INOGATE

PROGRAMME FUNDED BY THE EU

Electricity Markets in the Eastern Partner Countries: Potentials and Challenges from a Regional Perspective

3rd WORKSHOP OF EASTERN PARTNERSHIP ENERGY REGULATORY BODIES

27 - 28 May 2014 – London

Contents of the Presentation

1. Regional Markets
   a. Where ?
   b. Why ?
   c. How ?

2. Situation in the INOGATE Partner Countries
   a. Eastern Europe
   b. Caucasus
   c. Central Asia

3. How INOGATE TECHNICAL SECRETARIAT might help?
   a. Operation of the Technical Expert Groups
   b. Cross Border Study
   c. Capacity Building Activities

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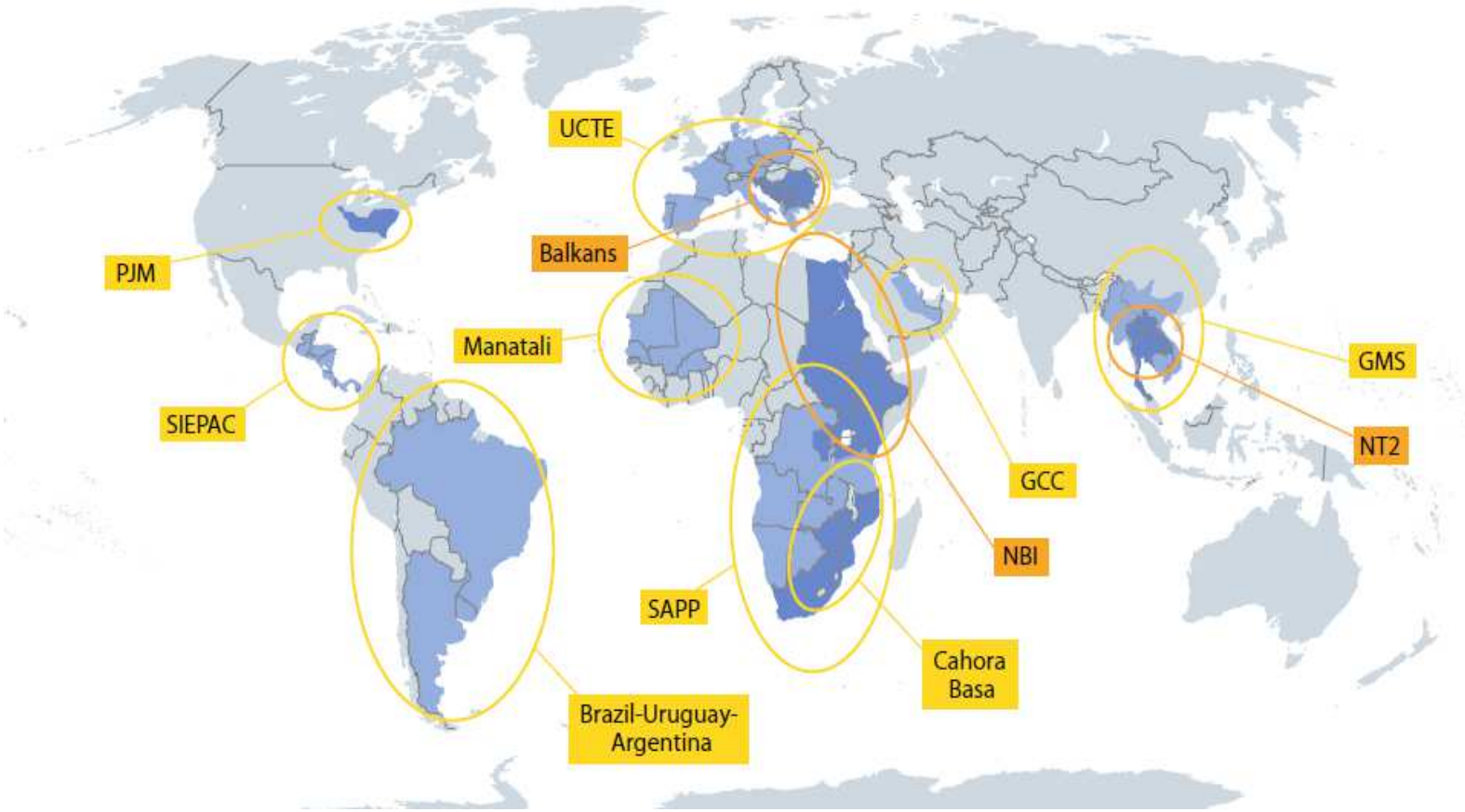
Regional Markets – We are not alone



Source: Regional Power Sector Integration, ESMAP, IBRD/WB, 2010

Various degrees of integration – A work in progress

Area of Regional Cooperation	Inter-connectivity	Trading Arrangements	Harmonisation	Planning and Investment	Examples
Interconnection	Typically starts with 2 countries, later a wider interconnected grid	Long-term bilateral PPAs	Simple rules agreed for the operation of the interconnected system	National planning and investment	Cahora Bassa, Manantali, NT2, GMS, Argentina-Brazil, GCC
Integration - Shallow	Interconnected grid involving a number of neighboring countries	Long-term bilateral PPAs with short-term markets	Harmonisation of rules, grid codes and transmission tariff	Some coordination of national investments with optimised regional investment plan	SAPP, SIEPAC
Integration -Deep	Full synchronous operation of a multi-country interconnected system	Competition achieved through a range of markets (spot, day-ahead, transmission capacity auctions, etc.)	Regional regulatory agencies, systems and markets operators	Regional integration body empowered to required investments in agreed regional plan to be implemented	PJM, ENTSO-E (former UCTE), SEE

Source: Regional Power Sector Integration, ESMAP, IBRD/WB, 2010

Regional Integration Benefits

Higher efficiency and (hopefully) lower environmental costs

- Efficient and environmental friendly generation replaces less efficient generation

Increase power system security

- larger systems are more robust against system contingencies if control areas are well coordinated

Increase security of supply

- primary energy sources are more diversified

Increase competition in generation and supply

- Wholesale market (increase size of the relevant market)
- Retail market (higher possibilities to choose supplier)

Regional Integration Barriers

Political and institutional barriers

- Political borders, national security, public opposition,
- Poor institutional structure, internal disunity, differing political systems, powerful interest groups, corruption

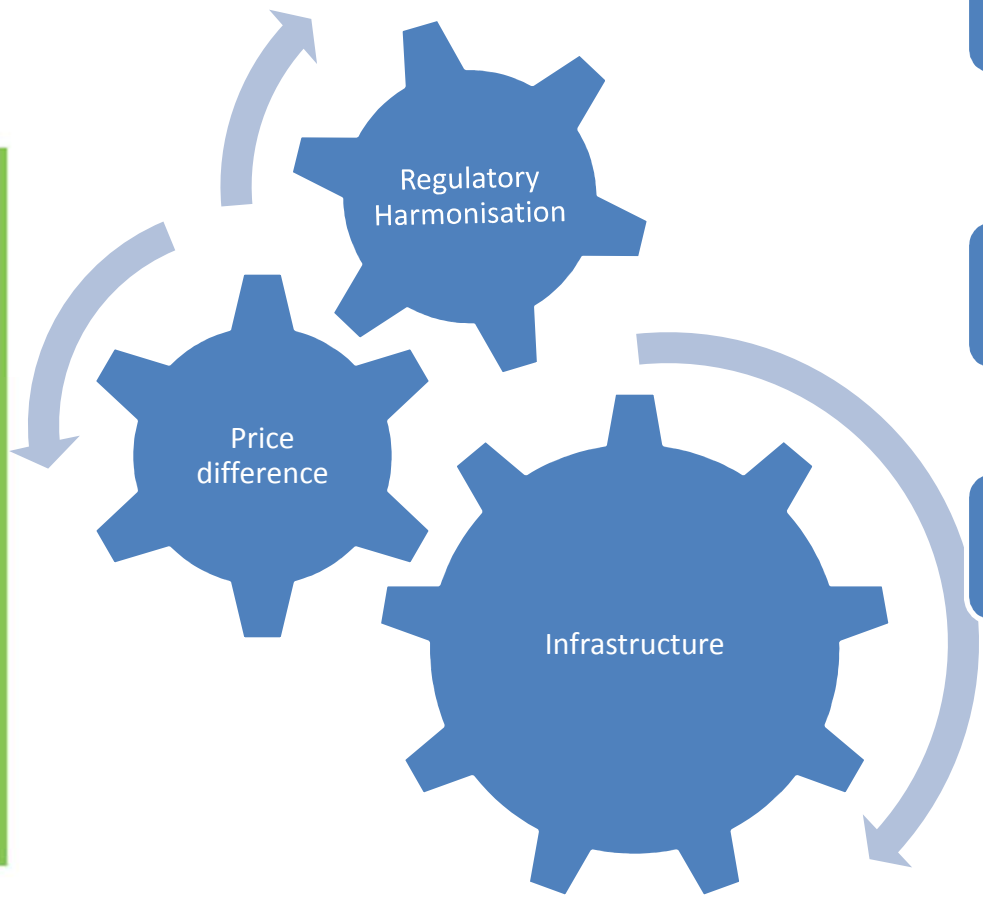
Natural and technical barriers

- Technical and economic feasibility of interconnection of transmission lines influenced by factors such as geography (distance, terrain)
- Barriers to trade i.e. lack of harmonisation on network access, pricing and congestion management, concentration, transparency and market structure (i.e. government restrictions, taxes & duties)

