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# SOUTH-EAST EUROPEAN ELECTRICITY MARKET MONITORING PROJECT

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**Training Course: Monitoring Activities of the Energy Regulatory Commissions**

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# Contents

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- **Energy Community: Basic information**
- **Congestion Management in SEE region**
- **Market Monitoring (MM) in SEE Region:**
  - USAID MM Project in SEE
  - MM Screens
  - MM Guidelines
  - MM Web Based Interface (SEEAMMS.COM)
  - Regional Market Monitoring Process
  - SEE CAO Monitoring
  - Other Regional Initiatives
  - Action Items
  - Next Steps

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# Energy Community

# - Basic information -

# Treaty establishing the Energy Community

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The European Community

**THE ENERGY POLICY IN EUROPE**

Generally, approach towards common principles (security of supply, competition, environment);

SEE: mostly bilateral relations;

Necessity for a common framework: **THE TREATY ESTABLISHING THE ENERGY COMMUNITY**

Signed on 25 October 2005
Came into force in **July 2006**

The Republic of Albania
The Republic of Bulgaria (EU MS since 2007)
Bosnia and Herzegovina
The Republic of Croatia
The Former Yugoslav Republic of Macedonia
The Republic of Montenegro
Moldova
Romania (EU MS since 2007)
The Republic of Serbia
Ukraine
The United Nations Interim Administration Mission in Kosovo

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# Energy Community Regulatory Board (ECRB)

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- ✓ shall discharge the tasks entrusted to it by **Article 58** of the Energy Community Treaty → 1st ECRB meeting held in December 2006
- ✓ at the request of the European Commission, or on its own initiative and in accordance with the objectives of the Energy Community Treaty, shall **undertake the function of advising** on statutory, technical and regulatory rules in the region to the Energy Community Treaty Institutions
- ✓ shall provide **advice to the Ministerial Council** and the PHLG with **regard to monitoring** and **assessing the operation** of the **energy networks** and **network energy market** and **issue recommendations** to the Parties when so entrusted by the Treaty or the Ministerial Council.
- ✓ shall **facilitate consultation**, **co-operation** and **co-ordination** amongst **regulatory authorities** to a consistent application of the Acquis Communautaire. The ECRB makes recommendations and reports with respect to the functioning of the energy markets.
- ✓ may **determine** the **existence** of a serious and persistent **breach** and bring it to the **attention** of the Ministerial Council.

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# Who are the Members of ECRB?

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- ECRB consists of **representatives** from **Regulatory Authorities** from **Contracting Parties**, **Participants** and **Observers** to the Energy Community Treaty
- ECRB Members comprises high level representatives from ten energy regulatory authorities of the Signatory Parties:
  - Energy Regulatory Authority of Albania (ERE)
  - State Electricity Regulatory Commission of Bosnia and Herzegovina (SERC)
  - Croatian Energy Regulatory Agency (HERA)
  - Energy Regulatory Commission of the FY Republic of Macedonia (ERC)
  - Energy Regulatory Agency of Montenegro (REGAGEN)
  - ANRE - Moldova
  - Energy Regulatory Agency of the Republic of Serbia (AERS)
  - NERC - Ukraine
  - Energy Regulatory Office (ERO) of the United Nations Interim Administration Mission in Kosovo (UNMIK), and
  - a representative of the European Commission

# Who are the Participants of the ECRB and what distinguishes them from the Members?



- ECRB is also attended by thirteen energy regulatory authorities of the so called **Participants**. These are currently:

E-Control (Austria)
SEWRC (Bulgaria)
ERU (Czech Republic)
CERA (Cyprus)
CRE (France)
BNetzA (Germany)
RAE (Greece)
HEO (Hungary)
AEEG (Italy)
ANRE and ANRGN (Romania)
RONI (Slovakia)
AGEN-RS (Slovenia)
OFGEM (UK)

- Participants have the right to **participate in the discussions**, however have **no voting rights**

# Who are the Observers to ECRB?

- ECRB allows **Observers** to its meetings, currently attributed to the following energy regulatory authorities:
  - GNERC (Georgia)
  - NVE (Norway)
  - EMRA (Turkey)
- Observers do generally not take part in the discussions

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# Congestion Management in SEE region

# The 8th Congestion Management Region - SEE



- The most pressing issue was the **pending definition** of a **Congestion Management area in the South East European region - Prerequisite for SEE CAO establishment** was creation of the 8th Region and definition of consisting countries
- The need of a definition for South East Europe region became evident during the Action Plan drafting process for the CAO as Regulation 1228/2003 and its Congestion Management Guidelines consists no definition for SEE region
- At the same time, the definition is essential for the SEE CAO project as it **predefines the future participants of the CAO**
- The so called 8th Congestion Management Region was established according to the approach used within the EU (ERGEG Electricity Regional Initiatives) by the agreement/**decision** reached at the **Ministerial Council** in June 2008

# A Project Overview : The 8th Region

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As a result a **common Coordinated Congestion Management method**, including capacity allocation, is to apply for the **following territories**:

- the nine Energy Community Treaty Contracting Parties
- the neighboring countries Bulgaria, Greece, Hungary, Romania and Slovenia
- Italy with regard to the interconnections between Italy and the Contracting Parties to the EnC Treaty (DC undersea cables)
- Austria, as an important supporter of the SEE Coordinated Auction Office project got an observer status


| SEE |
|---|
| 13 contracting parties |
| 24 borders |
| Population: 137,12 million |

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# Congestion Management in SEE

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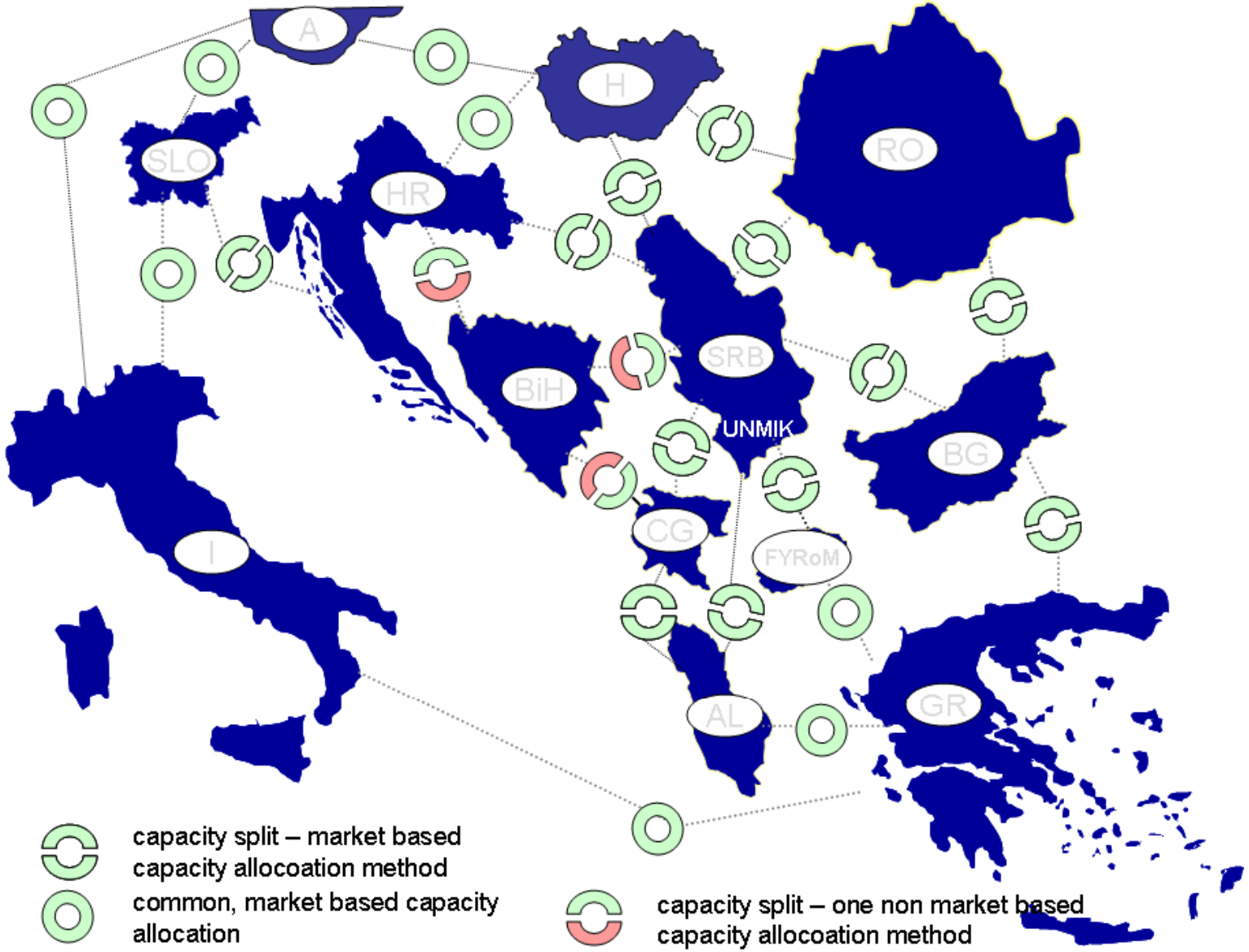

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# Congestion Management in SEE: Compliance with Regulation 1228/03 and CMG

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- SEE national transmission systems are **faced** with a **complex** international electricity **market**, **transits** and a growing **number** of market participants
- Thus Cross-Border **congestions occur** and create a **barrier** for international electricity trade within SEE (North → South)
- Therefore it was **necessary** to **implement** proper **rules** for **Market-based** Congestion Management
- The **Basic principles** for Cross-Border Congestion Management are described in the **Regulation** (EC) **1228/2003** and **CMG**
- Regulation 1228/2003 is **applicable** in the SEE Region through the **Energy Community Treaty**
- SEE Region is working on **Flow-base explicit coordinated auction scheme** since 2004 (dry-run) involving TSOs, regulators and traders

# SEE Coordinated Auction Office

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- **CEE** and **SEE** TSOs decided to **implement Explicit Flow-based CA mechanism** in SEE Region ... **vs.** CWE, SWE and Nordic Region where **Implicit NTC based mechanism** is implemented (Market Coupling, Market Splitting)
- Coordinated Auctions and **CAO** are in **compliance** with **Regulation 1228/03** and **CMG** provisions
- **Majority** of EnC contracting parties **support** the establishment of a Cooridinated Auction Office in the SEE region
- **Steering Committee** for creation the **Project Team** for CAO establishment - underway
- MC supported **Montenegro** as **location** for SEE CAO

# SEE Coordinated Auction Office

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- **NTC based approach** for SEE CAO as the **first step**
- ECS **studies** related to SEE CAO (technical and legal study)
- **Project Team** will **produce** CAO relevant **documents**: Business Plan, Auction Rules, NTC vs. Maximum Flow approach, etc.
- SEE **Regulators** will have to **approve** CAO related **rules** and perform CA and SEE CAO **Monitoring**
- **ECRB** is working on **CAO Monitoring** → proposal for approval of SEE CAO related documents and SEE CAO Monitoring (regional vs. national) – as part of USAID MM Project

# Activities on ex-ERGEG ERI reporting / ACER

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- SEE **Regulators** recognized a **need** for a **detailed overview** of **current CB mechanisms in SEE** as there is a necessity to work on **improving** Cross-Border modalities in SEE
- Necessary to **investigate** how EnCT signatories are **taking** necessary **steps** in order to **meet CMG requirements** and analyze their awareness of the progress they have to make in order to fulfill them
- SEE Regulators **discussed** detected **deviations** from Regulation 1228/03 and CMG, including an explanation/motivation for these deviations and assessing which of them are within the regulatory scope and how and by when to **overcome** them
- **ECRB** agreed to **follow** the **transparency monitoring approach** applied by **ERI**
- Transparency Monitoring will be exercised by ECRB-Section
- Upon ex-ERGEG proposal, ECRB welcomed **inclusion** of the **8th Region progress report** as **Annex** to **ERI/ERGEG reporting**, but keeping content responsibility with ECRB
- ECRB EWG took part in ex-ERGEG ERI TF CB activity; now ACER ERI

# General Principles for Congestion Management

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***Regulation (EC) 1228/2003**, Article 6:*

*"…Network congestion problems shall be addressed with non discriminatory market based solutions which give efficient economic signals to the market participants and transmission system operators involved..."*

*"… The maximum capacity of the interconnections and/or the transmission networks affecting cross-border flows shall be made available to market participants, complying with safety standards of secure network operation …"*

No pro-rata allocation of capacity & No long term contracts

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# Progress

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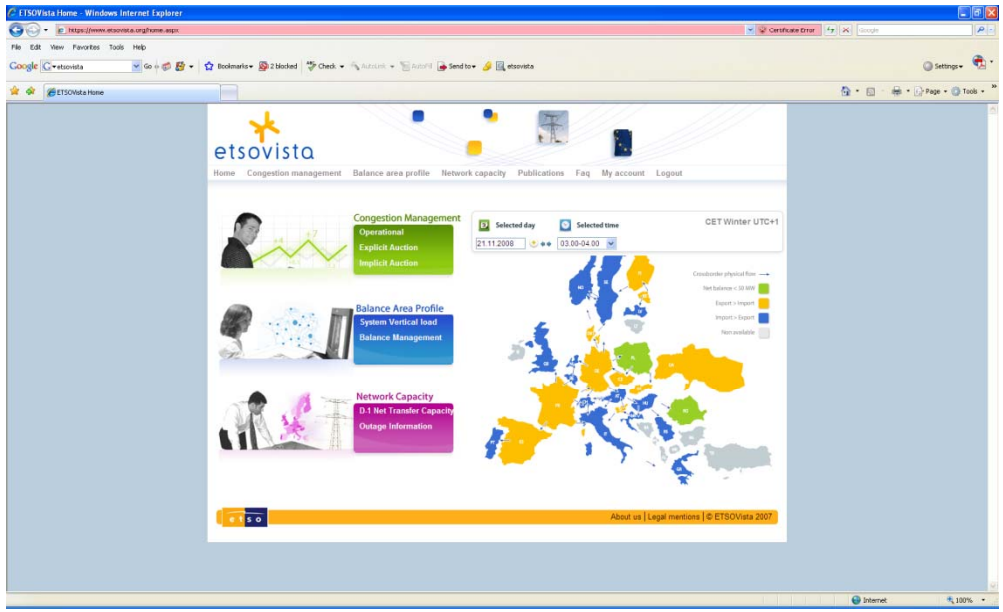
- Preliminary review regarding actual Cross-Border mechanisms in SEE Region was presented to the 12th **Athens Forum**
- The Contracting Parties made significant **progress** towards reaching **full compliance** with the **Regulation 1228/03** within the last year
- Especially **Transparency** regarding the Allocation of Cross-Border Capacity was **increased** within the last year
- Most of the contracting parties **introduced** a **Market-based** Capacity Allocation **scheme** (50/50 split)
- Most of the contracting parties perform **no Common Auctions** (except MAC-GR, HR-HU, AL-GR, SRB-HU), but few SEE TSOs recently started **negotiations** (SRB-CRO, SRB-BUG, ...)

# Transparency



- **Increased Transparency** can be noticed in SEE region
- TSOs of the contracting parties take part in the **ENTSO-E Vista project** which foresees publication of Auction results, CB flows, available capacities, etc. (according to Regulation 1228/03 and CMG provisions)




- Furthermore, the EnC contracting parties increased the number of documents **available in English** in their web sites
- Market Rules will be published by all EnCT signatory parties soon (during 2011)
- ENTSO-E Transparency Guidelines

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# Market Monitoring in SEE Region:

USAID MM Project in SEE

MM Dry Run in SEE

MM Guidelines

Regional MM Process

SEE CAO Monitoring

Other Regional Initiatives

Action Items

Next Steps

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# SEE Market Monitoring Overview

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- **What is Market Monitoring?**
  - ➢ Liberalized Markets versus Regulated Markets
  - ➢ Multilateral versus Bilateral Generation Markets
  - ➢ Transparency versus Market Monitoring
- **SEE Market Monitoring Dry Run project**
  - ✓ Monitoring Cross-Border Transmission in order to promote competition in Generation Markets
  - ✓ Monitoring Multilateral Balancing / Wholesale Markets

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# Market Monitoring: General

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- Market Monitoring activities are **necessary** for each **national** electricity market in order to provide its **well functioning** in line with approved rules and **based on non-discrimination and transparency**
- As the **regulators** are entities which **approve Market Rules** and give guidelines for Market Design, they should also **develop Market Monitoring tools** in order to **check if** these rules and recommendations are **fully respected** and **implemented**
- **Usually** the **TSO** or **Market Operator** is **proposing** the **market rules** or other rules related to organizing or enabling functioning of electricity markets
- Therefore, **regulators** have to **check** if the TSOs have **implemented** all agreed rules and if they **respect** and conduct their activities in line with them

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# Market Monitoring: Electricity Market in SEE

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- SEE region (8th region) is characterized as a region with **partially opened** and **not sufficiently liquid** electricity markets, but with **very dynamic cross-border trade** transactions
- Due to low tariff prices of electricity in most of the SEE countries, big industrial consumers prefer **not to exercise** their **eligibility** and **remain tariff** consumers, and thus slow down opening of electricity markets
- Therefore, there is **no active and liquid** electricity market in SEE which could be fully monitored by regulators, using and implementing usual Market Monitoring schemes, indicators and approaches
- **Only** Cross-Border activities in SEE Region could be fully and broadly examined and monitored by regulators at the moment
- SEE **Regulators need to timely acknowledge** and **learn** how to monitor all performances within electricity markets in order to provide non-discriminative and transparent participation for all participants in the electricity markets

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# Market Monitoring responsibilities in SEE

