January 2008 with a particular focus on virtual power plant auctions (CIDA/SEETEC proposals)
- Generation Adequacy Capacity support mechanism in SEE
- Regional planning for transmission networks in SEE (ETSO-SECI project)
- Market Monitoring in SEE (USAID Pilot Project)
- Trading Licenses harmonization in SEE
Progress with market design and regulatory initiatives under the Athens Forum

- SEE regional Regulators and TSOs are working to provide and enable the active and efficient market conditions for Electricity Market functioning in SEE
- New TSOs mechanisms were introduced as preconditions for efficient Electricity Market functioning and as initial elements of future SEE Market Design with clear goals:
  - ITC mechanism → remuneration for transits, usage of tr.grid)
  - Explicit Flow-based Coordinated Auctions of interconnected transmission capacities (CAO) → provide one step trading between SEE region towards other EU regions
  - Regional Balancing Mechanism → help TSOs operation and placement of short-term generation surpluses
ITC Mechanism in SEE region
SEE ITC History and Status of play

- Most of SEE TSOs signed a voluntary SEE CBT Agreement in July 2004, based on ETSO CBT Mechanism with minor specifications, while the SEE region was still disconnected from UCTE region; follow up in 2005 and 2006
- The voluntary Interim ITC June-December 2007 Agreement (merging) has been signed by TSO companies from 19 EU countries as well as Norway and Switzerland and, for the first time, Albania, Bosnia and Herzegovina, Croatia, FYROM, Montenegro and Serbia
- Constant work on ITC Common methodology; when agreed, ITC Guidelines will be defined
  - No fees or charges for transit any more
  - Facilitate electricity trade
  - Common ITC mechanism in place for SEE and EU (IEM)
Status of play

- Aim of actual Inter-TSO Compensation (ITC) Mechanism is to calculate costs for using other TSOs networks
- Apply sensitivity calculations to (based on snapshots):
  - Estimate impact of transmission grid flow of possible transactions
  - Find the electrical distances between the countries
- Assign Reference Exchanges (RE) between countries
  - Calculated based on a global minimisation of transit
- Allocate Compensation/Payment according to the use of individual components for each country
Explicit Flow-based Coordinated Auctions in SEE region
Goal and responsibilities

- Treaty on Energy Community sets aim of creating an international electricity market in South East Europe (SEE) in accordance with EU legal framework
- Among other tasks, establishing non-discriminatory, efficient and market-based procedures for cross-border congestion management (CM) is of high importance for achieving this aim
- Development of CM requires support from many stakeholders
  - TSOs: to develop concepts and make proposals
  - Consultants: to moderate and make recommendations
  - Regulators: to decide or approve
Methods for Capacity Allocation - Classification

<table>
<thead>
<tr>
<th>NTC based</th>
<th>Flow-based</th>
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</thead>
<tbody>
<tr>
<td>Explicit</td>
<td>Explicit</td>
</tr>
<tr>
<td>Implicit</td>
<td>Implicit, hybrid</td>
</tr>
</tbody>
</table>

- **NTC based**
  - Explicit:
    - First come, first served
    - Pro-rata rationing
    - Flexible auctions
  - Implicit:
    - Bilateral implicit auctions
    - Multilateral (Market splitting)

- **Flow-based**
  - Explicit:
    - Coordinated explicit auctions
    - Flow-based Market Coupling
  - Implicit, hybrid:
    - Open market coupling

- **Development trend**
  - “Rule”-based
  - Market-based (auctions)

- **Ongoing investigation in SEE region**

- **Proposal, Dry-run in SEE (SETSC)**

- **widely applied**
  - Bilateral (widely applied)
  - Coordinated (CZ, PL, D, SK)

- **proposals**
SEE CA Process Basic Info

- Explicit Flow-based Coordinated Auctions are in compliance with Regulation 1228/03
- Principles of Coordinated flow-based Auctions; feasibility…
- Dry-run of CA in SEE region and its results
- DrCAT web-based tool
- Coordinated Auctioning Office (CAO) issue – will contribute to market transparency in SEE
- Consultants recommendations (Consentec, APCS, H&W)
- SEE Regulators obligations concerning CA
- Electricity Traders obligations concerning CA
- Establishment of CAO Implementation Group
- Next steps; Realistic start of SEE CAO till end 2008?
Simulation of coordinated auction on monthly basis

Started in January 2006 (for March 2006)