Environmental barriers

- important in the case of hydropower projects (displacements of population and disruption of natural ecosystems) and lengthy multinational transmission projects

Important elements to consider …



Infrastructure

- Generation Adequacy
- Transmission (incl. cross-border capacity)

Price Differences

- Cost of generation
- Peak demand coincidence

Regulatory Harmonisation (ERGEG 2006)

- Network operations
- Network capacity and investments
- Network access
- Transmission charging
- Market rules compatibility
- Network maintenance
- Cooperation between TSOs
- Transparency & Information exchange

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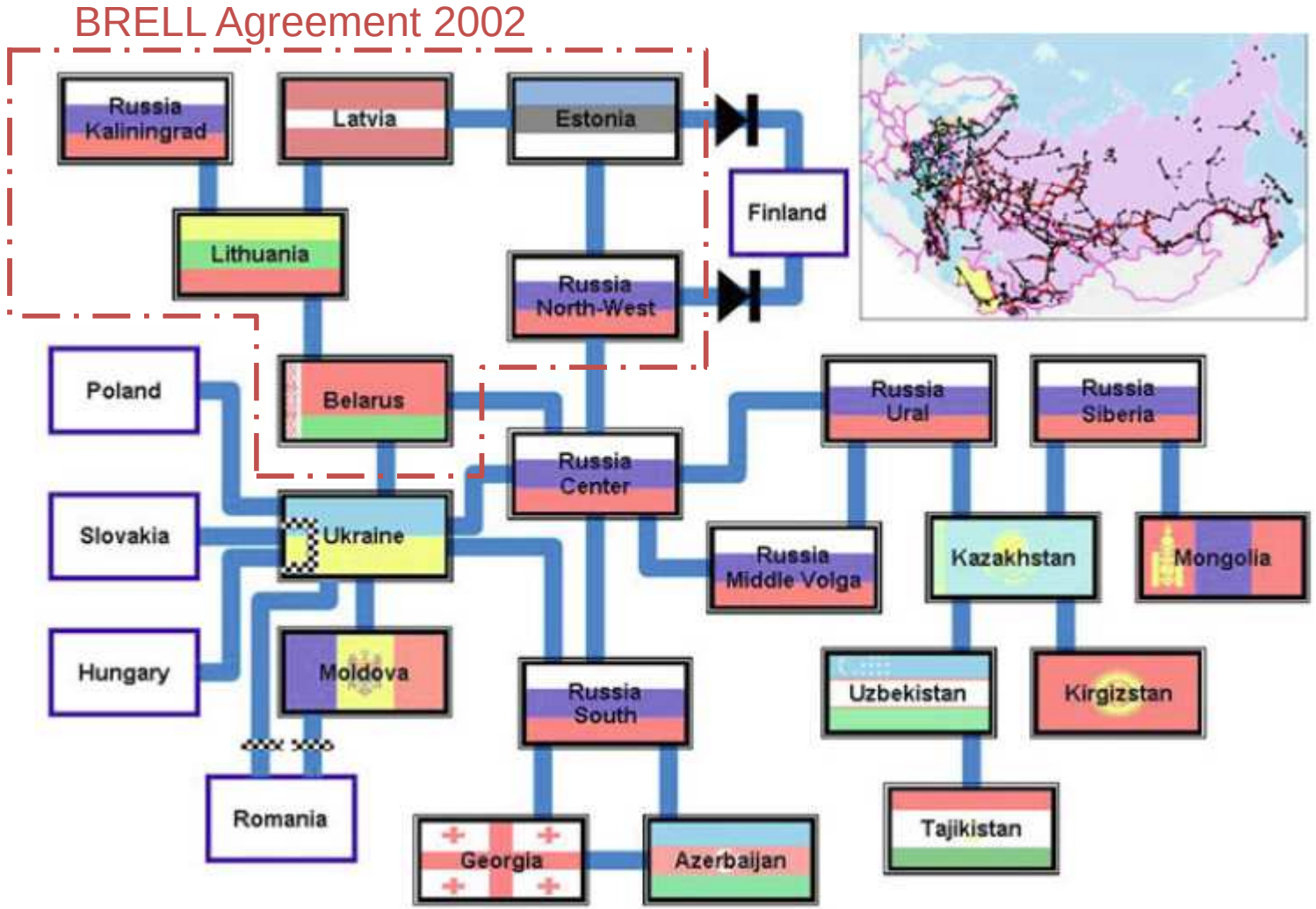
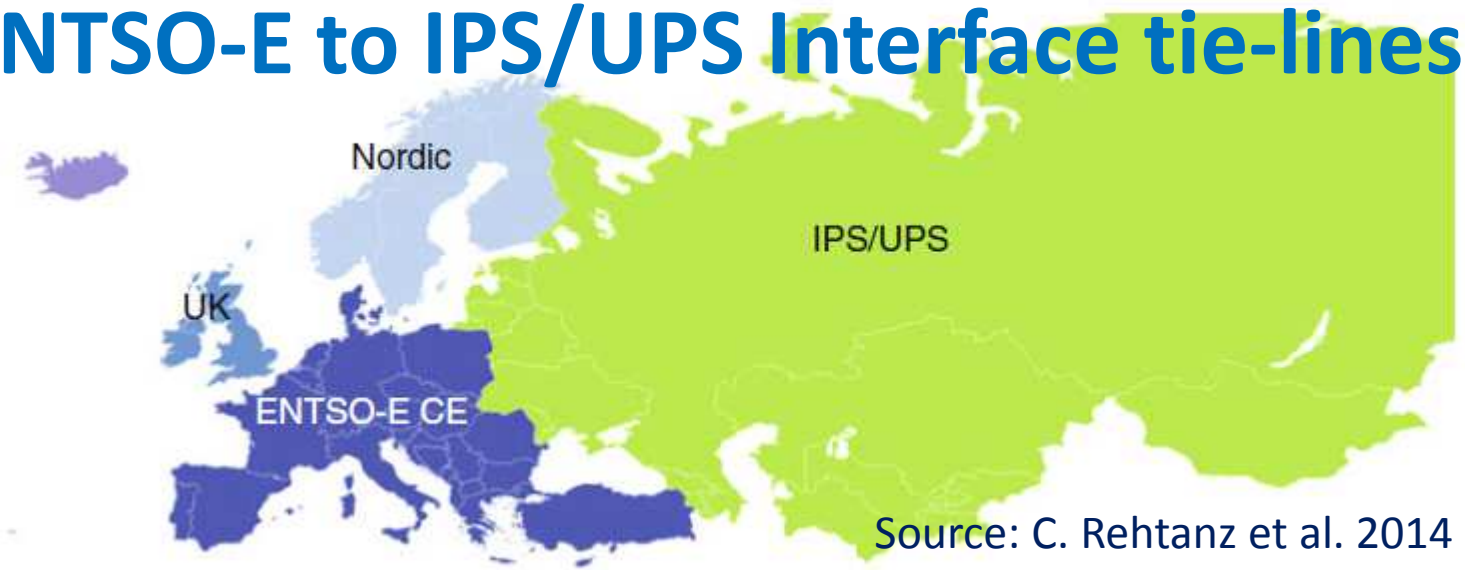
The structure of IPS/UPS and neighboring countries