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- NRAs in SEE are usually given **authority** to **track** licensed subjects' **behavior** in the electricity market and **produce reporting**, as the expert bodies for Electricity Market, **but**…
- NRAs are usually **not given** any **authority** to **penalize** those participants which did not obey to rules in SEE
- **EU MS NRAs** are **given authority** to **overtake concrete measures** against breaches in the market – **difference** between EU and SEE (CPs)
- The only measure that most of SEE NRAs could raise against those participants that breach rules is **withdrawal** of the **license** – but being the radical measure and not very popular…
- In SEE, the **Competition Authorities** are given authority to **performing concrete action** (penalties) against participants in cases they get input from NRAs on detected deviations
- Therefore, **strong cooperation** between **Regulatory** authority and **Competition** authority must be envisaged and developed

# What is Market Monitoring

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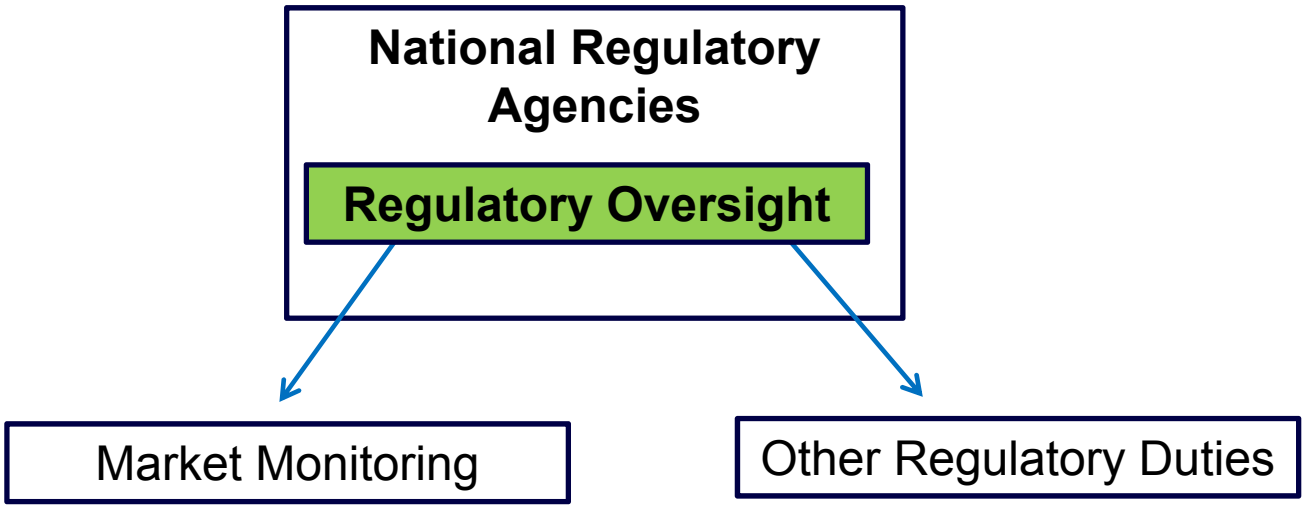
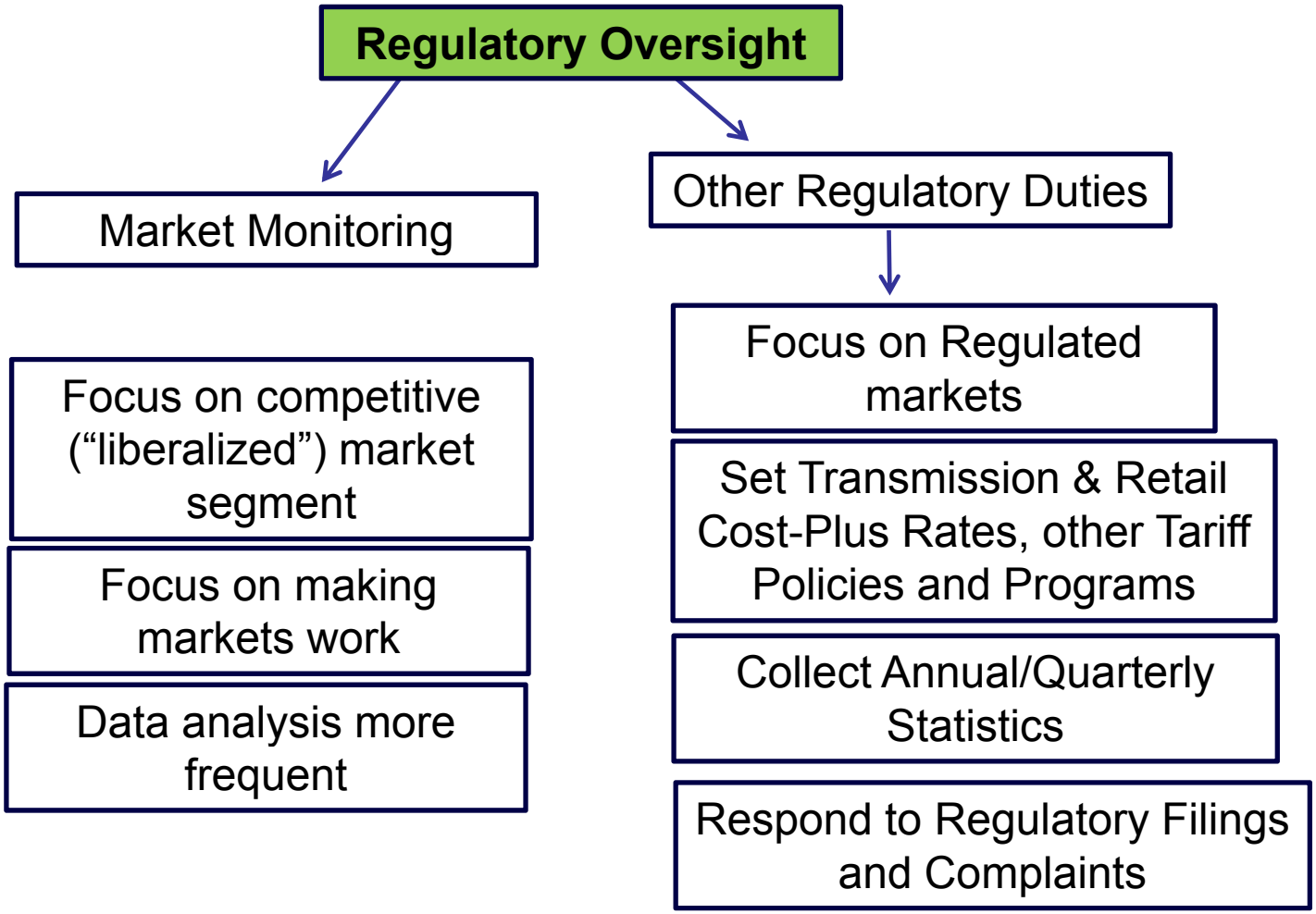
**Market Monitoring** is part of **Regulatory Oversight** conducted by National Regulatory Authorities

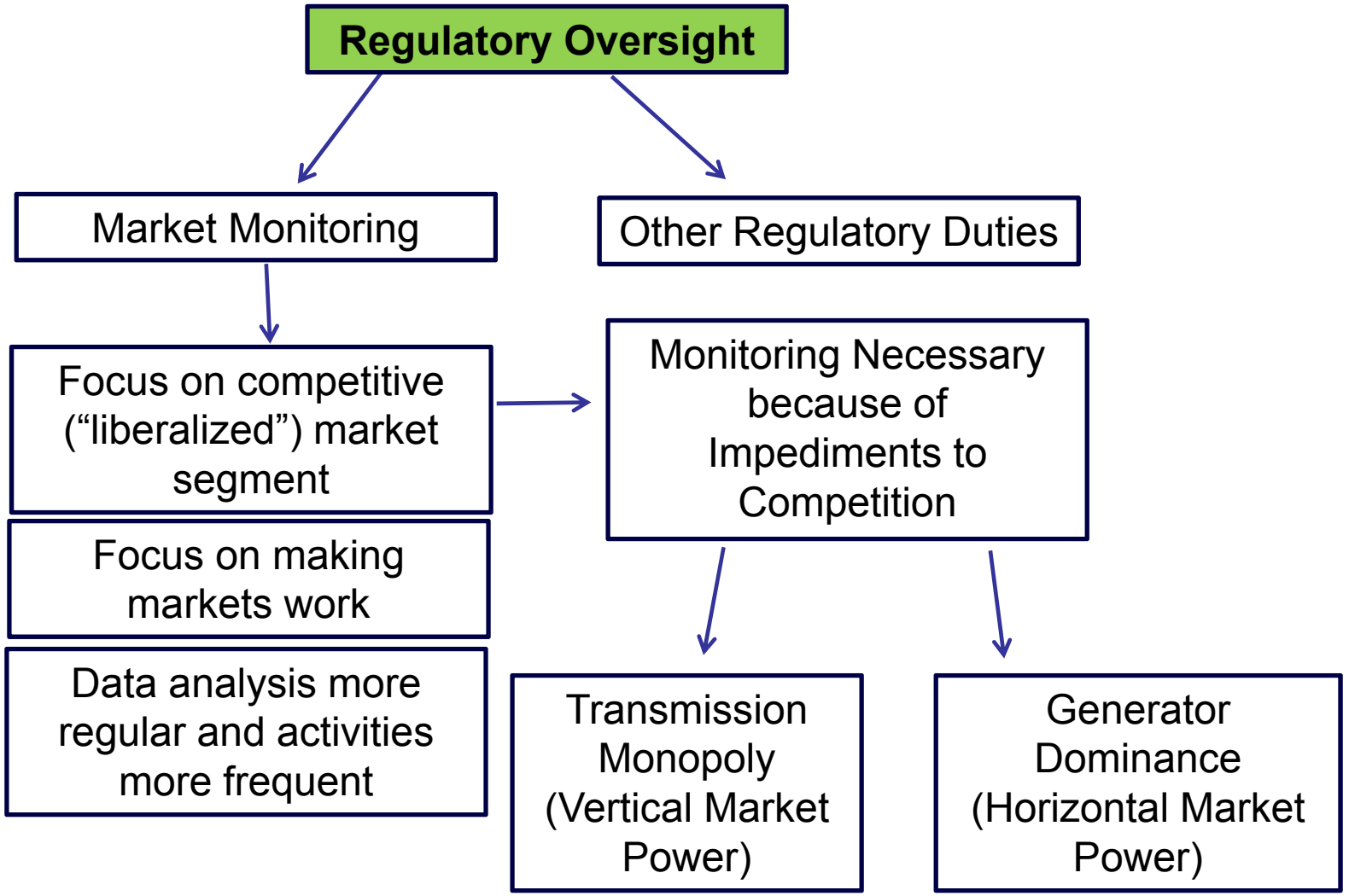


# What is Market Monitoring





# Electricity Market Monitoring



# Electricity Market Monitoring



Transmission Provider may favor affiliated generator

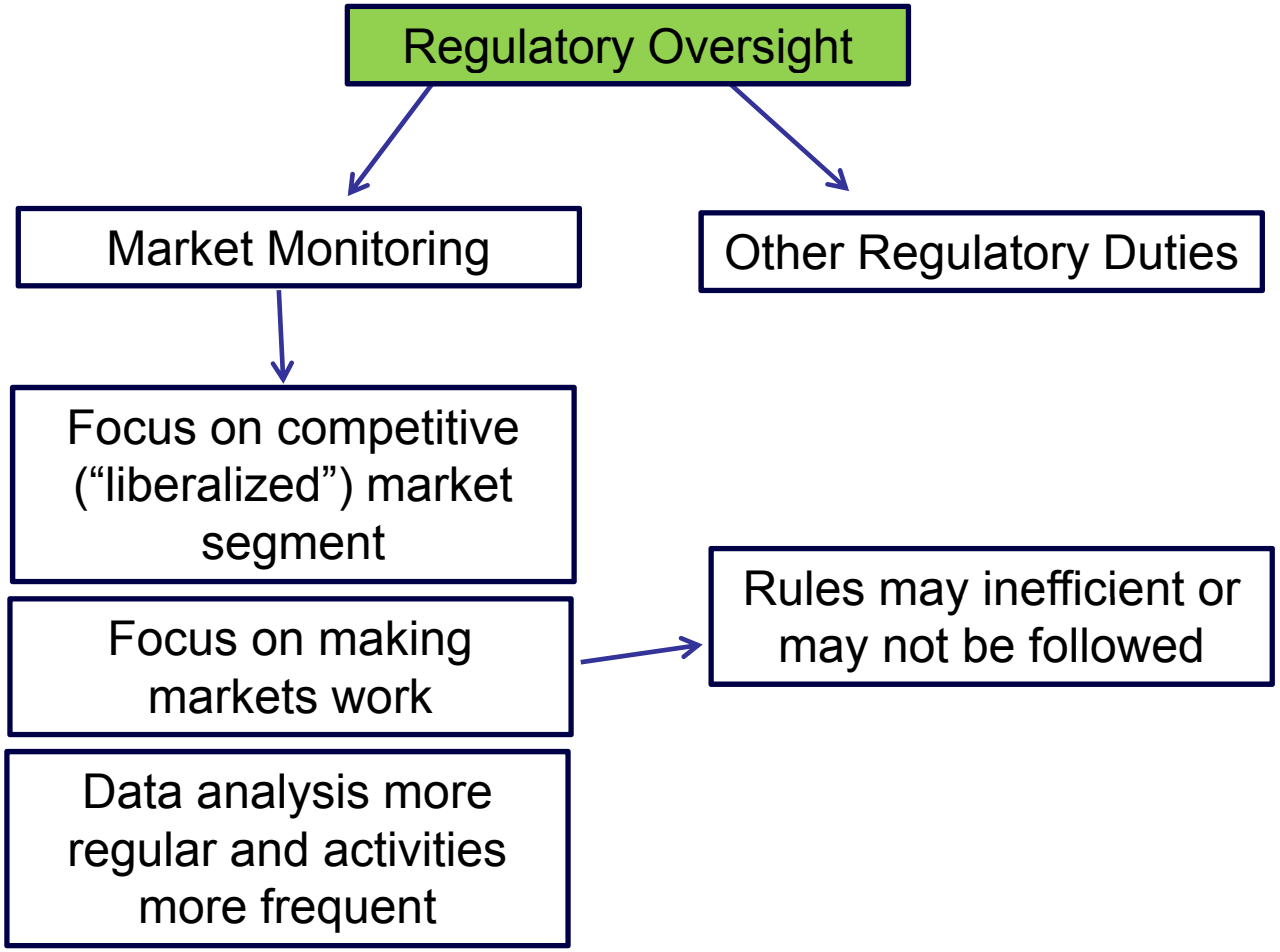
Transmission operations focus on reliability

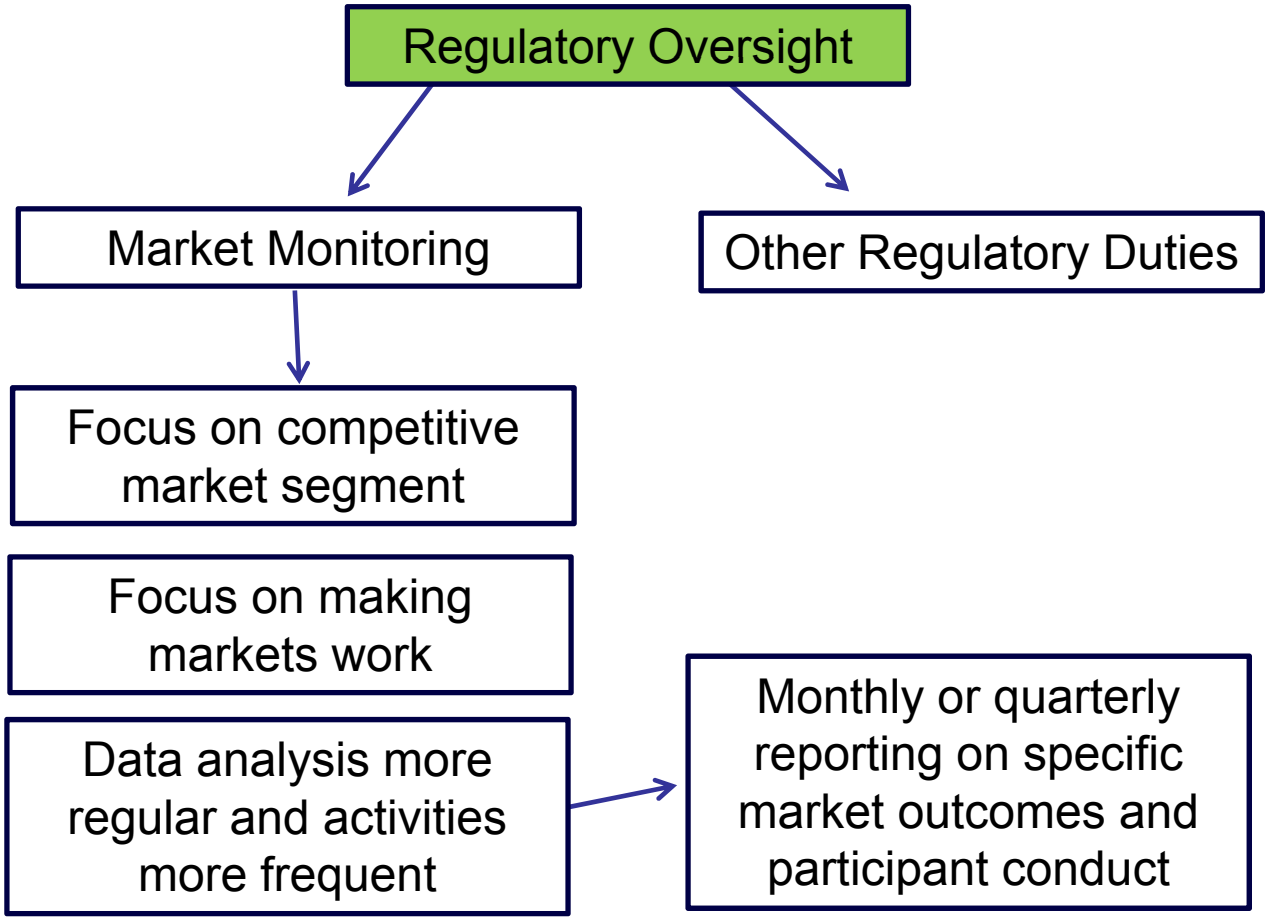
Generator may be dominant and control prices