8 TSOs participate in dry-run incl. Croatia + Turkey + neighbours in LF model

Rotation of the CAO role:

<table>
<thead>
<tr>
<th>Round</th>
<th>Who</th>
<th>Status</th>
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<tbody>
<tr>
<td>1</td>
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<td>2</td>
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<tr>
<td>4</td>
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<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>HTSO</td>
<td>✓</td>
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<tr>
<td>6</td>
<td>NOS BiH</td>
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<td>7</td>
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<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>TEL</td>
<td>✓</td>
</tr>
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</table>
Concept of Dry-run in SEE-Region

Participating Parties

- Trader
- TSOs

Explicit Bids for Capacity

settled Capacity

'Settlement'

→ Max. Cross Border Capacities

→ Load Flow (PTDF-Matrix)

Auction Office

- Each month another TSO is acting as an Auction Office
- Internet based Software DrCAT is used for clearing!

Participating TSOs in Dry-Run

Currently 9 TSOs are participating actively at the Dry-run!

Croatia announced its participation
Ongoing development in different Regions

CWE-Region:
- Project for Market Coupling (TLC → MLC)

CEE-Region:
- Coordinated explicit auctions

SEE-Region:
- Coordinated explicit flow-based auctions
Perimeter of SEE Co-ordinated allocation region

- Perimeter of SEE Co-ordinated allocation region and treatment of interconnection capacity over borders of SEE within neighbouring regions
- Recent entering in EU of Bulgaria and Romania brought request to revise current CM Guidelines
- Number of countries are currently evaluating their possible participation to SEE CA
- Considering current perimeter of Dry-run simulations, interface borders of SEE CA region with neighbouring regions are defined
Regulatory role

Regulators’ role

- Support and enforce CM development as part of implementation of Energy Community
- Approval of TSOs proposals related to organizational, commercial and legal aspects
- Verification of compliance with national legal framework and development schedules and with EU legal framework
Regulators responsibilities on CA revenues distribution modality

The issue of distribution and use of CA revenues is one of the critical issues that falls within regulatory duties, as it can have an effect on:

- TSOs interest in CA participation
- Transmission capacity that TSOs make available to the market
- Degree that regional cross-border trade and future market integration are facilitated
Regulation 1228/03 about CM revenue

CM revenue usage, foreseen by Regulation 1228/2003 is to:

- Relieve congestion by investment
- Guarantee availability of allocated capacity
- Reduce tariffs

→ related to fact that final consumers should benefit from congestion revenues
→ TSOs should accept the fact that congestion revenue is not their income for providing a service
→ Necessary to safeguard against giving TSOs questionable incentives to maintain congestion on their borders
SEE Regulators’ position concerning CA revenues distribution

Fundamental objectives of CA revenue distribution scheme:

- Give right incentives to TSOs to maximize transmission capacities they make available (ideally there should be no need to give incentives to TSOs through revenue distribution algorithm)
- Provide suitable signals with respect to indicating where congestion alleviation measures are mostly needed → to allocate revenue in relation to existence and value of congestion
- Provide incentives, or not impede network investment in congested areas
Consultants proposals on Distribution method

- Based on economic value « shadow price » model
- Based on Relative usage of interconnectors
  → Not appropriate methods
- Based on Absolute usage of interconnectors
- Based on Variants and weighting factors, « hybrid » models
  → Good basis for further work

- Focused only on TSOs stimulation how to increase BCs values – to report real BC values
- None Consultants’ proposals stimulates TSO investment in building new cross border capacities or increase of existing capacity volume
- There is no mechanism in place to stimulate TSOs to decide to make investment on its congested interconnectors and thus increase its capacity
Conclusions on Consultants’ proposals

SEE Regulators encourage SETSO NACMPF SG and Consultants Consentec/APCS to:

- Elaborate more in depth the « absolute usage » of interconnectors introducing weighting factors as a principle which could be an acceptable method for further testing and analyses.

- Provide complete mathematical formulation of interconnection clearing price calculation in order to allow a broad understanding and further discussion.

- Further testing of the method should include its application on the Dry-run auction results with the bids submitted by Traders.

- Consider “with or without netting” models when assessing which would be the most appropriate revenue distribution method.
Next steps on CA

- Start of the joint work between Regulators and TSOs within CAO Implementation Group
- Importance of defining the borders of the Co-ordinated Auction Office and consequently the perimeter countries to it
- The ECRB asked and EC announced that it considers establishing an 8th region by amending the Congestion Management Guidelines
- The non EU parties but contracting parties to the Energy Community will be integrated into the 8th region through the Energy Community Treaty
Congestion Management: Transmission Investment criteria; How to invest?