Source: C. Rehtanz et al. 2014 & own BRELL representation

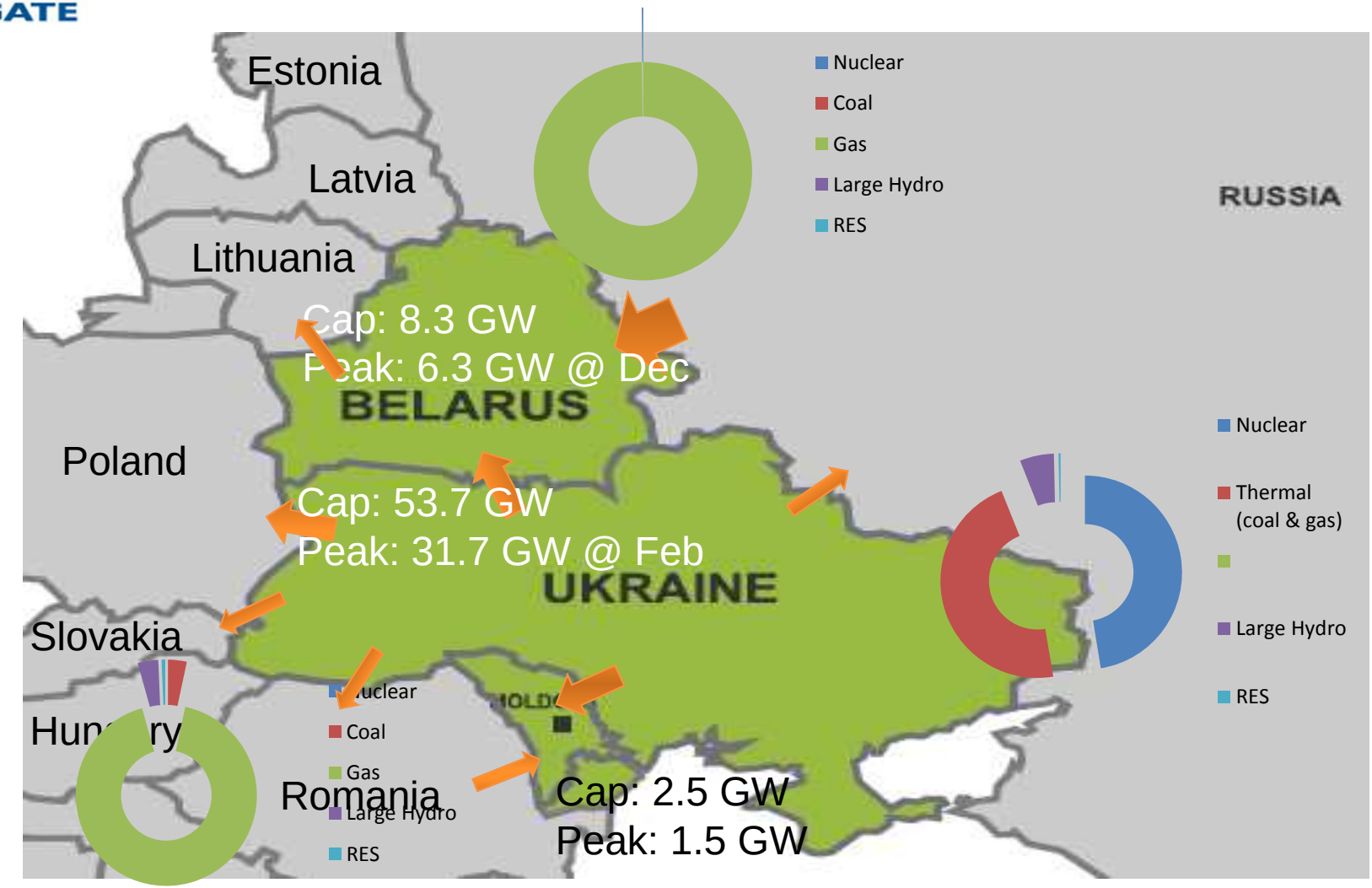
ENTSO-E to IPS/UPS Interface tie-lines



Source: C. Rehtanz et al. 2014

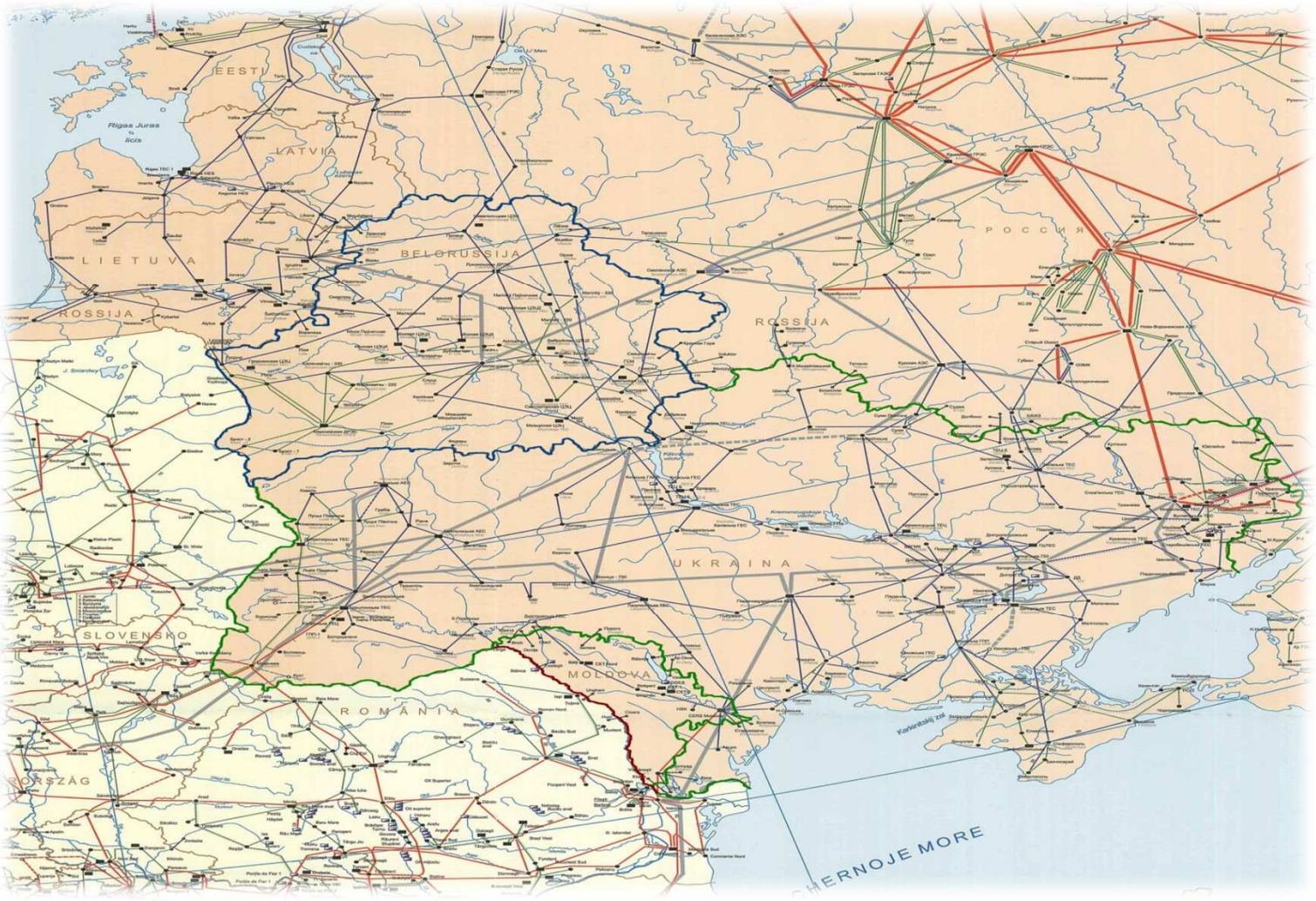
ENTSO-E CE Substation	Country	IPS/UPS Substation	Country	Voltage (kV)
Rzeszow	Poland	Khmelnitska NPP	Ukraine	750
Vel'ke Kapusany	Slovakia	Mukachevo	Ukraine	400
Sajoszeged	Hungary	Mukachevo	Ukraine	400
Albertirsa	Hungary	Zakhidnoukrainska	Ukraine	750
Kisvarda	Hungary	Mukachevo	Ukraine	220
Tiszalok	Hungary	Mukachevo	Ukraine	220
Rosiori	Romania	Mukachevo	Ukraine	400
Isaccea	Romania	Pivdennoukrainska NPP	Ukraine	750
Isaccea	Romania	Vulkaneshty	Moldova	400
Elk	Poland	Alytus	Lithuania	400
Bialystok	Poland	Ross	Belarus	220
Zamosc	Poland	Dobrotvirska	Ukraine	220
Dobrudja	Bulgaria	Vulkanesti	Moldova	400