"Unbundling" can address this relationship

Transmission Monopoly (Vertical Market Power)

Generator Dominance (Horizontal Market Power)

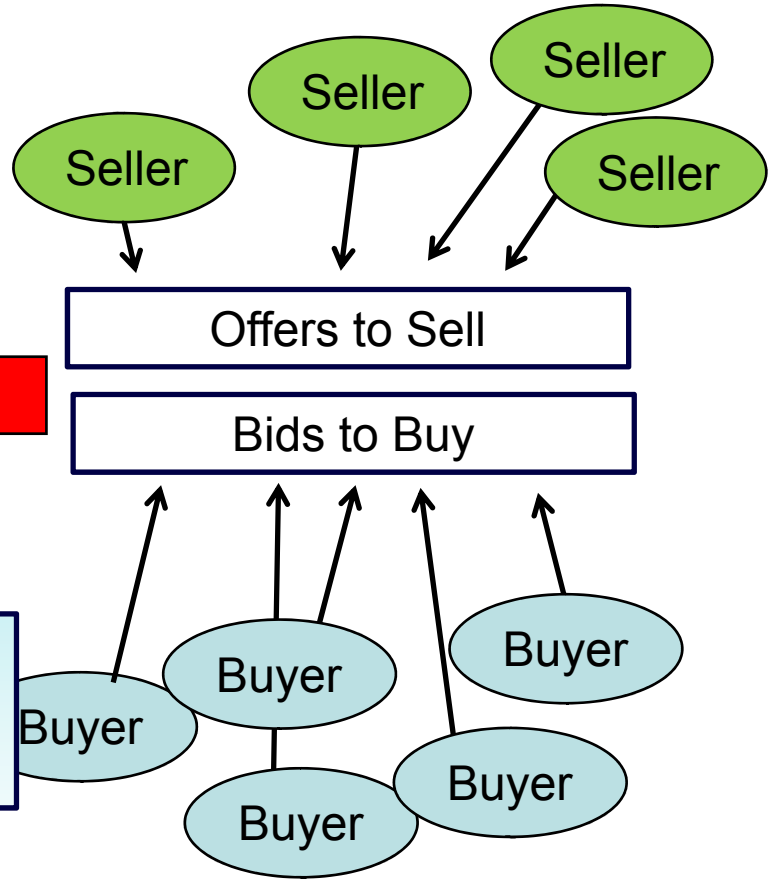

Regulatory Oversight
Market Monitoring
Other Regulatory Duties
Focus on competitive ("liberalized") market segment
Focus on making markets work
Data analysis more regular and activities more frequent
Rules may inefficient or may not be followed


Regulatory Oversight
Market Monitoring
Other Regulatory Duties
Focus on competitive market segment
Focus on making markets work
Data analysis more regular and activities more frequent
Monthly or quarterly reporting on specific market outcomes and participant conduct

Market Monitoring is commonly associated with Multi-Lateral Generation Markets ("pools")

Price is Formed through Auction
Paid By Buyers
To Sellers

Monitoring is focused on
(1) Manipulation of auction;
(2) Manipulation of market rules

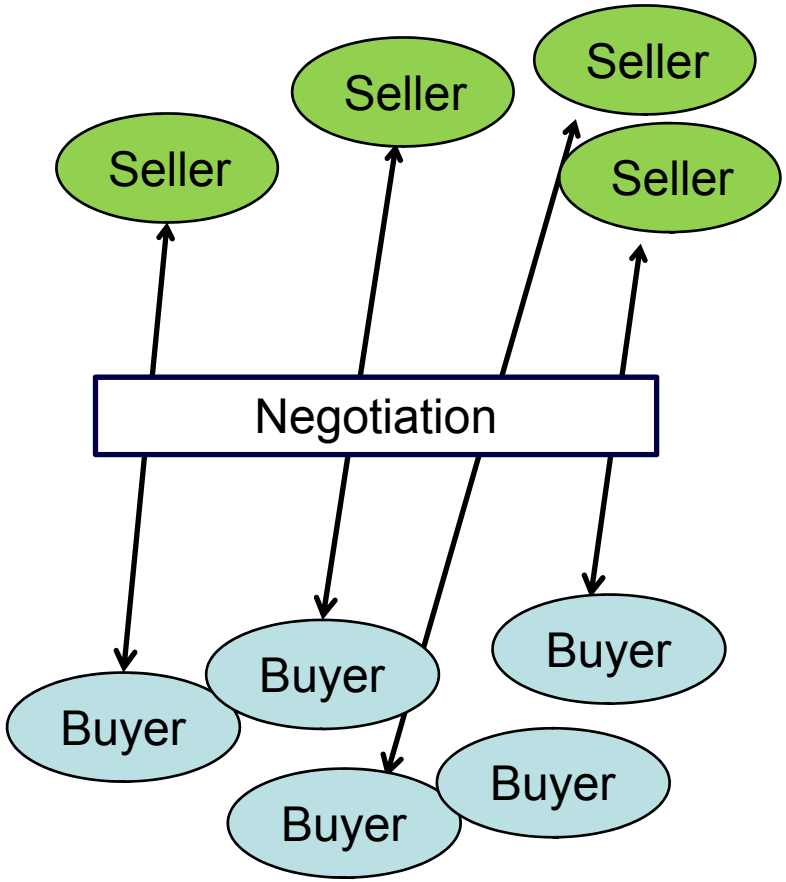



A Multi-Lateral Generation Market

Market Monitoring is also used in Bi-Lateral Generation Markets

Price is Formed through direct negotiation, through "tenders"

Monitoring is focused
(1) on transmission access;
(2) Seller Dominance




A Bi-Lateral Generation Market

# Market Monitoring in South East Europe

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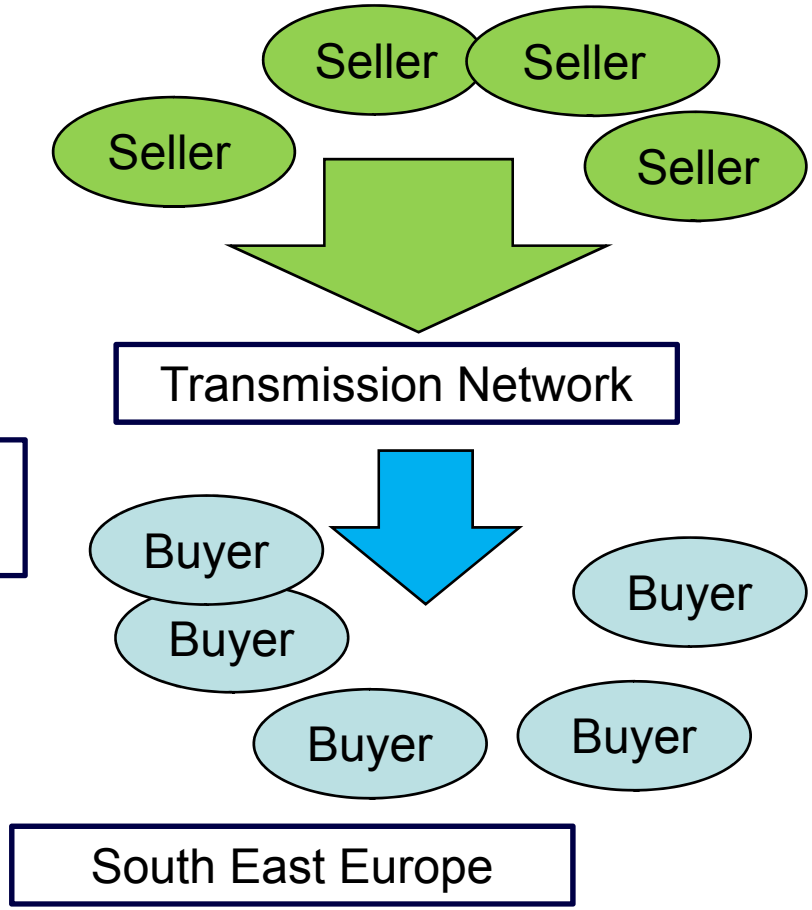
South East Europe is (mainly) a Bi-Lateral Market

A key Issue is transmission access

Transmission Limits can reduce market activity

*Via* Constraints

*Via* Hoarding



# Market Monitoring in South East Europe

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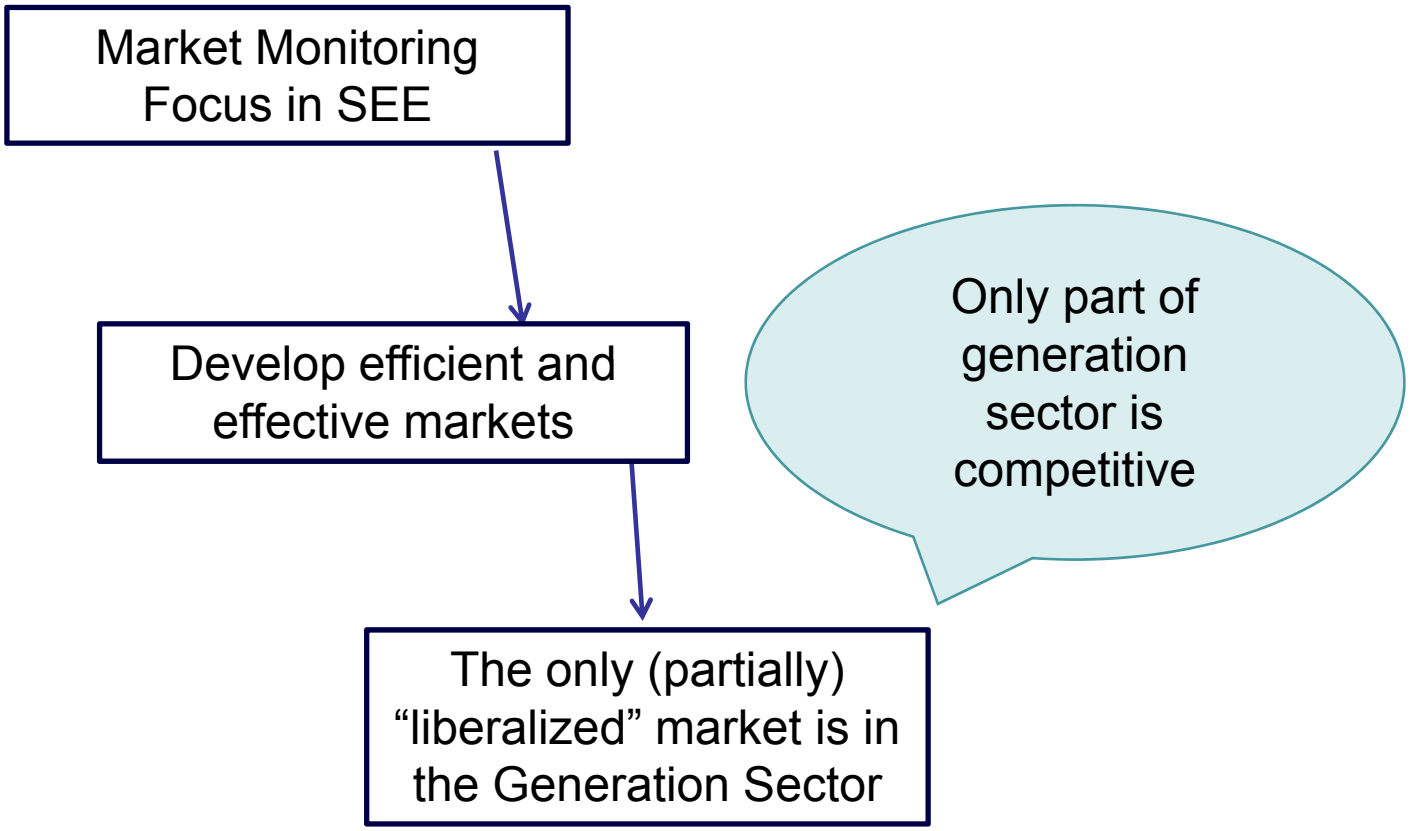
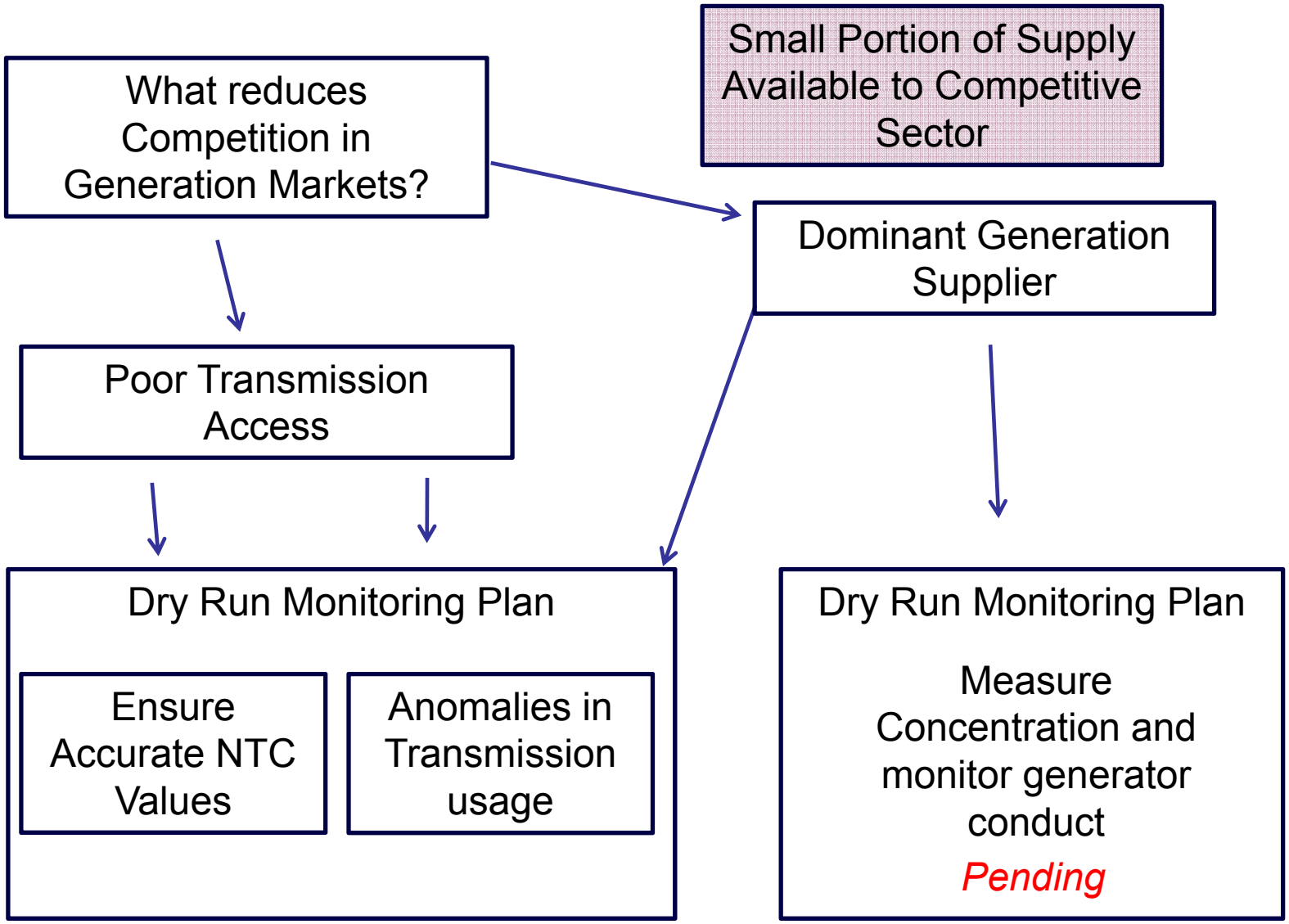
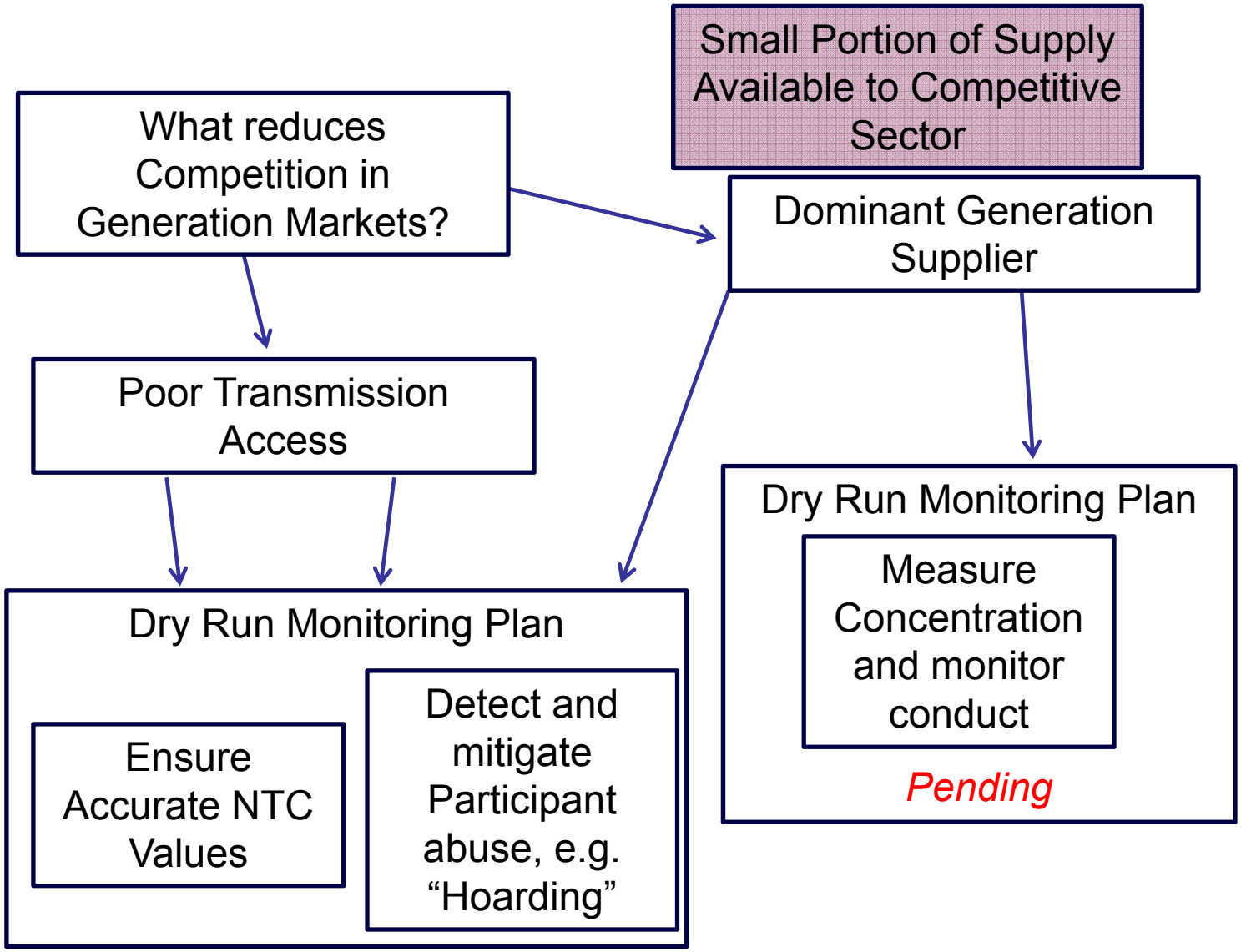