- To make investment on congested interconnectors and thus increase its capacity
- Network investments are mainly driven by operational network security reasons, but market issues are hardly considered in investment decisions
- Internal electricity network should be developed in order to resolve internal grid congestions and thus enable increase of interconnectors capacity; Invest in internal TSOs transm.grid!
- Overall objective: coordinated grid expansion contributing security and facilitating market integration irrespective whether an investment is “internal” or “cross border”
- Regional dimension (example): building concrete interconnector (SRB-MAK) in SEE region will provide discharging of existing congested interconnected lines (BUL-GR)
- Complexity of meshed SEE networks to take into consideration
Regional Balancing Mechanism in SEE region
RBM Final Goal

Based on TSOs concept (developed by SEE TSOs), the RBM final aim is:

- To increase margins of balancing resources for SEE TSOs
- TSOs obtain Balancing Energy (BE) in short period and under competitive market prices
- To help TSOs to obtain necessary tertiary reserve (fast and slow) easily (emergency help)
- To ensure safe, reliable and secure power system operation
- To reduce TSOs costs for obtaining BE
- To give opportunity to national market players to offer their short-term electricity surpluses via BETSEE/TSOs platform with lower prices
- RBM/BETSEE represents actual state of play of market participants offers for BE depending on real-time situation, introduced on BETSEE internet platform
Main issues related to RBM Proposal

- Efficiency of the RBM proposal
- Coexistence of RBM and national balancing mechanisms
- Cross-border capacities treatment
- Obstacles to RBM implementation to overcome (Legal and Technical requirements harmonization: remove limitations for RBM implementation)
- Financial elaboration
- Need for Centralized Office for RBM?
- Conclusions, further activities and ECRB recommendations
Regional Market Design in SEE
Status of Activities

- Several documents on SEE Market Design:
  - CEER WG SEE - “SMD papers” - 2003
  - Electricity Transition Strategy - 2005
  - SEE Market Options Paper - 2005
  - WB papers on development of regional trade (2004) and power market (2006)
  - SEETEC report on obstacles to trade (2006)
  - SEETEC - Proposals on Wholesale Market Opening and Compatibility (harmonization) of Market Rules
  - EnCS reports on regional market design
ECRB EWG views on RMD

Regional market design (RMD)
• REM- least cost option for sustainable development of national markets (compared to VPPs, generation divestment etc.)
• Defines targets of regional integration (bilateral contracts and/or DAM and/or balancing mechanism) - respecting the principle of subsidiarity
• EnCT just sets the level playing field, RMD aims to avoid creation of several isolated markets with unfavourable market structure for developing competition
• Resolving the issue of market concentration - dominant national players become small players in regional context

Minimum content of the market rules and compatibility
• Strongly dependent on the target market integration
• Further elaboration needed
• Compliant to the initiative of establishing the 8th region
Conclusions and Objectives
General Conclusions

- According to updated GIS there is an evident energy deficit in SEE region
- Electricity Import abilities in SEE are limited by congestions in SEE Transmission Grid
- Urgent need for both Generation and Transmission investments in the construction of new power plants and interconnectors in SEE
- SEE Regulators and TSOs are working on mechanisms which have to be developed in order to create the regional electricity market in SEE and enable opening of individual SEE electricity markets, with perspective to join internal EU electricity market
- Serbian Regulator is taking an active role within the process of TSOs mechanisms’ implementation in SEE region
- Regulatory initiatives are preparing good environment for Generation and Transmission Grid investments in SEE, as they have to facilitate trading and placement of electricity in SEE region
Overall Objective

- Single Regulatory Framework (including protection of investors) in EU, including SEE
- Operational Regional Institutions (ECRB, PHLG, Ministerial Council) in SEE
- Advanced Regional Mechanisms (ITC, CA and RBM underway) in SEE
- High Electricity Prices in SEE

Realisation of the General Main goal:
- Guarantee Safe and Reliable functioning of electric power system of SEE region within pan-European interconnected electric power system UCTE → respect technical rules
- Respect and use experiences from the black-outs in California, Canada, Italy, etc. → protect SEE region
- Ensure Security of Supply for all final consumers in SEE region
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