Eastern Europe – Basic info



Moldova: own data/estimates

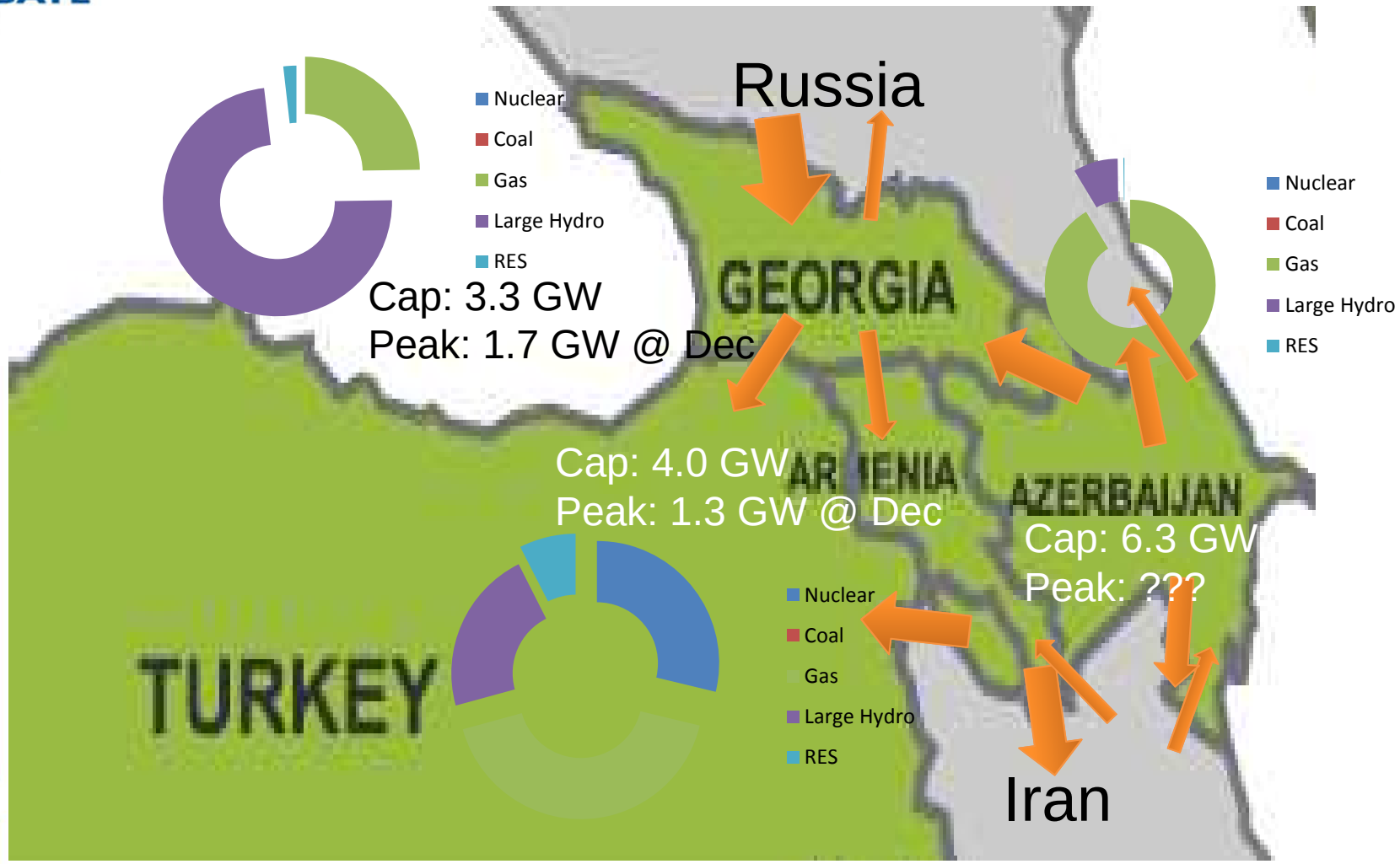
Eastern Europe – Grid Map



Eastern Europe – SO & MO Functions

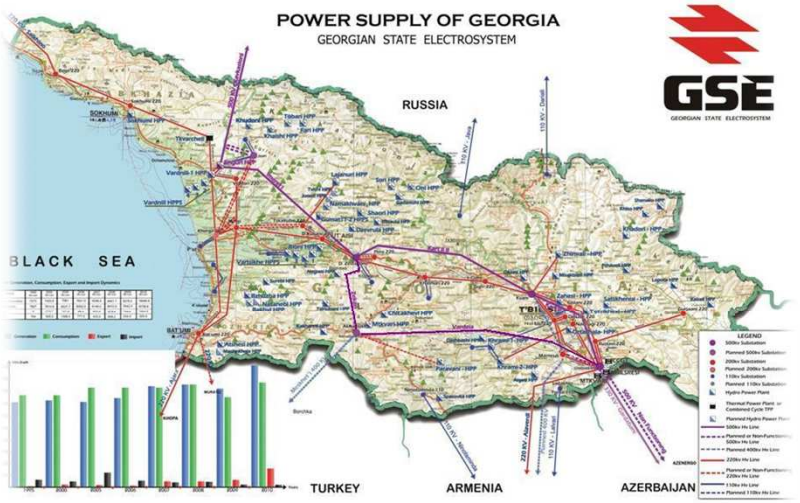
Belarus	Ukraine	Moldova
BELENERGO (Vertically Integrated)	NEC Ukrenergo	Moldelectrica
	Energorynok	Moldelectrica

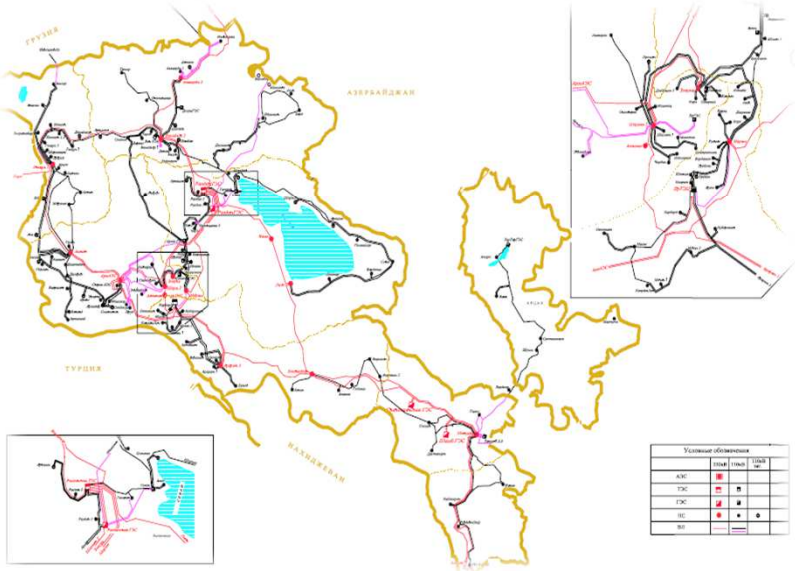
Caucasus – Basic Info



Azerbaijan: own data/estimates exc. Capacity/energy mix

Caucasus – Grid Map(s)