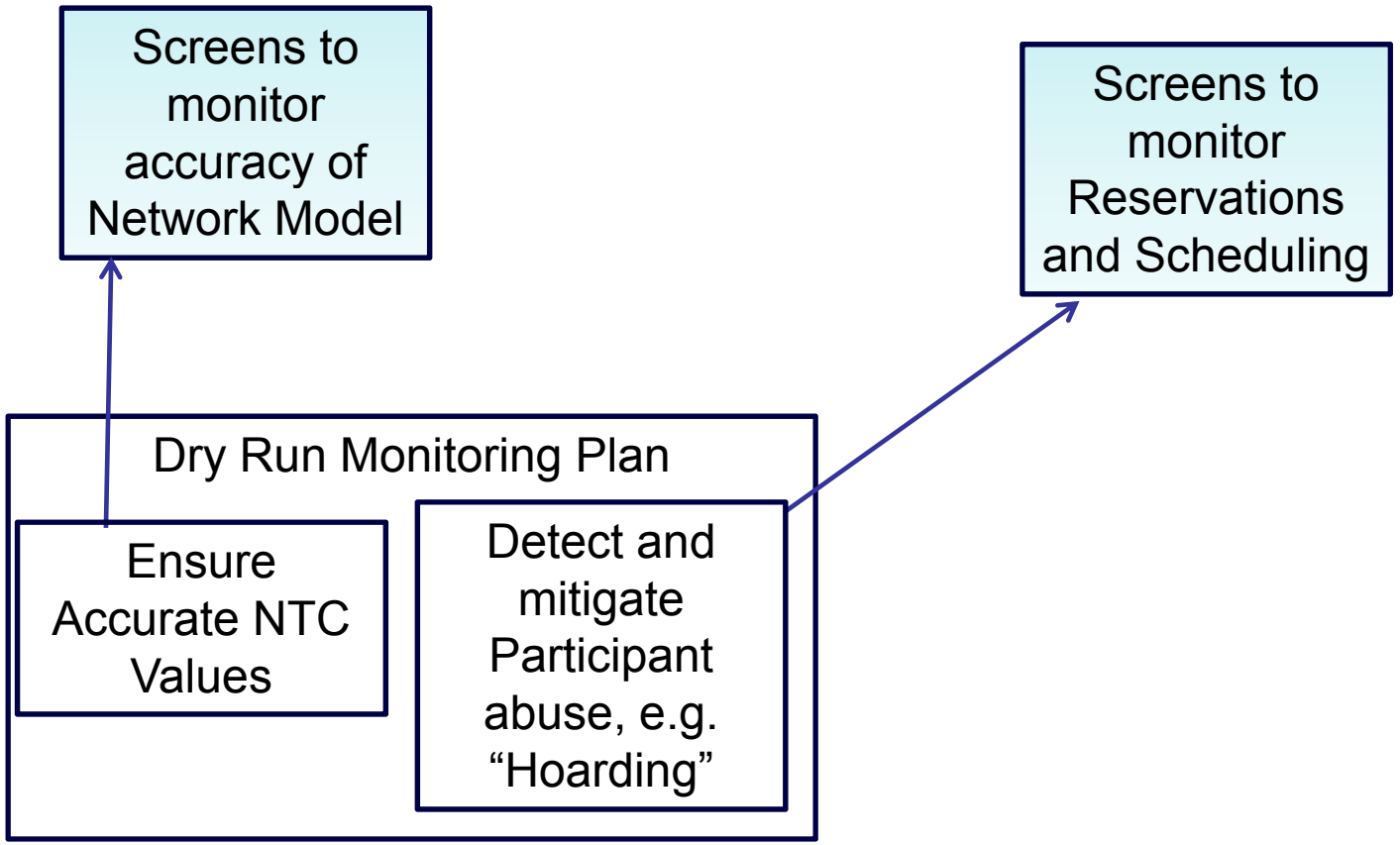
# Dry Run Market Monitoring Project



# Dry Run Market Monitoring Project



# Market Monitoring in South East Europe



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# USAID Market Monitoring Project in SEE

# USAID Market Monitoring Project in SEE Region: History

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- **MM Project** was initiated after invitation from the 8th Athens Forum in **June 2006** to establish a **Market Monitoring Pilot Plan**, which became effective in December 2006
- 12th Athens Forum (May 2008), ECRB and ECRB EWG **recommended continuing** MM Plan under a two-year **transition phase** that would lead to sustainable operations within ECRB, including **extension** of MM project in 2 streams:
  - **CAO Monitoring** modalities, and
  - **General MM - education of SEE regulators** on general MM activities
- **Primarily involves Cross-Border** transmission capacity market - **ensuring maximum capacity is available** on the interconnections and that this **capacity is allocated** and **used** in a **non-discriminatory manner**
- **MM Project** is designed with **goals**:
  - to **ensure accurate estimates** of **cross-border transfer capacity**
  - to **ensure proper utilization of reserved capacity** (i.e., no hoarding or over-scheduling)

# USAID Market Monitoring Project in SEE Region: History

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- **Very first phase**: Cross-Border Monitoring – **USAID/PE produced Quarterly Reports** and various templates due to the importance of maximum and non-discriminatory access to interconnectors
- ECRB EWG **recommended changing** Quarterly Report format and **starting more operational phase**: **learning phase** for regulators and **direct cooperation** between **TSOs** and **regulators** on **data collection** and **analysis**
- **USAID/PE** presented its **proposal** for **MM indicators** within MM general work-stream:
  - **Seven monitoring Screens** to accomplish the objectives for **monitoring Cross-Border transmission capacity market**
  - Market Monitoring **proposal** was agreed and **supported** by ECRB **EWG**, based on PE Screens proposal
  - MM **Dry-Run** has **started successfully** with Screen 1 in **November 2009** as part of Transitional phase

# USAID Market Monitoring Project in SEE region: History

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- The **MM Project includes** the **entire 8th Congestion Management Region**
- Project introduces a **single Screen** (1-7) **each month** and asks **NRAs** to **request** from **TSOs** very specific **data** to **calculate very specific screens** in order to be able to **make conclusions** regarding Screen analysis outcomes
- USAID MM **Workshop** was organized on 18 May 2010 in ECS premises in Vienna with support of ECS
- **SEE regulators** (EWG) were **invited** to participate this Workshop in order to **discuss** MM Screens, make **analysis**, pose **questions** and **comments** and try to **define an appropriate MM procedure** in the 8th Region on **common template basis**, **respecting ERGEG monitoring experiences**
- SEE **TSOs** representatives were **also invited** to participate MM Workshop as they are important for MM cooperation between regulators and TSOs

# USAID Market Monitoring Project in SEE

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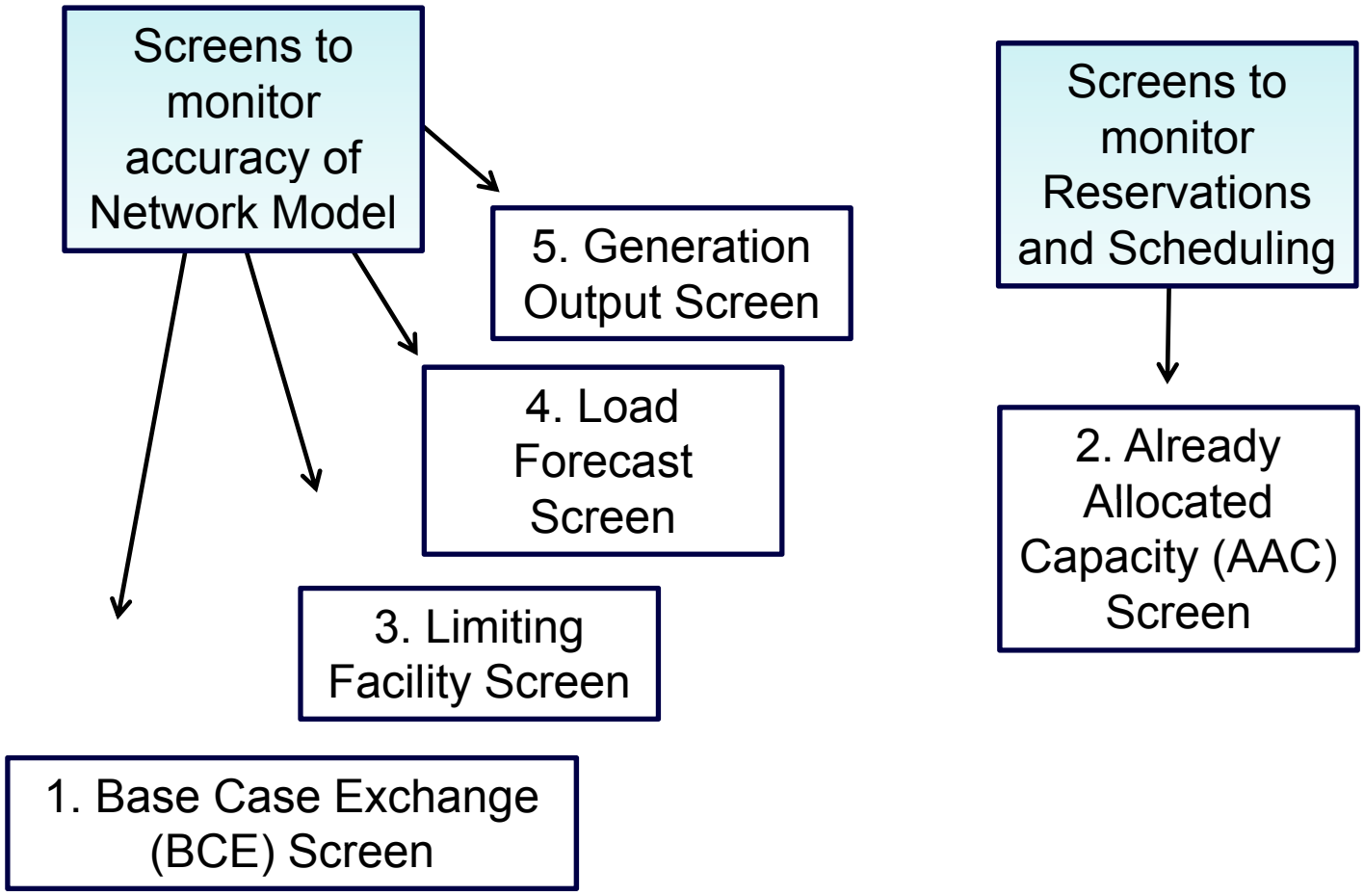
- These Screens have **focused only** on **cross-border** transmission capacity as **first phase** of MM Dry-Run
- **Later** phases will **focus** on **other aspects of the market**, e.g. generation (as electricity market evolves, develop and mature)
- With respect to each individual Screen, **NRAs** and **TSOs** aimed to **determine** whether:
  - There is agreement on the technical correctness of the Screen?
  - There are clear benefits from Screen implementation?
  - Regulators should implement the Screen?
- After examining all four Screens for which Dry-Run experience was available, all NRAs and all TSOs attending **concluded** the **Screens** are **desirable** and **beneficial** for **removing obstacles** to market competition in the 8th region
- It was also concluded that EWG will propose to and seek ECRB approval in June 2010 to draft MM Guidelines for the 8th Region based on Screens accepted at the Workshop (This task would be undertaken by USAID/Potomac Economics)

# The Dry Run Market Monitoring Project



# 8th Region Market Monitoring Guidelines

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## Draft Market Monitoring Guidelines (Screens 1-4)

- It was concluded that, upon ECBR approval, **Market Monitoring Guidelines** would define the **minimum set of commonly introduced MM Screens** (for cross-border issues) for all NRAs of the 8th Congestion Management Region
- At the May 2010 SEE Market Monitoring Workshop, NRAs and TSOs recommended adopting Dry-Run market Monitoring Screen 1-4 as the basis for the 8th Region Market Monitoring Guidelines;
- ECRB approved drafting of the 8th Region Guidelines and PE submitted this Draft to EWG in 2010;
- One key addition was made, this was the use of a “reference value” for the screen threshold:
  - ✓ Thresholds were initially set at -/+ 15% (i.e., the screen failed if the forecast error was greater/less than 15% of the actual value)
  - ✓ As introduced at the MM Workshop, PE proposed using reference values instead

# Reference Values in 8th Region Guidelines

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- **Reference Value** is a **threshold** value that is **based on empirical experience**
- Reference values are **used widely** in market monitoring systems
- The underlying theory of a reference value is that **in many circumstances**, **market and operating data will reflect competitive conditions**
  - ✓Hence, historical experiences during "competitive" periods represent values to which current conditions can be compared
- The key is finding periods when "competitive" conditions prevailed
- PE suggested to use the middle 70th percentile as representing "competitive" conditions:
  - ➢We eliminate top 15% of observations and the bottom 15% of observations
  - ➢The highest and lowest values within the 70th percentile are the upper and lower threshold

# Reference Values in 8th Region Guidelines

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- **Example of Reference Value**
- Suppose we have these forecast errors for Screen 1 (BCE)

| | |
|---|---|
| 150% | 90% |
| 140% | 40% |
| 140% | 10% |
| 135%`` | 0% |
| 125% | -5% |
| 120% | -10% |
| 110% | -15% |
| 100% | -30% |
| 100% | -50% |
| 95% | -100% |

85-percentile is 137%

15-percentil is -17%

Middle 70th percentile
-17%, 137%

# Reference Values in 8th Region Guidelines

- BCE Screen (Screen 1)
  - Upper Bound: 81%
  - Lower Bound: -85%
- AAC Screen (Screen 2)
  - Upper Bound: 80%
- Critical Facilities Screen (Screen 3)
  - Upper Bound: 32%
  - Lower Bound: -80%
- Load Forecast Screen (Screen 4)
  - Upper Bound: 28%
  - Lower Bound: -2%

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# Monitoring the Network Model

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- **Network Model** is **used** to **estimate cross-border capacity**
- **Reasons** for the Initial Focus on Network Model
- A critical component of the Liberalized sector
  - ✓Cross-Border Trade **essential** to market **development**
- **Screens** would **also fit Coordinated Auction Monitoring** program

# Market Monitoring the Network Model

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**Network Model**

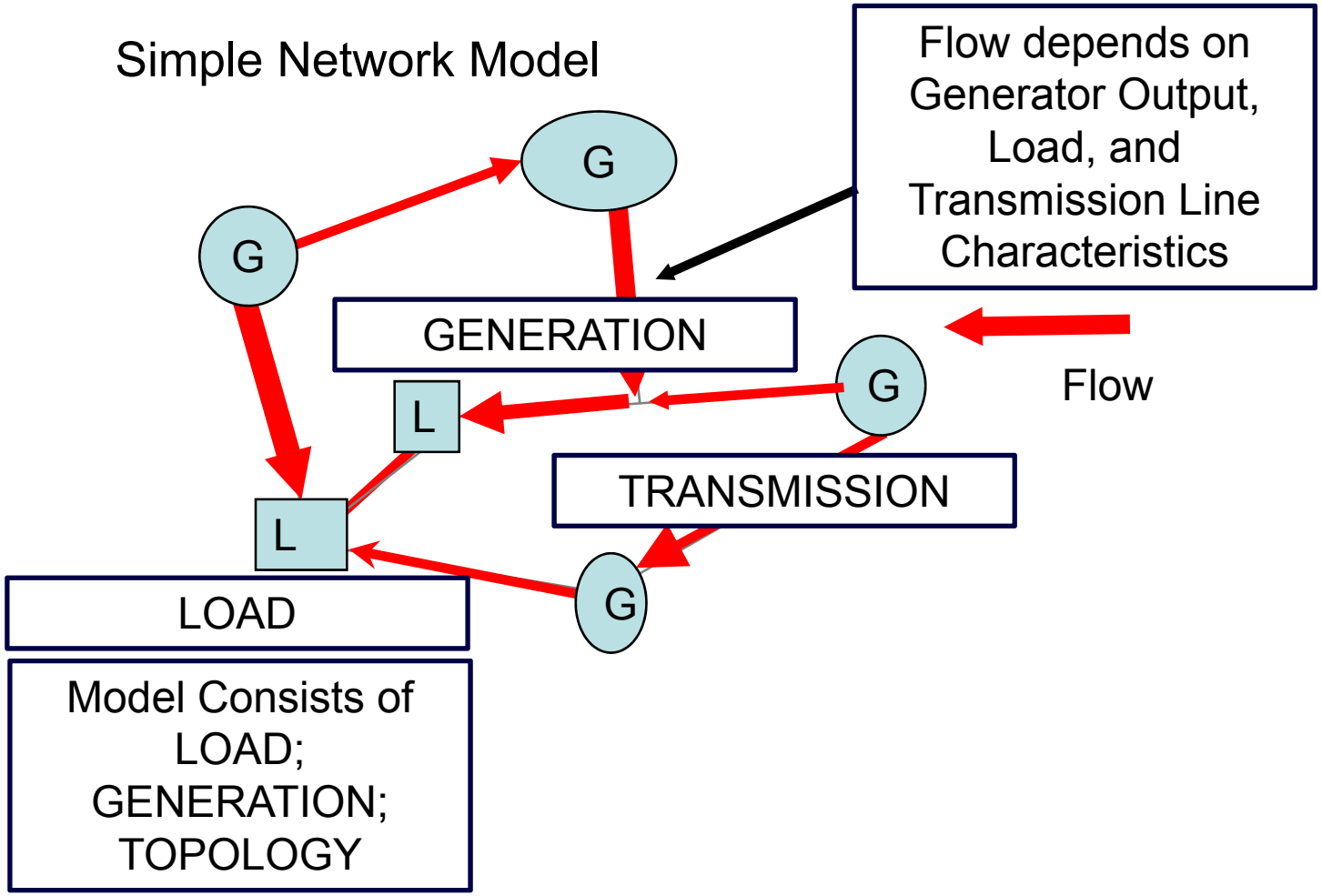
- Simulation of the Electrical System including:
  - Transmission Elements;
  - Load;
  - Generation; and
  - Control Area Exchanges
- Network Model is **used** to **estimate NTC values**, which **indicate** the **capacity available** on the cross-border interconnections for exchanges