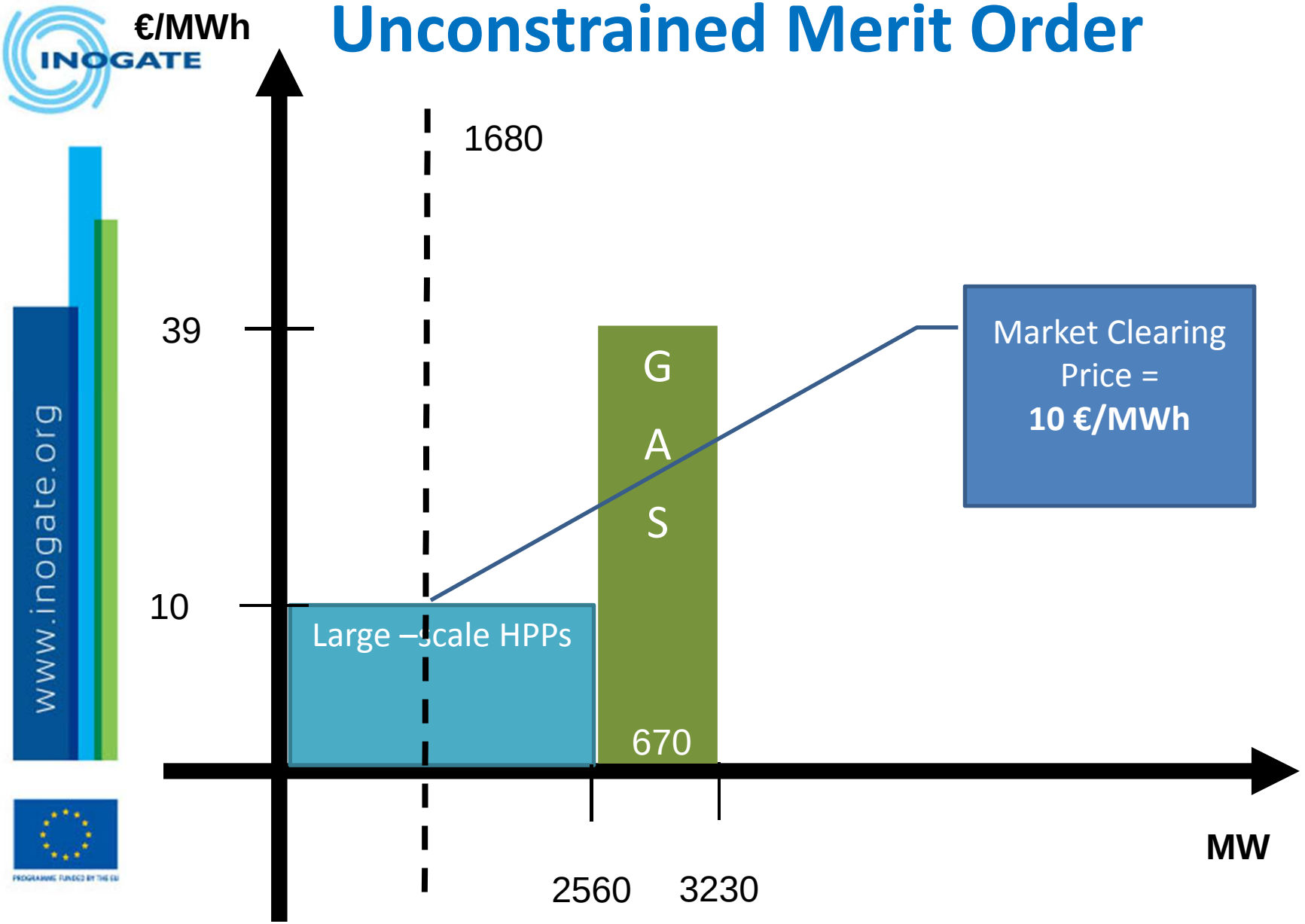




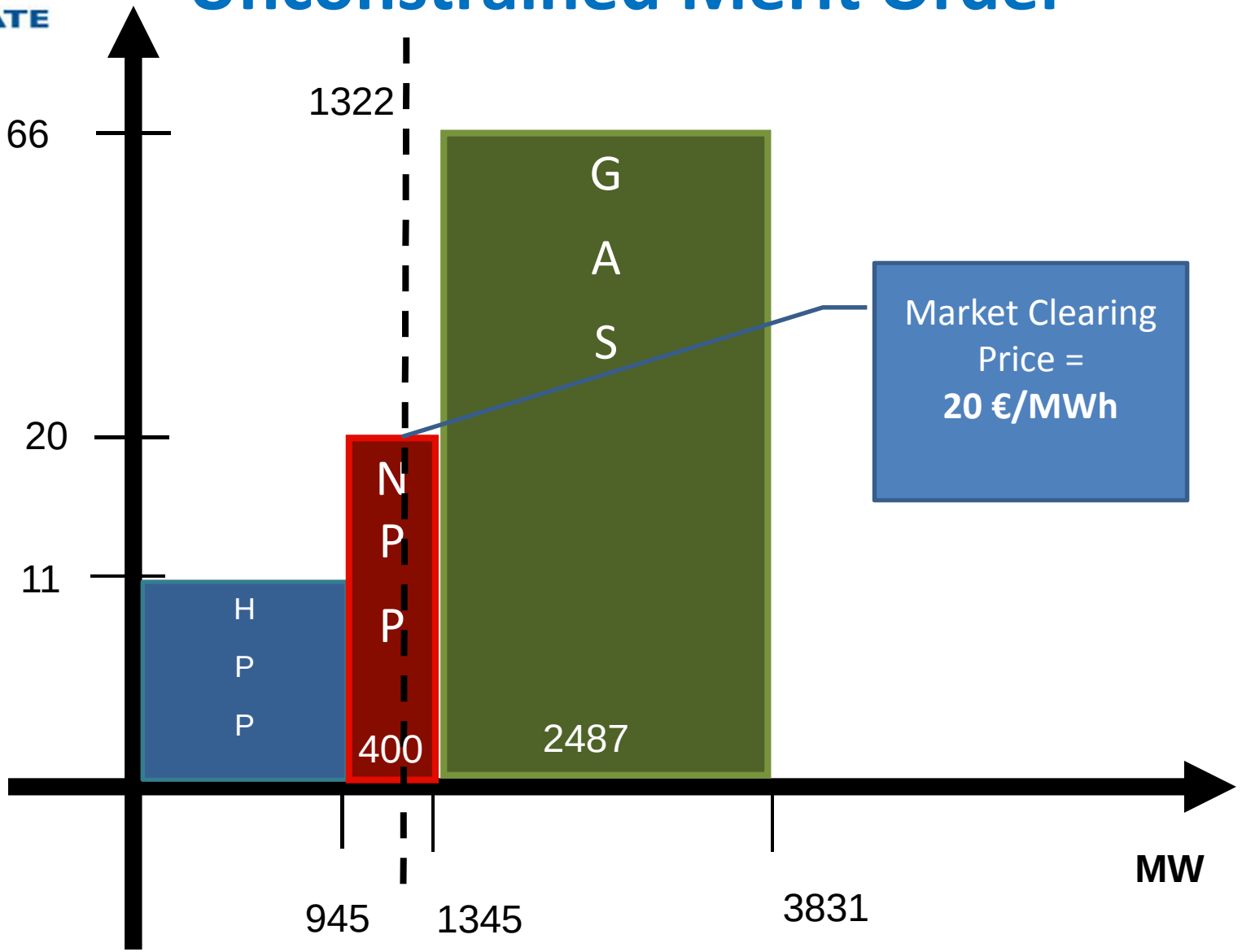
Caucasus– SO & MO Functions

Azerbaijan	Georgia	Armenia
AZERENERGY (Vertically Integrated)	GSE	CJSC "Power System Operator"
	ESCO	Settlement Center CJSC

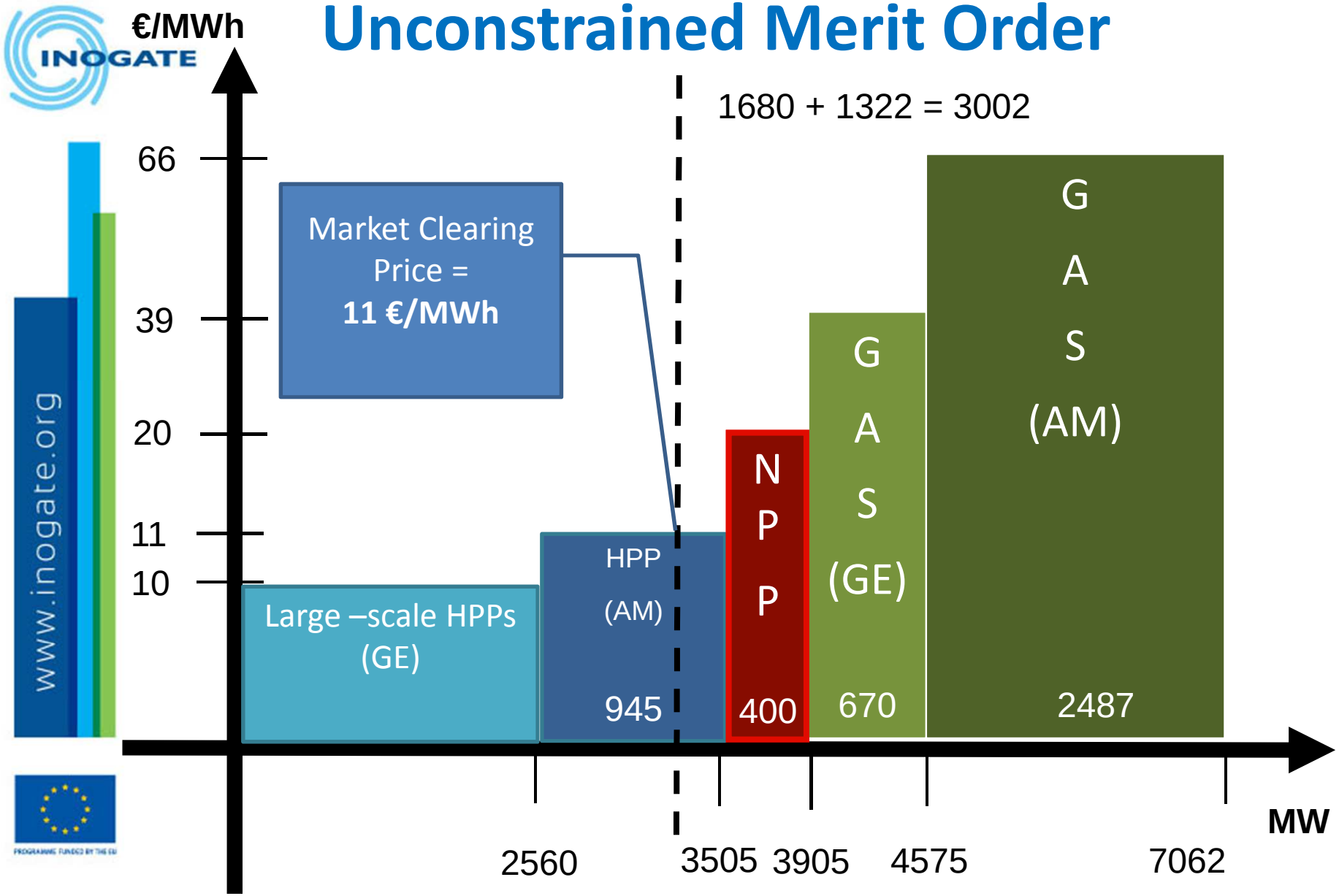
Caucasus Price Discovery – Georgia
Unconstrained Merit Order