# The Network Model



Network Model

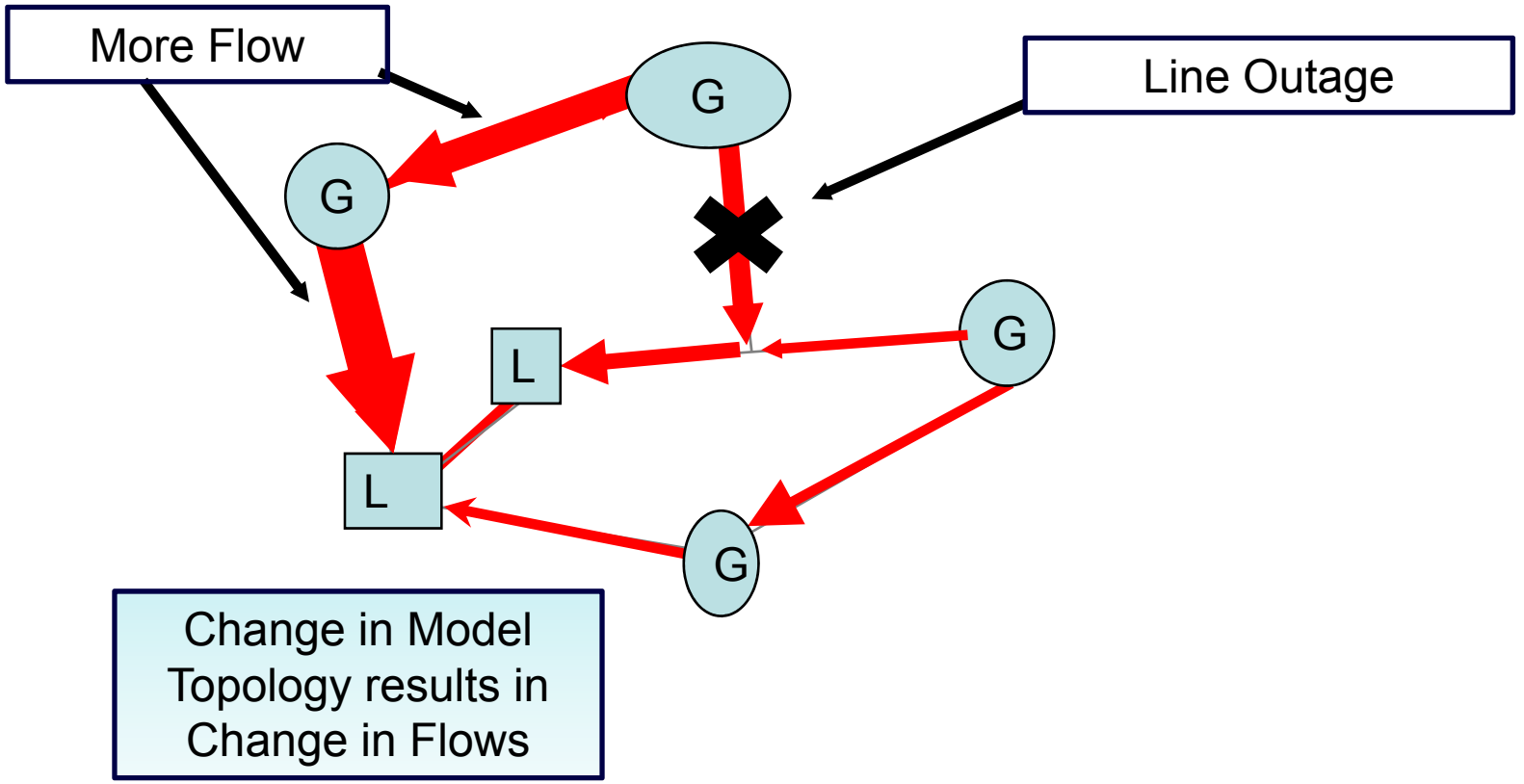
Simple Network Model



# The Network Model

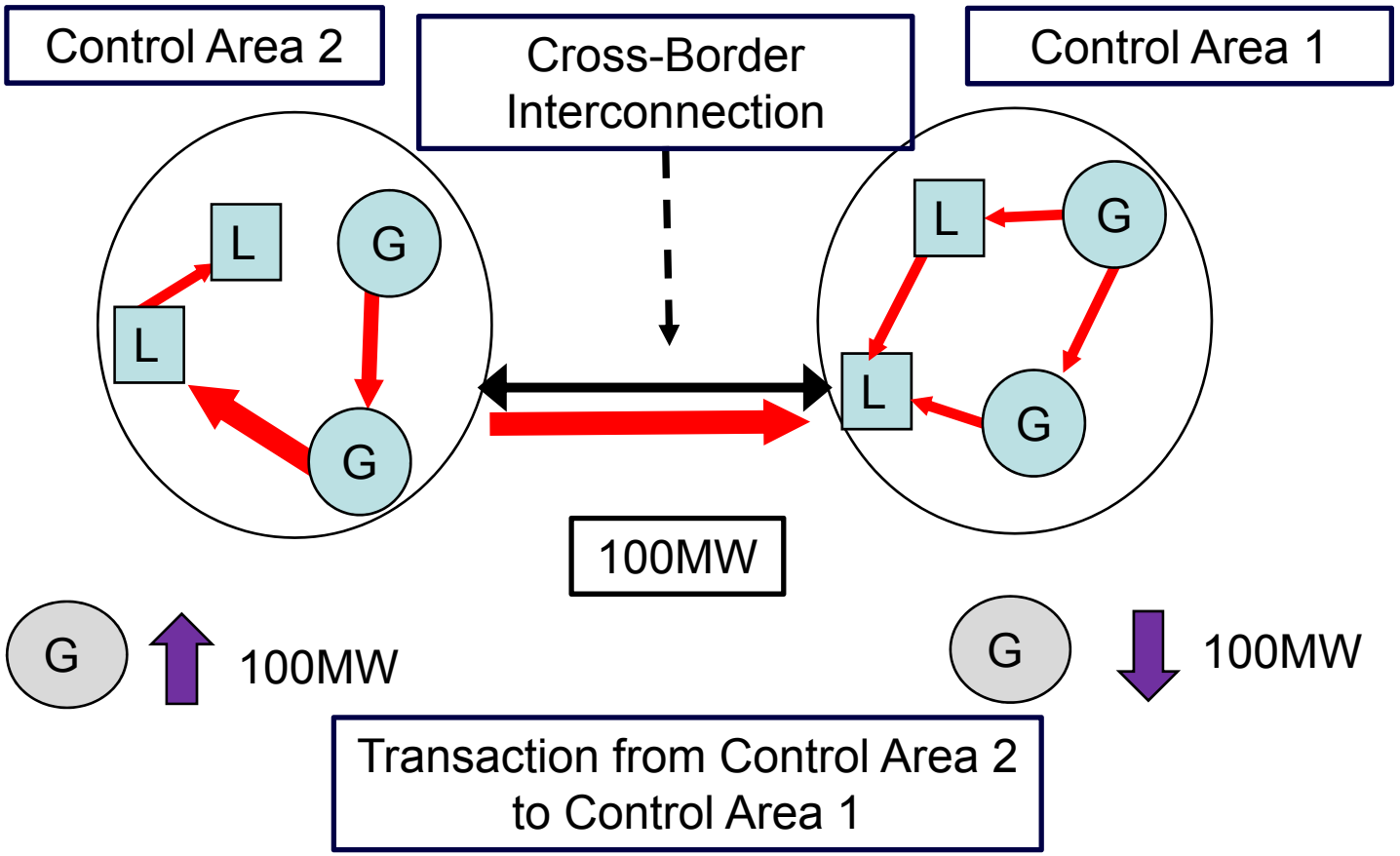


Simple Network Model Affects of an Transmission Outage



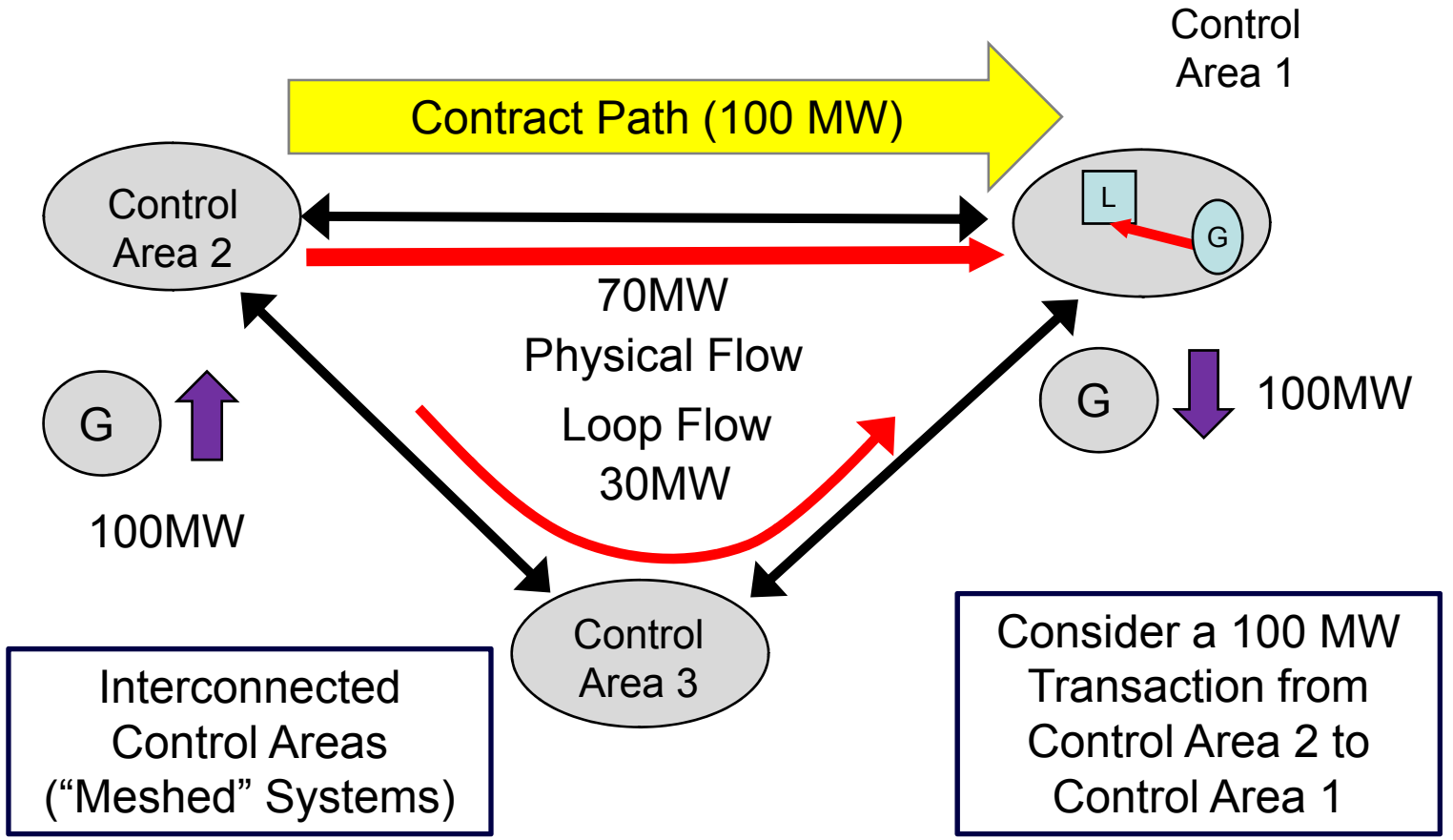
# Regional Network Model





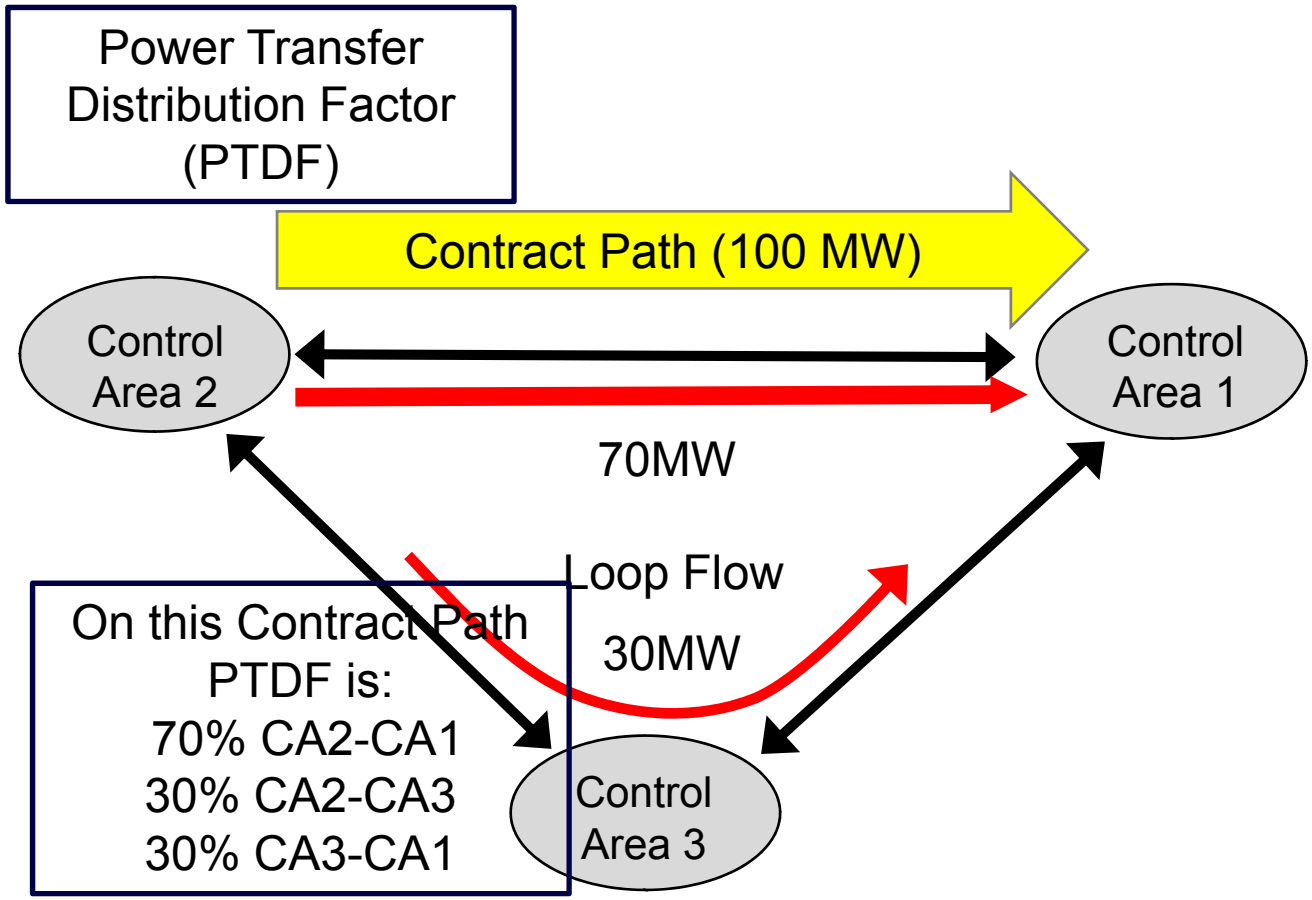
# Regional Network Model





# Regional Network Model

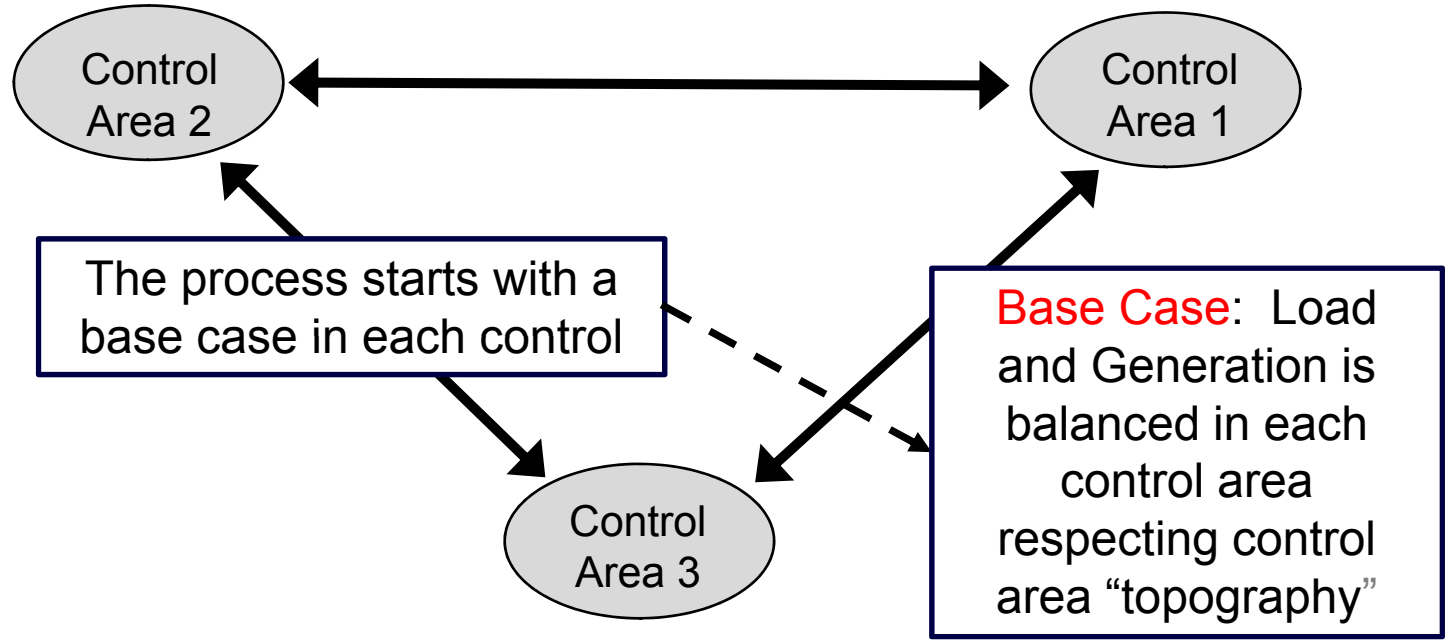




# Network Model and Net Transfer Capacity (NTC) Calculations

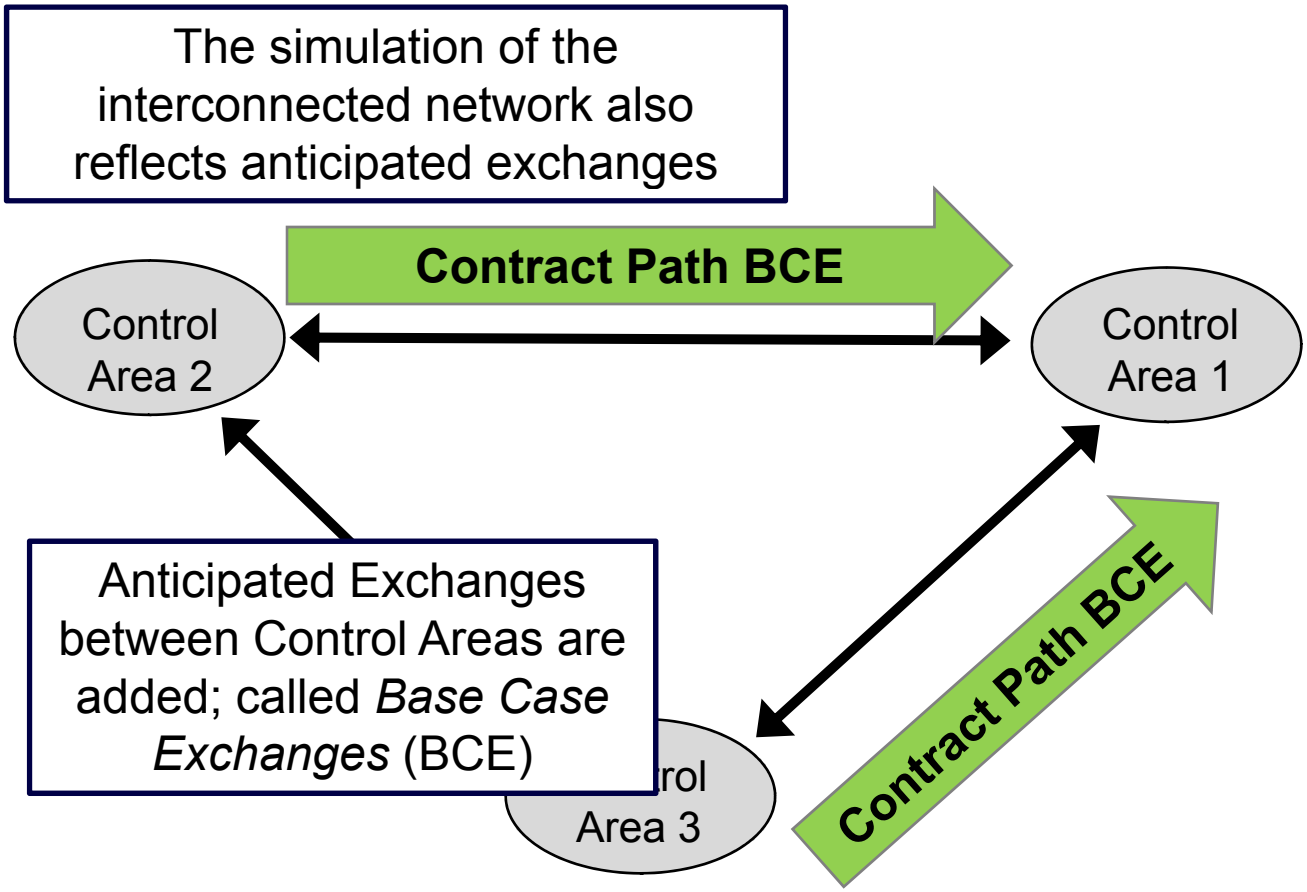
NTC is a contract-path concept: It determines the maximum Reliable transfer between two control areas

NTC is based on a simulation of the interconnected network



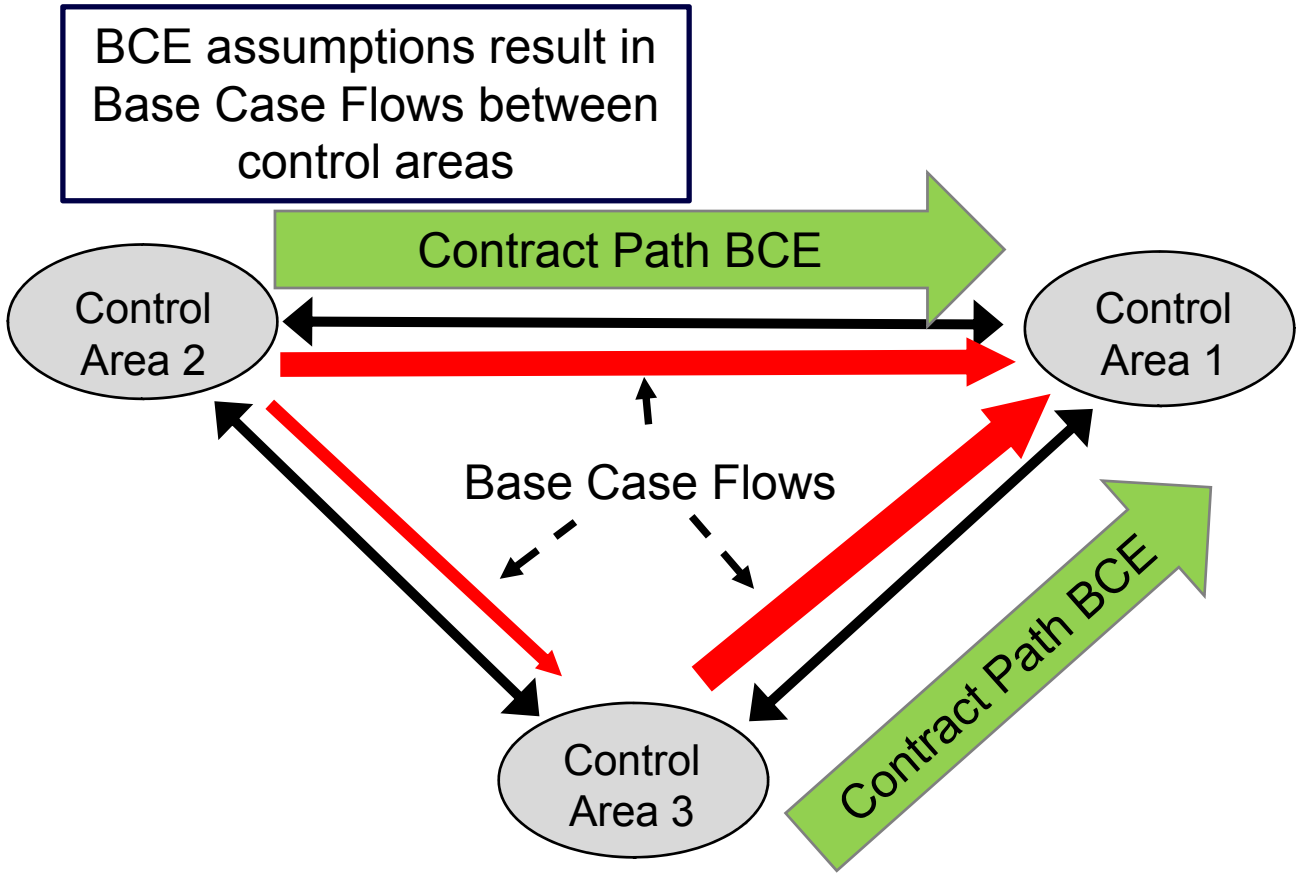
# Net Transfer Capacity (NTC) Calculations





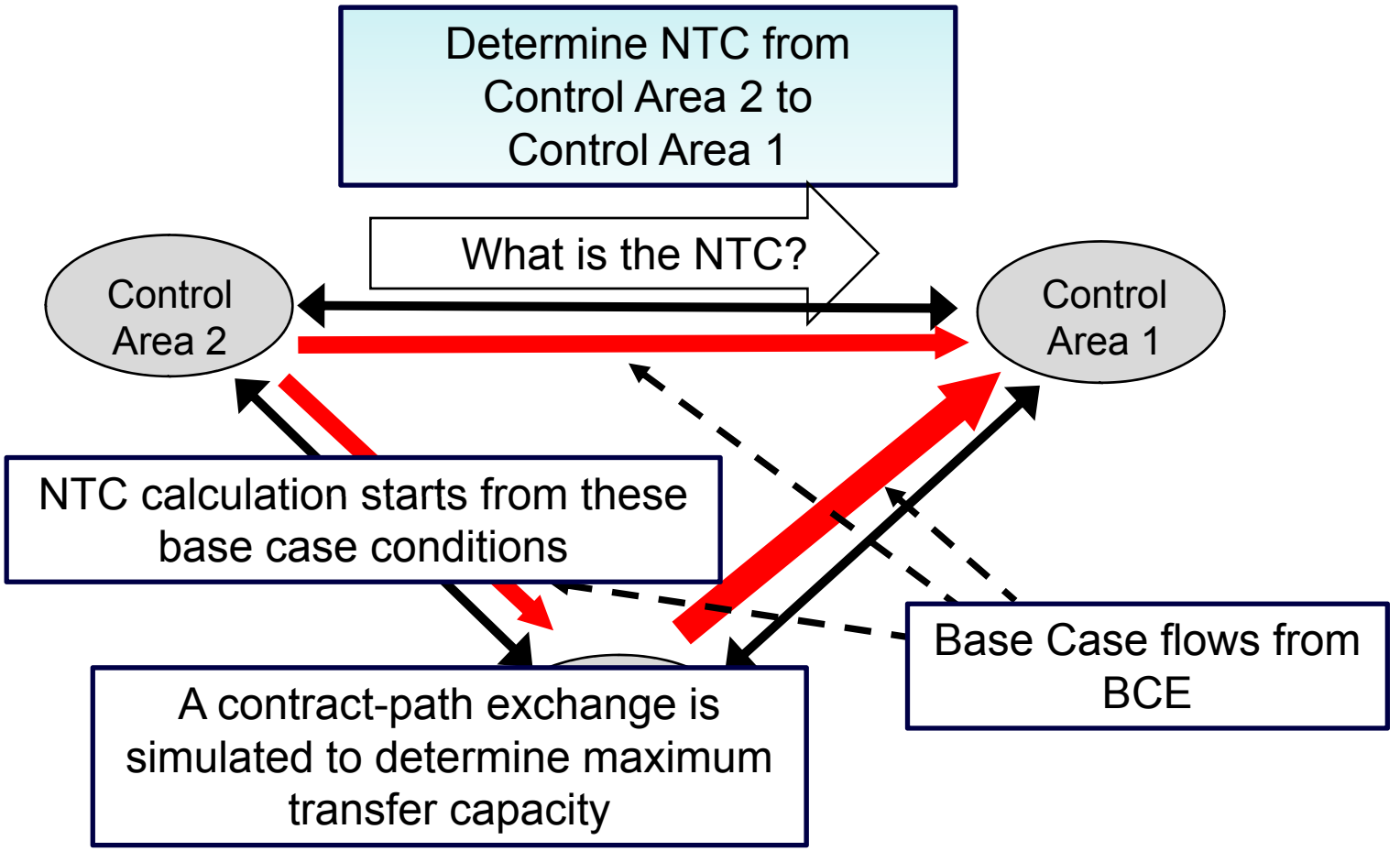
# Net Transfer Capacity (NTC) Calculations





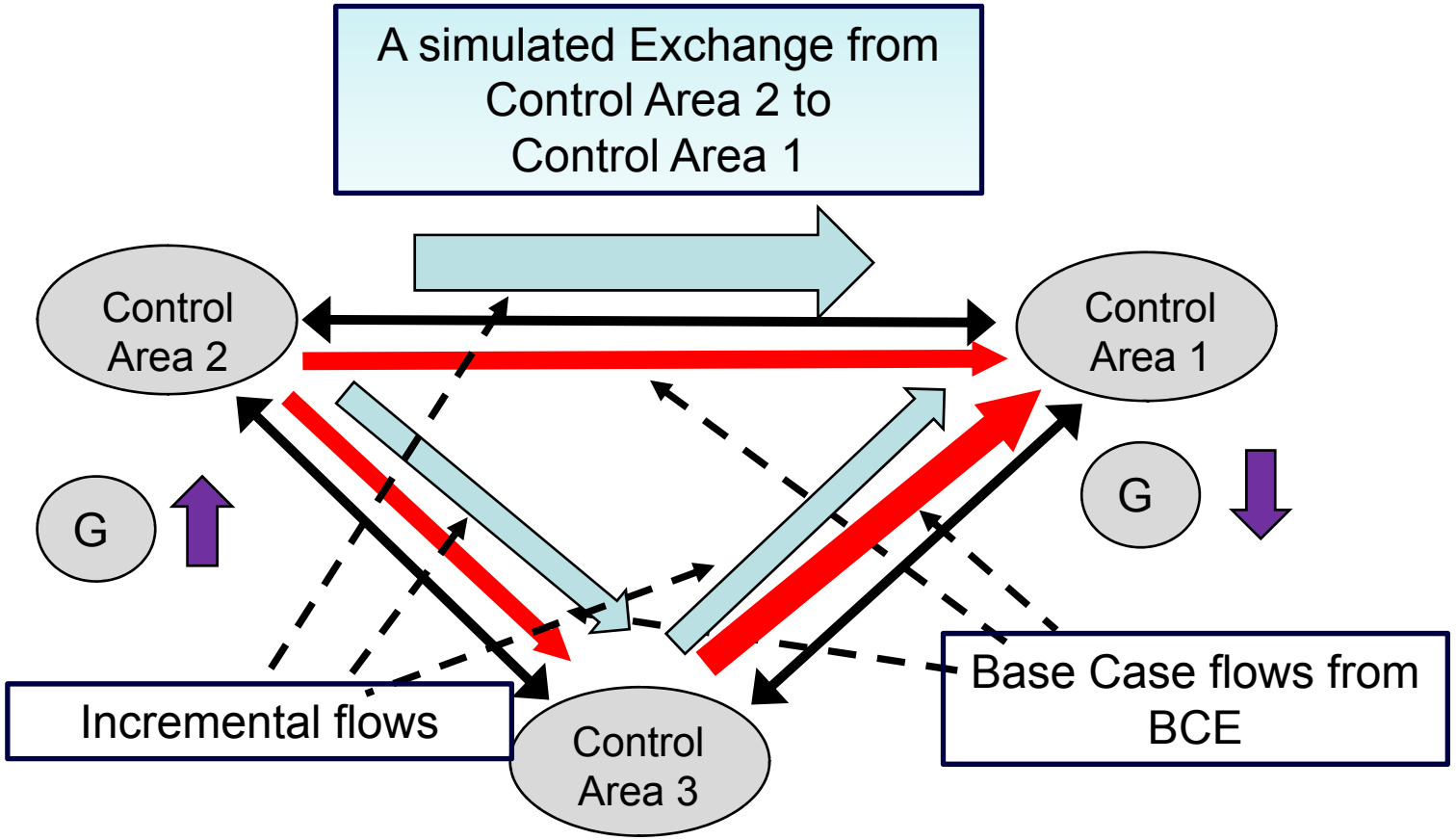
# Net Transfer Capacity (NTC) Calculations





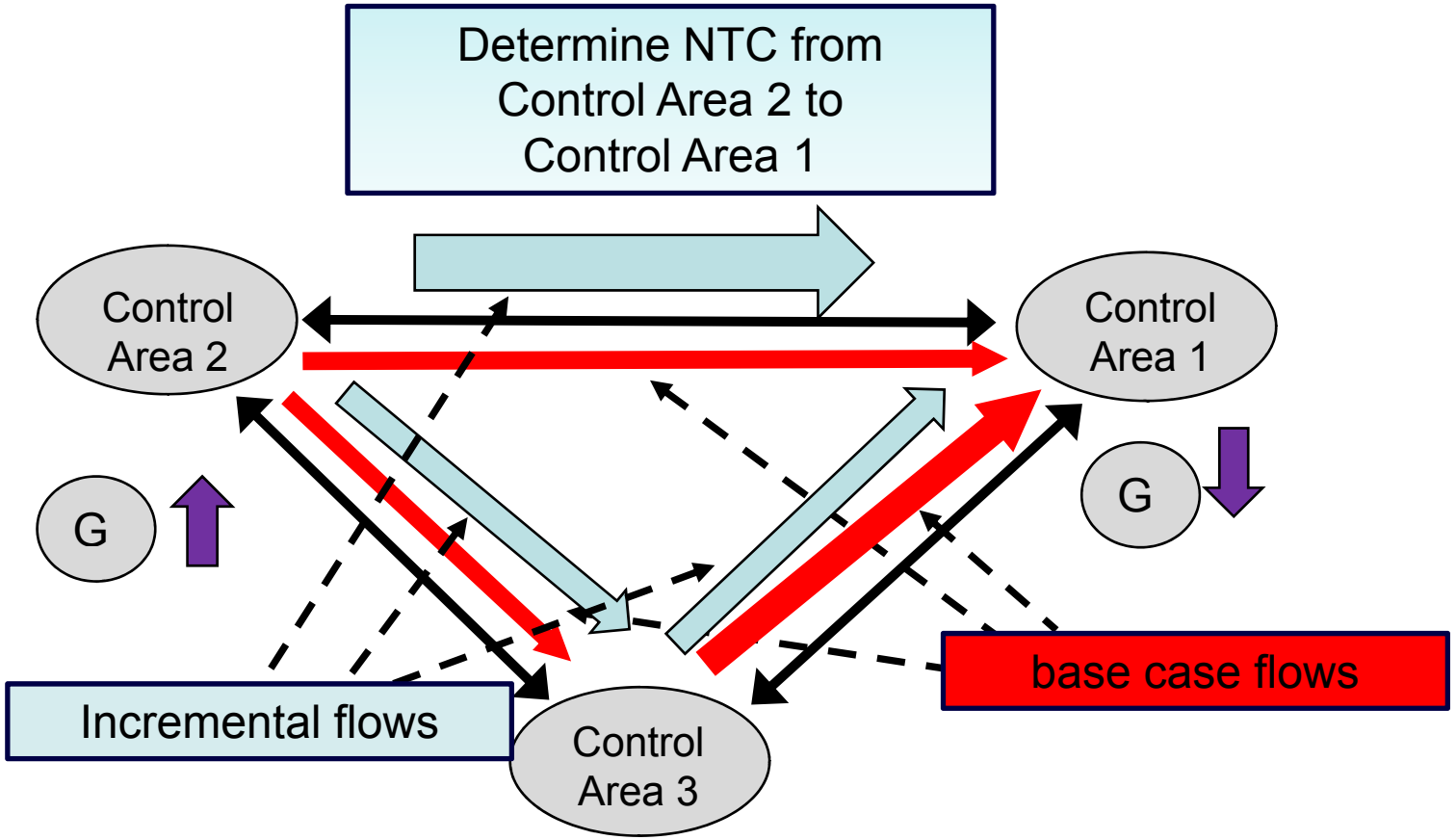
# Net Transfer Capacity (NTC) Calculations





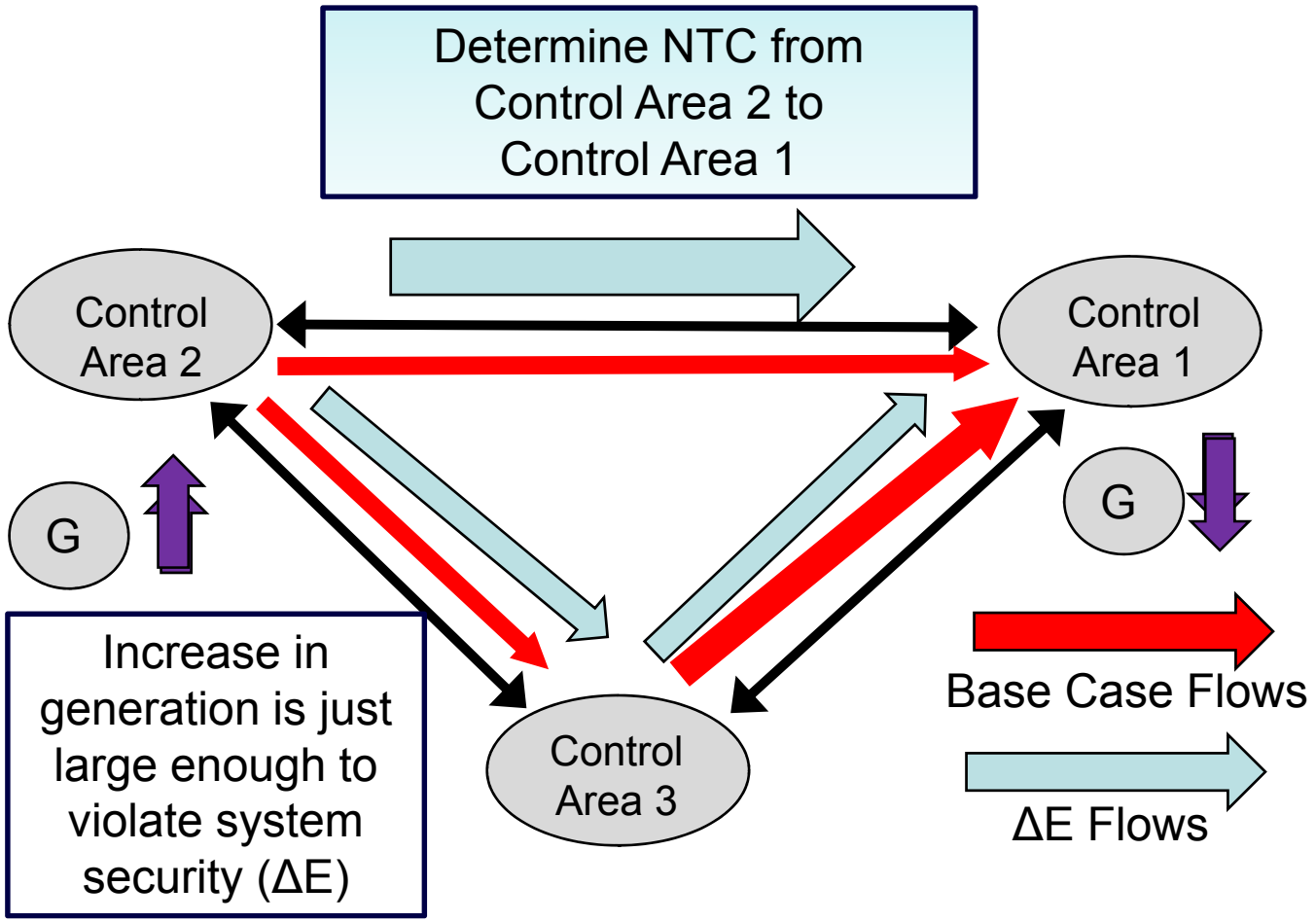
# Net Transfer Capacity (NTC) Calculations





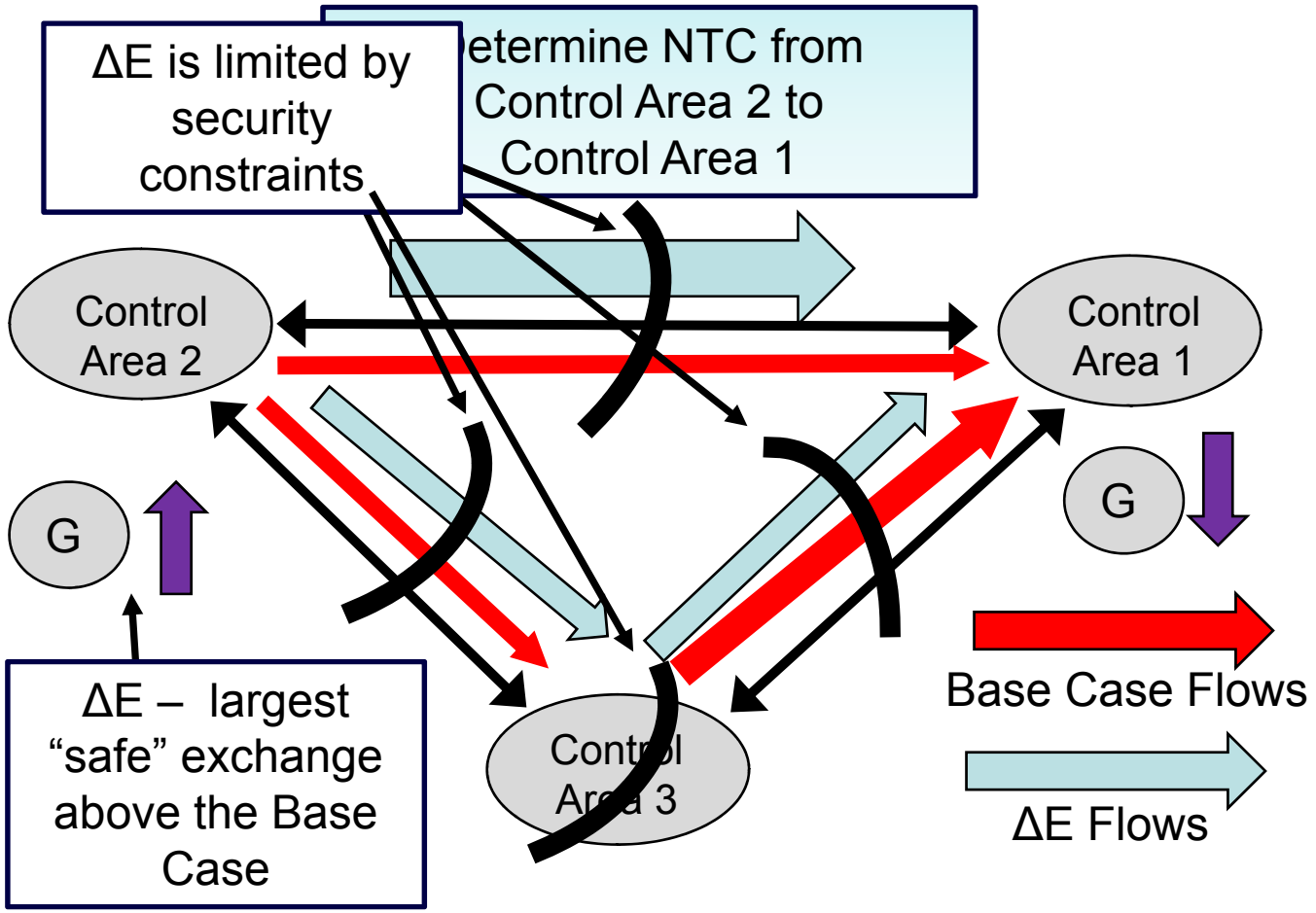
# Net Transfer Capacity (NTC) Calculations





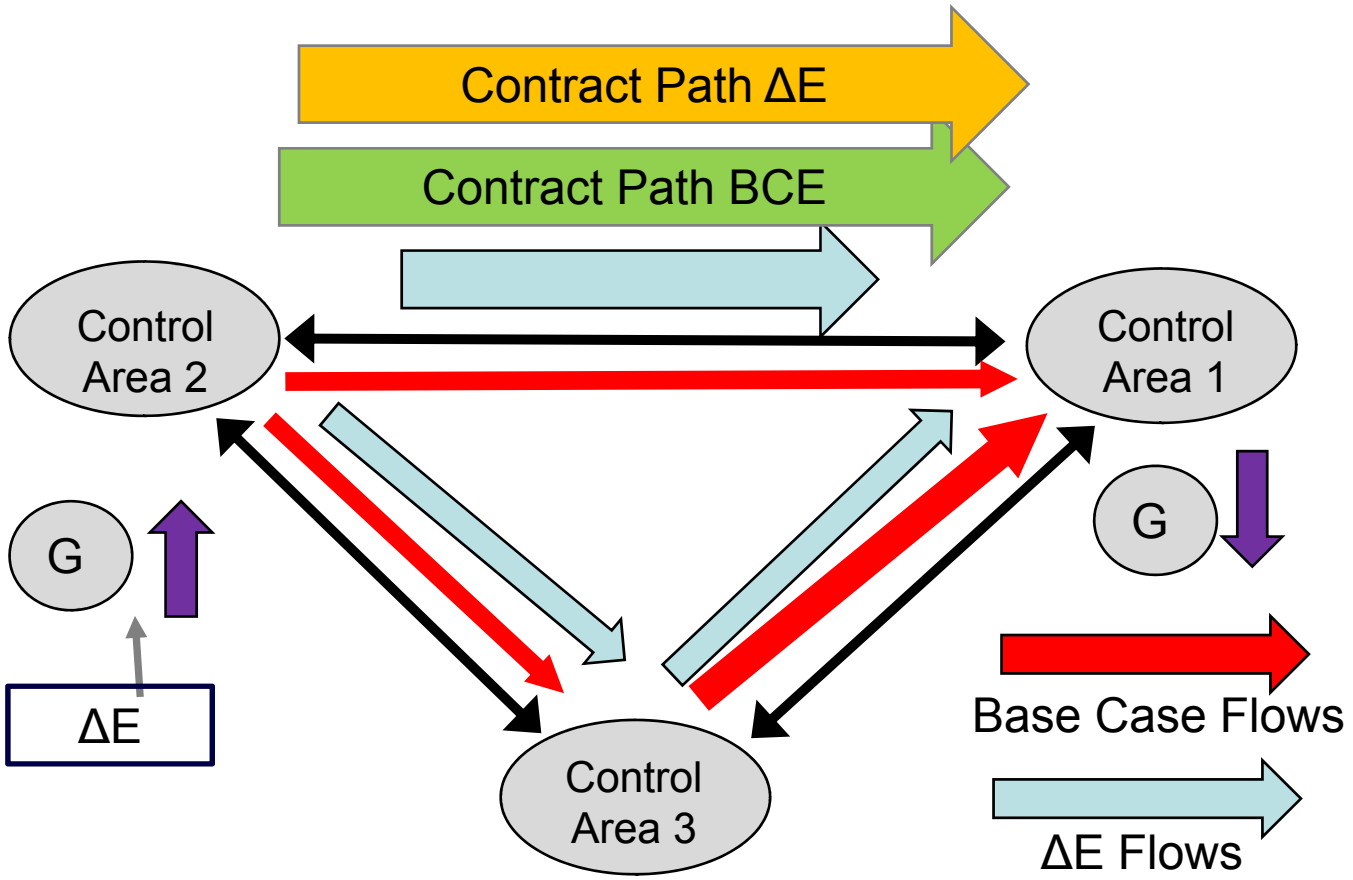
# Net Transfer Capacity (NTC) Calculations





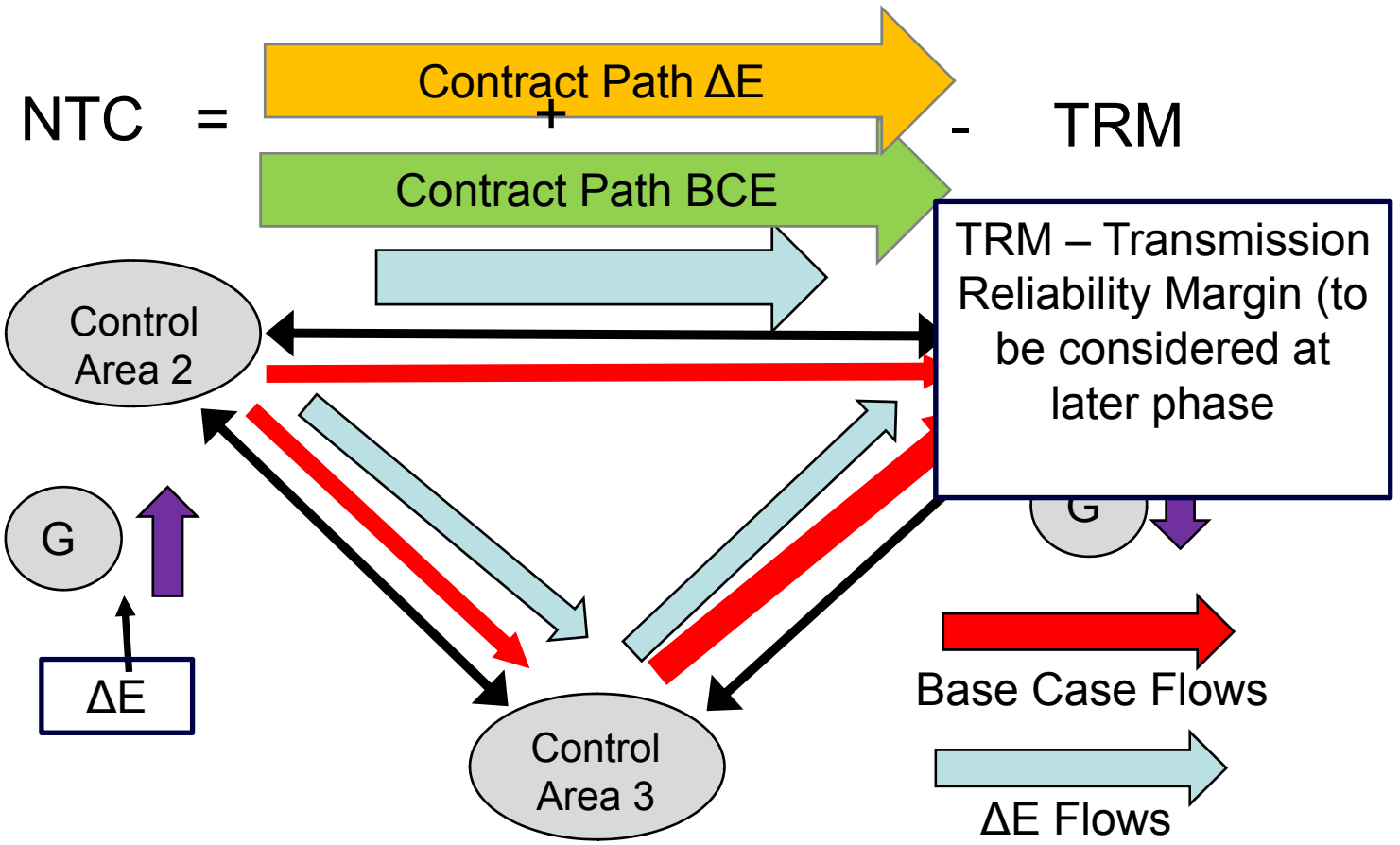
# Net Transfer Capacity (NTC) Calculations