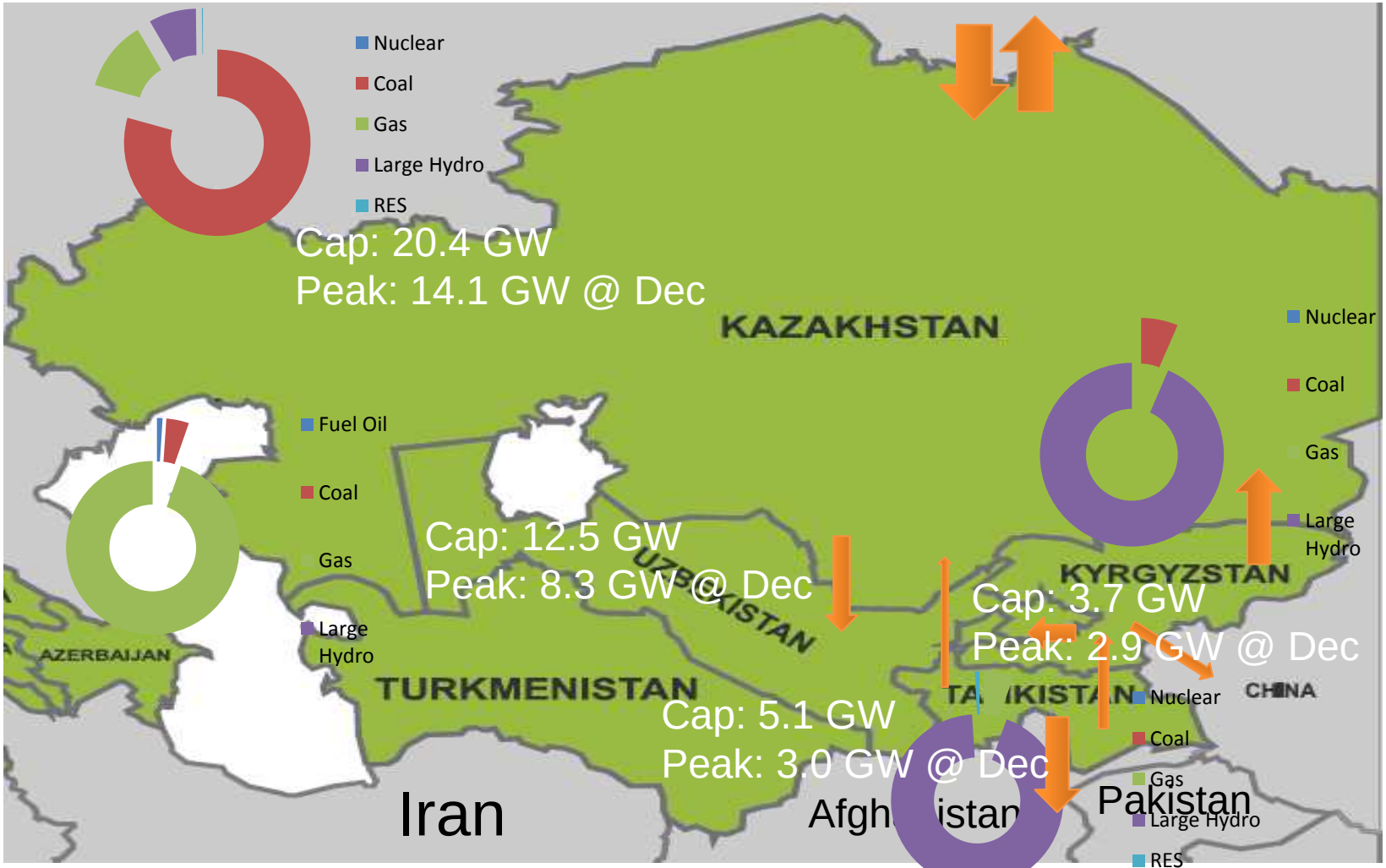
Caucasus Price Discovery – Armenia
Unconstrained Merit Order



Caucasus Price Discovery – GE/AM
Unconstrained Merit Order



Central Asia – Basic Info



Turkmenistan: No data, Uzbekistan: technical exchanges only

Central Asia - Grid Map

Карта-схема основных эл.сетей 220 - 500 кВ ОЭС Центральной Азии с перспективой до 2020 г.

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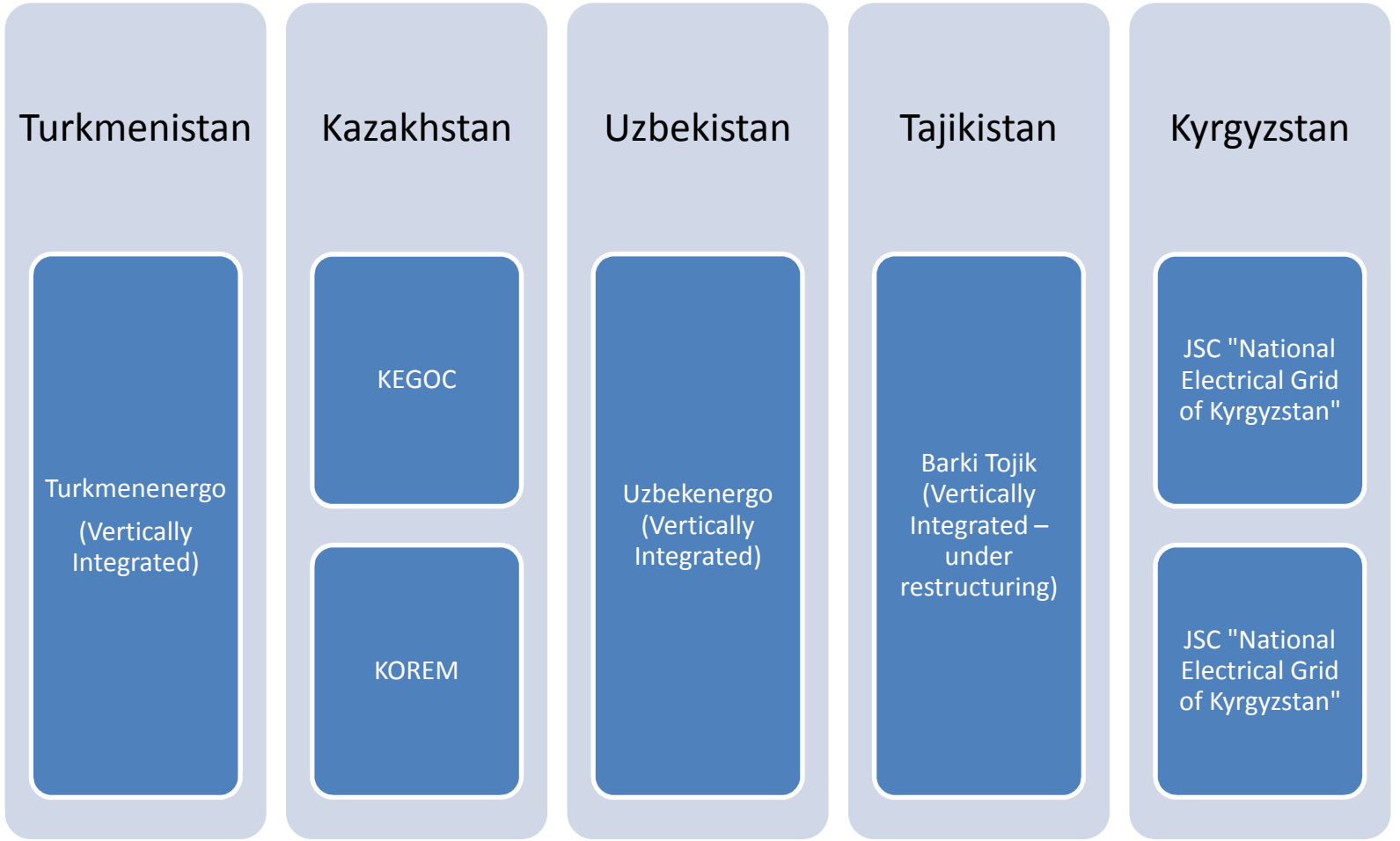
Central Asia – SO & MO Functions



International Organisation: Central Dispatch Centre Energia (based in Tashkent)

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What is INOGATE?

An EU-funded programme for regional energy cooperation between the European Union and its Partner Countries in Eastern Europe, Caucasus and Central Asia

12 INOGATE Partner Countries:
Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, Turkey (O), Turkmenistan, Ukraine and Uzbekistan.

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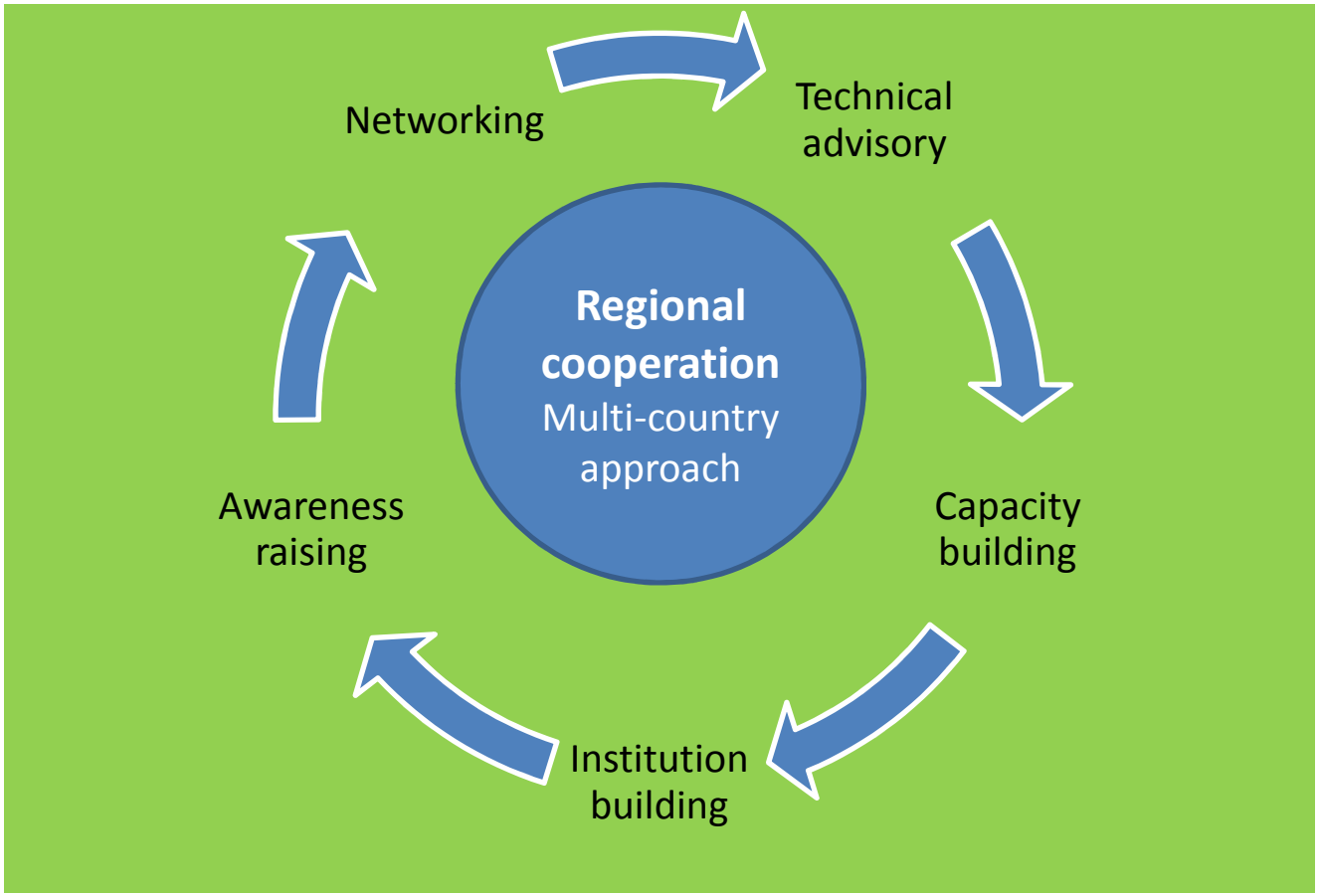
New ITS - Fact Box

- Project title: INOGATE Technical Secretariat (ITS)
- Budget: € 16.5 million
- Duration: 36 months (02.2012 – 01.2015)
- Partner Countries:
  - **Eastern Europe** - Belarus, Moldova, Ukraine,
  - **Caucasus** - Armenia, Azerbaijan, Georgia
  - **Central Asia** - Kyrgyzstan, Turkmenistan, Kazakhstan, Uzbekistan, Tajikistan
- Four Project Components (A,B,C,D)

New ITS - Project Components

A - Coordination	**B – Electricity & Gas**	C- Sustainable Energy	D – Energy Statistics
• ITS operation • Communication Strategy • Investments policy • Monitoring • 18%	• **Regulation & Markets** • **Standards** • **Cross-border trading** • **Gas streams efficiency** • **34%**	• RES • EE • 24%	• Energy Statistics • Energy balances • 24%

Types of assistance provided



Technical Experts Groups in PCs

TEG 1: Energy Markets & Infrastructure

- Team 1: Energy Policy
- Team 2: Tariffs & Regulation
- Team 3: Licensing, Markets and Monitoring
- Team 4: Cross-border trade Electricity
- Team 5: Cross-border trade Gas
- Team 6: Gas infrastructure

TEG 2: Standardisation (Electricity & Gas)

- Team 1: Standardisation policy, Technical regulations
- Team 2: Gas standards
- Team 3: Electricity standards

- Participate to events/capacity building activities
- Discuss needs for further study
- Shape ITS work-programme
- Review and evaluate project outputs
- Provide support to national decision-makers

Support to a framework improving energy cross border trade and cooperation

B3

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Activities

- **Legal framework analysis of cross-border trade**
- **Capacity Gap Analysis, Capacity Building Strategy for TSO/operators**
- **Promotion of cooperation between TSOs**
- **Promotion of cooperation TSOs & ENTSO/E, ENTSO/G.**

Deliverables

- **Seminars**
- **study tours**
- **Studies**
- **Reports**
- **AHEF**

Results to be achieved

- Cross border cooperation **opportunities and benefits** as well as EU best practices are showcased to the PCs
- **Obstacles to trade** in regional markets identified and ways of mitigation discussed and “fed-in” to AHEF
- **TSOs** advised on **improvement** of technical, operational and financial **competences**.
- Cross-boarder trade **communication** among PCs is improved
- A “**process**” for the creation of regional markets is being initiated and sustained

Ad-Hoc Expert Facility: How AHEF works ?

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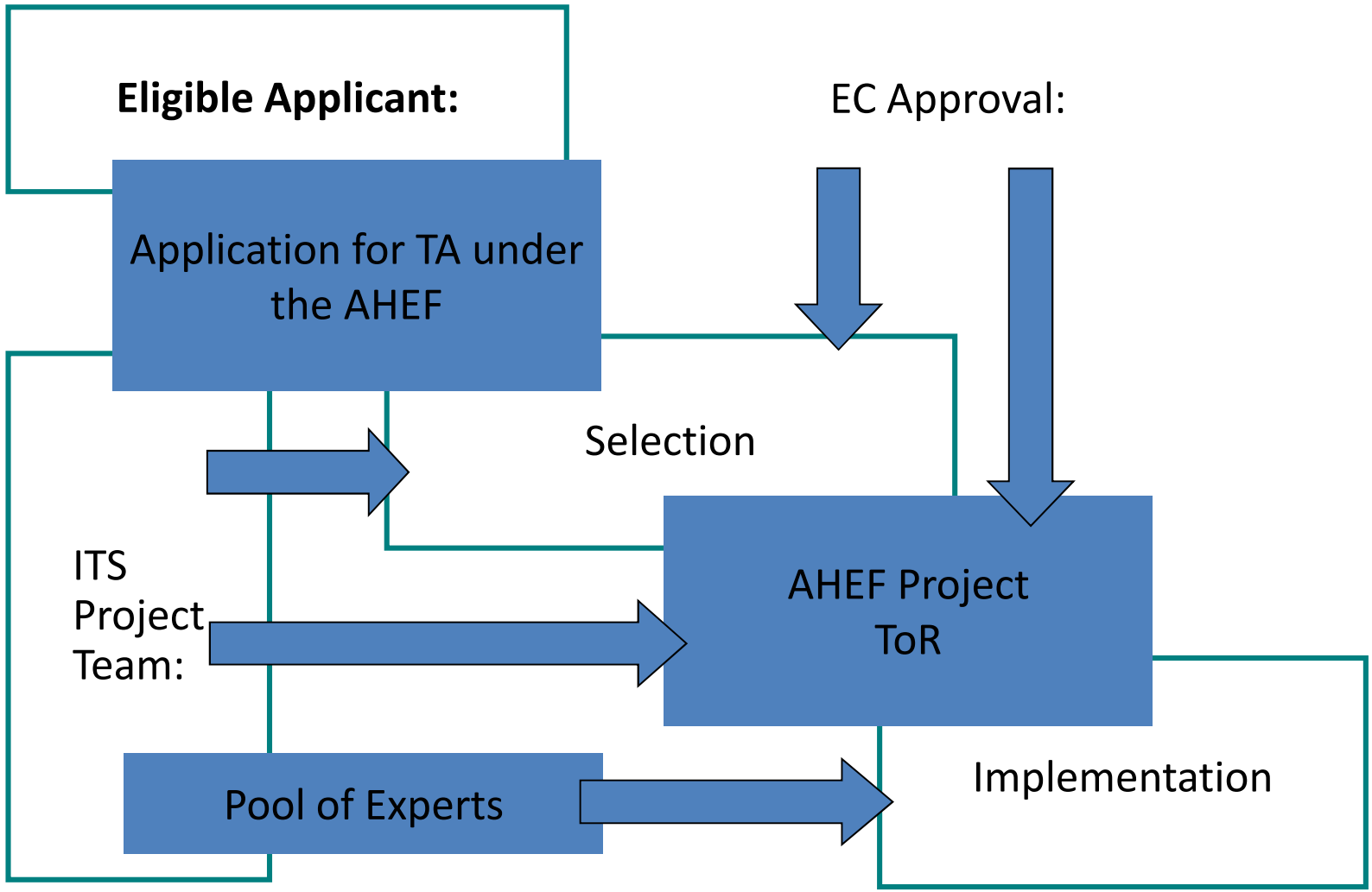


Case A: AGT AHEF

Azerbaijan (Azerenerji)

- An assessment of export potential
- Legal, Regulatory & Commercial modalities for CBT

Georgia (GSE)

- Review and compare current GSE transmission planning procedures and tools with those exercised in the EU

Turkey (TEIAS) - Observer

- Participate and follow the discussions between GSE and Azerenerji in a view of strengthening electricity trading
- Propose the milestones in a sequence of steps (sort of a Roadmap) aiming to an increased cooperation of the AGT systems

Case B: Kazakhstan AHEF

Central Dispatch Centre Energia (International Organization based in Tashkent, Uzbekistan) - Observer

Ministry of Industry and New Technologies

KOREM

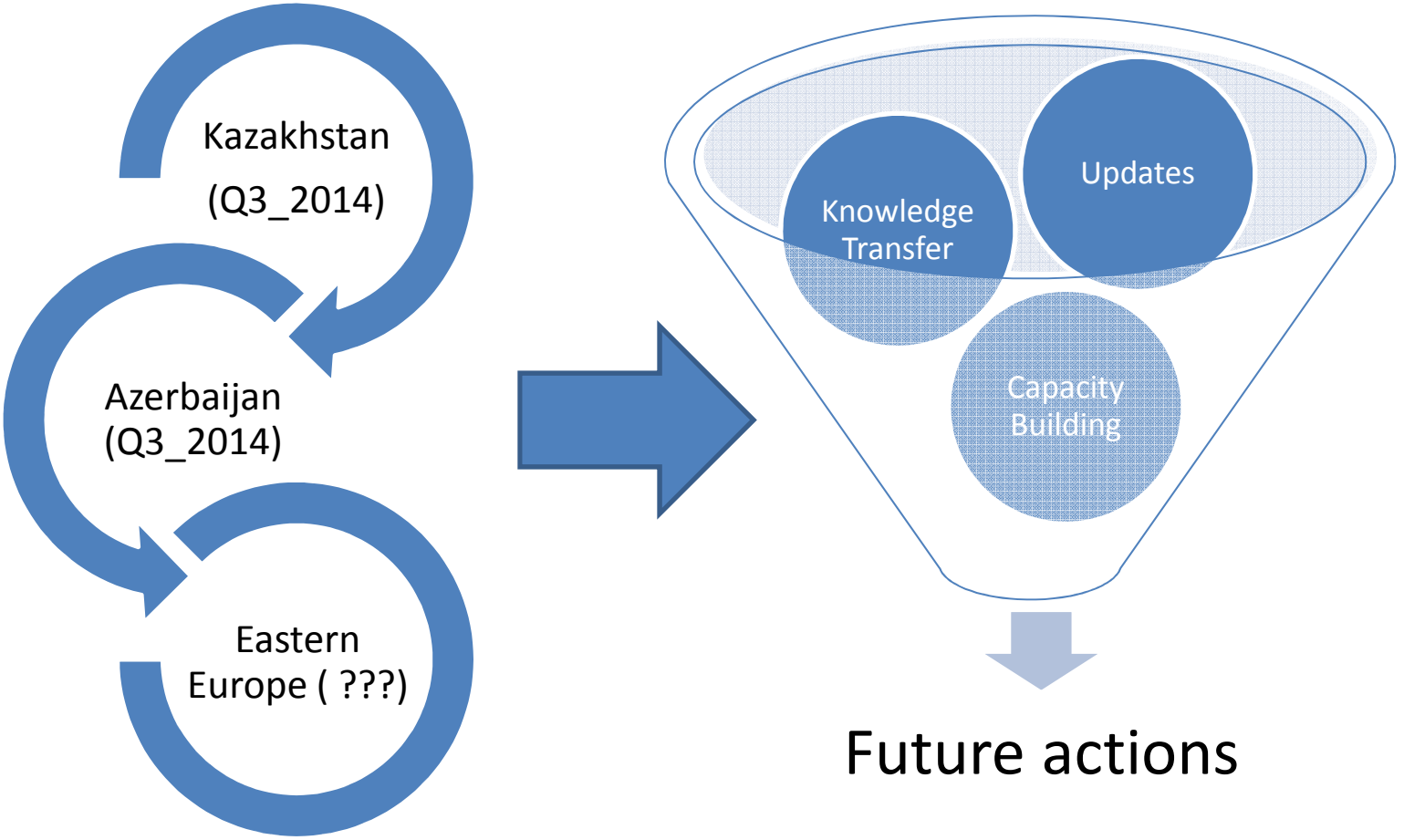
(Kazakh Market Operator)

Electricity Sector Reform Options

Impact of Sector Reforms and on electricity prices

Market Model & Capacity Market

Part of the CBT AHEFs: Regional Events



Info & Networking:
The New INOGATE Web Portal

www.inogate.org

www.inogate.org

INOGATE information:

- ✓ News on activities
- ✓ Reports & Studies
- ✓ Training Materials
- ✓ Publications
- ✓ Event materials

Regional energy info:

- ✓ Regional Energy News
- ✓ Country profiles and information
- ✓ Energy links

Thank You !

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