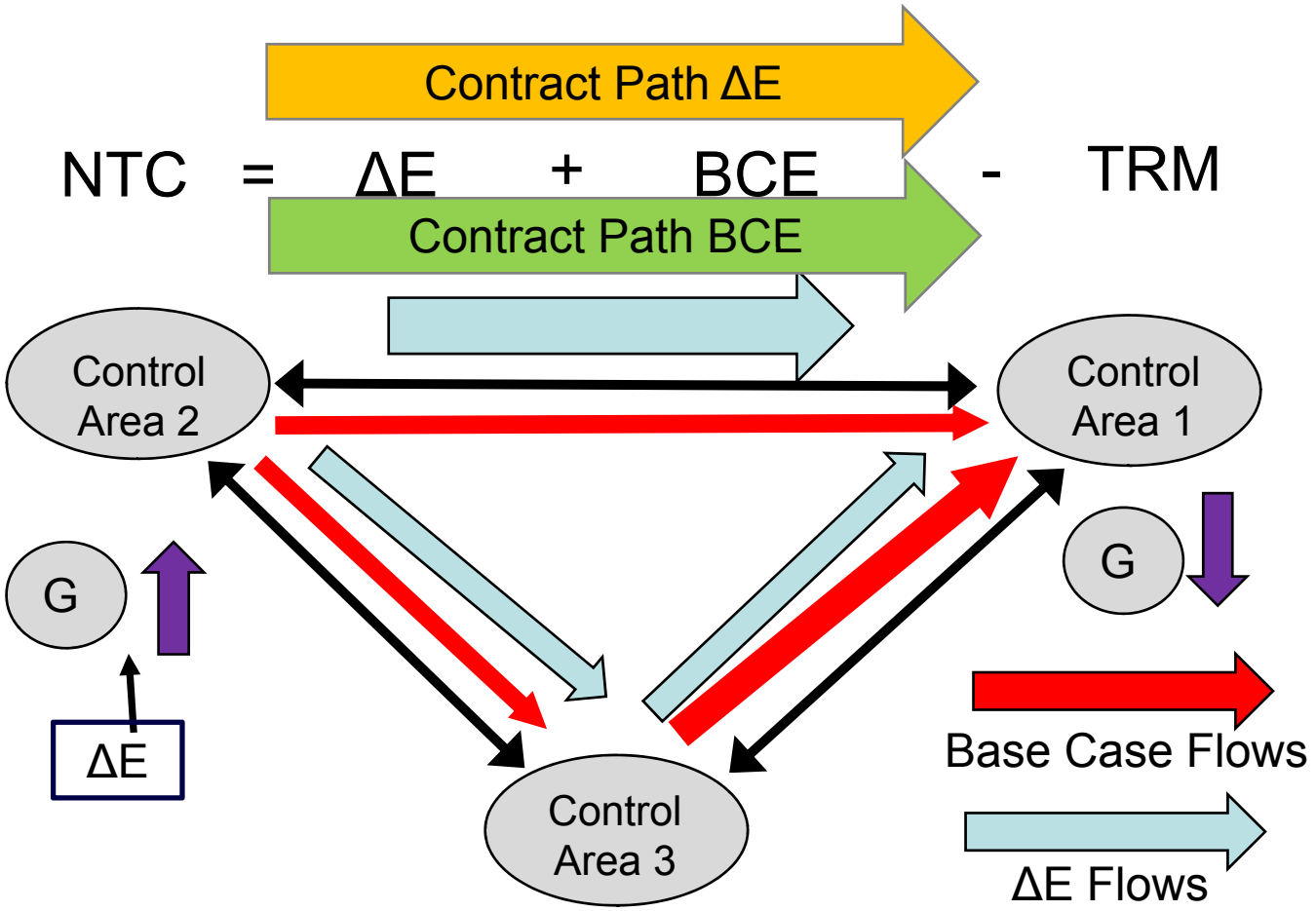
# Net Transfer Capacity (NTC) Calculations





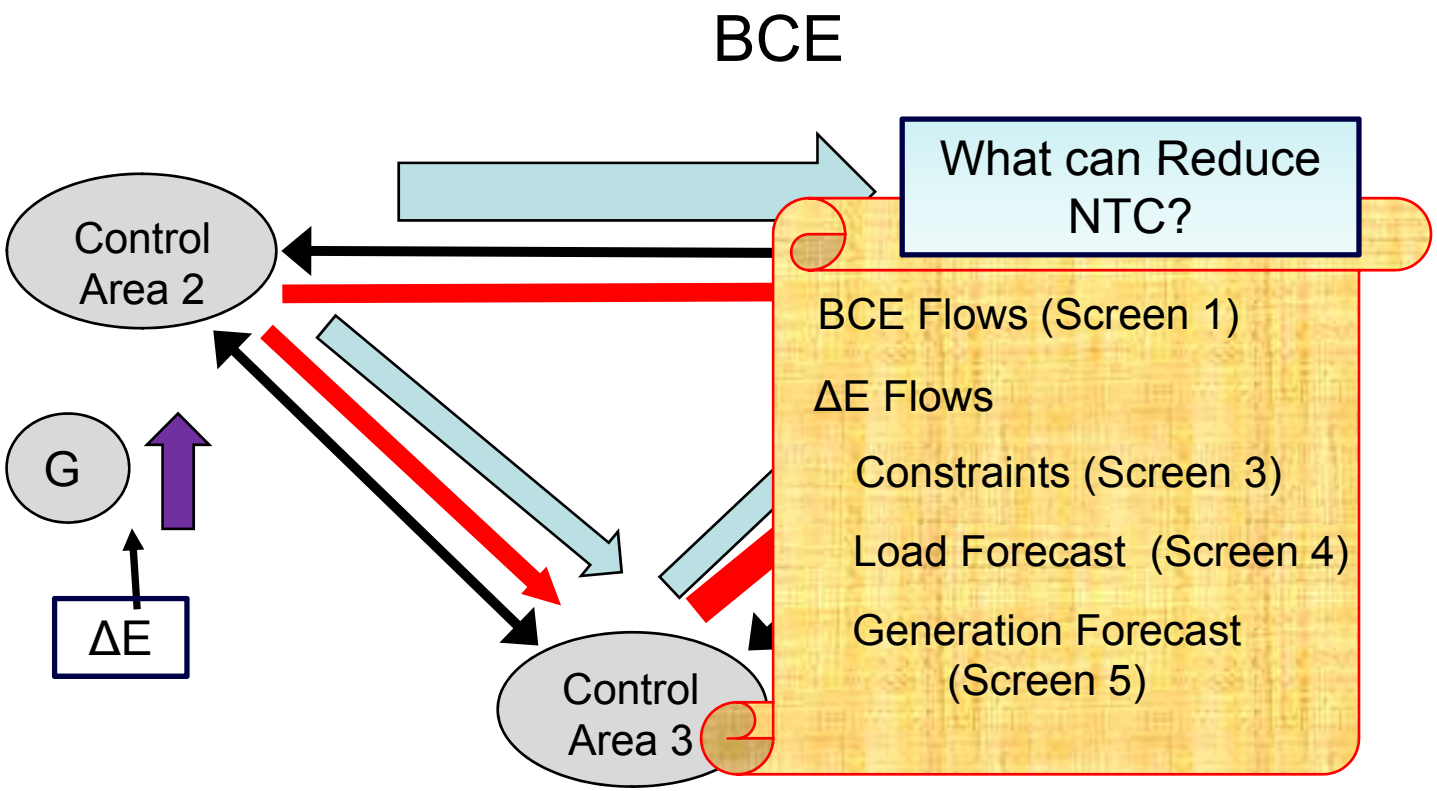
# Net Transfer Capacity (NTC) Calculations





# Total Transfer Capacity (TTC) Calculations





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# Market Monitoring Dry Run Project in SEE

# SEE MM Dry Run Project: Status of Play

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- EWG started the Dry Run project in September 2009
- The project introduces a single screen each month
- Five Screens have been introduced as of 1 May 2010
- More screens were introduced afterwards
- These screens have focused on cross-border transmission capacity
  - This comprises “Part I” of the Dry Run
  - Part II will focus on other aspects of the market, e.g., generation

# SEE MM Dry Run: Procedures

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**Basic Approach** of **Dry Run**:

- NRAs to collect national (control area) data from TSOs
- Calculate screens
- Conduct follow-up when screens indicate an anomaly that may adversely affect the market
- Screens are established in advance
- Follow-up depends on circumstances

# Regulation EC 1228/2003

**In addition** to the NRAs' **National focus**, NRAs would **"cooperate"** by **sharing the monitoring data**:

- This enables the **addressing of regional issues**
- This cooperation is envisioned in **Regulation EC 1228/03 (714/2009)**:

*(Article 9): "Where appropriate to fulfill the aims of this Regulation [NRA's] shall cooperate with each other and with the Commission."*

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# SEE MM Dry Run

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- The **Dry Run** is **developing** the **capacity** for **NRAs** to **perform** their **own National monitoring**
- Furthermore, as explained previously, there is a **need** for **regional analysis**
- Who is going to analyze the data on a regional level to help NRAs and EWG to “cooperate”?
- We do not believe it requires new authority for existing entities or a new supra-regional entity
- There are two options that appear to be practical

# SEE MM Dry Run Results: Participation

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- All 8th Region Countries have participated - Except Bulgaria, Hungary have not provided data for any period of Dry Run
  - Montenegro regulator is attempting to gain TSO participation
  - The participation has been regular and thorough
- For Screen 5, most NRAs have been successful at obtaining data on generator output; Aside from Bulgaria, Hungary, and Montenegro, only Croatia continues to face obstacles in securing this data;
- Due to the need for a time series of data, missing data causes problems

•Missing data has caused many instances where the screens cannot be evaluated;

  – Part of this is related to the fact that consecutive months of screen data is necessary to complete the monitoring
  – In particular, a screen violation occurs when an individual month's screen exceeds the threshold and it was exceeded in two of the previous three months;
  – This requires four consecutive month's of data;

# SEE MM Dry Run Results: Missing Data

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- Missing data has caused many instances where the screens cannot be evaluated;
  - Part of this is related to the fact that consecutive months of screen data is necessary to complete the monitoring;
  - In particular, a screen violation occurs when (1) an individual month's screen exceeds the threshold and (2) it was exceeded in **two** of the previous **three** months;
  - This requires four consecutive month's of data;
- **Recommendation**: Change Screens to a screen violation occurs when an individual month's screen exceeds the threshold and it was exceeded in **one** of the previous **two** months;
  - This is appropriate given the introduction of percentile thresholds;
  - It will also reduce the impact of missing data;

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# SEE MM Dry-Run: Summary

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- The Dry-Run Market Monitoring project was initiated at the invitation of the ECRB Electricity Working Group at its 16 September 2009 meeting
- The intent of this project is to use an on-line exchange (email) among regulators, TSOs, and USAID consultants to study market monitoring tools and processes
- This exchange will recur monthly with the objective of addressing the details of a single market monitoring screen each month
- In the initial stage of the project, we will focus on screens relating to congestion management, especially the estimation and utilization of cross-border capacity
- Subsequently, we expect to address other aspects of the electricity market, including the generation sector, the coordinated auction, the balancing mechanism, and the centralized wholesale market opening

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# 8th Region Market Monitoring Guidelines

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# Goal

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- Present Each Dry Run Screen:
  - Theory
  - Measurement
  - Results
  - Go forward with Screen?
- Round Table on Experience – Workshop on MM
- Regional vs. National Monitoring / Coordinated Auction
- Next Steps

# 8th Region Market Monitoring Guidelines: Status of Market Monitoring Screens



All screens in the Guidelines are concerned with cross-border activity;

- **Screen 1**: Base Case Exchange (BCE) Screen. Monitors the accuracy of cross-border transactions forecasts in Network Model;
  - –Network Model is used to establish cross-border Net Transfer Capacity (NTC)
- **Screen 2**: Already … en: Monitors the usages of cross-border reser… olding (Hoarding);
- **Screen 3**: Critical … s the accuracy of Network Model outcomes on cross-border limiting facilities;
- **Screen 4**: Load For… e accuracy of load forecasts in Network…
- **Screen 5**: Generation Output Screen – Monitors the accuracy of generation forecasts in Network Model;
- **Screen 6**: TRM … tions;
- **Screen 7**: Contr… itors imbalances for TRM accuracy an…

Already Recommended by EWG to ECRB for 8th Region MM Guidelines

Awaiting EWG action; Most NRAs currently able to provide data.

Propose to combine into a single Screen 6 to address TRM.

# Market Monitoring Guidelines: document

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Table of Contents

# Screen 1:
# Base Case Exchange (BCE)

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# Screen 1: Comparison of Base Case Exchange Assumptions to Cross-Border Schedules

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- Introduction: The Role of BCE in Calculating ATC
- Data Requirements
- Calculation of Screen
- Screen Threshold and Interpretation of Results
- Explanations based on: ENTSO-E, "Procedures for Cross-Border Transmission Capacity Assessments" (October 2001)

## Screen 1: Base Case Exchange (BCE) Screen

- This Screen is intended to **monitor accuracy of the assumptions of Network Model used to calculate net transfer Capacity** (NTC)
- NRAs and TSOs **accepted** this Screen
- **TSOs** should **cooperate strongly among themselves** to **harmonize process of establishing BCE values**
- **Dry-Run Reports** should **report BCE values** (for each NRA), thus **facilitating comparison** of **BCE values** used by different TSOs

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# Screen 1: Base Case Exchange (BCE) Screen

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- Screen 1 of the Dry-Run MM Project focuses on involving the Base Case Exchange (BCE) assumptions used in calculating **how much cross-border transmission capacity is available to the market -** known as Available Transfer Capacity (ATC)
- Because BCE can impact the level of ATC, this screen is intended to monitor the accuracy of the BCE assumptions so that ATC values are accurate

**What is a BCE value?**

- BCE value is an assumption about "exchange programs" between TSOs
- They reflect anticipated cross-border schedules on each interconnection in the computer simulation of the transmission network that is used to estimate ATC
- This computer simulation is known as the Network Model.

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# The Role of BCE in Estimating ATC

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## How Does BCE Affect ATC Calculations?

- The **simulated network model**, used to estimate ATC, must **assume network conditions** that accurately reflect transmission elements, load, generation, and exchanges between TSOs (i.e., BCEs)
- These **assumptions** are called the **"Base Case"** network model
- The **network model estimates** the **network base case** and **determines** the **"base case flows"** on **each** transmission element
- These estimates of base case flows are **critical** in determining **how much capacity is available** to the market **on** a **particular interconnector** (i.e., ATC)
- This is because **ATC depends** on how much additional flow can be accommodated over the network…

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# ATC Calculation

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**How is ATC Calculated?**

•ATC on an interconnection is defined as:

$$\mathbf{ATC = TTC – AAC - TRM}$$

where

- **TTC** is Total Transfer Capacity
- **TRM** is Transmission Reliability Margin, and
- **AAC** is Already-Allocated Capacity

•BCE does not significantly affect AAC or TRM

•The TTC value is where BCE has its effect

•On each interconnection, the TTC is defined as:

$$\mathbf{TTC = \Delta E + BCE}$$

where

•**ΔE** represents the **extra amount of power over the base case** that **can be exchanged safely** in **all hours** from one TSO to another

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# BCE impact on TTC

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**How do BCE values affect TTC?**

$$TTC = \Delta E + BCE$$

•It **affects** it in **two ways**:

**1.The first way TTC is affected is directly:**

•**BCE** is an **additive component** of **TTC**

•**If** the **BCE value** on an interconnector is **not accurate** (i.e., it does not reflect anticipated exchanges), then **TTC** (and, consequently, ATC) **may be too big or too small**

•It is **important** to note that the **BCE component** of the TTC equation **does not mean** that **part of the TTC** is **reserved** for **BCE transactions**

•**Transaction identified in the BCE** must **secure ATC** through the processes used by all market participants

•**BCE values** are **reflected** in the **network model** in order to help **ensure an accurate estimate** of **operating conditions**

# BCE impact on TTC



**What is the second way BCE values affect TTC?**

**2.Indirectly, BCE values also affect TTC through their impact on ΔE**

•Recall from the previous formulae:

$$TTC = \Delta E + BCE$$

•Hence, the BCE values effect on ΔE will affect TTC

•**Recall: ΔE** is the estimate of the **extra power** that can be **safely transferred** over an interconnector above the base case in the network model

•**If BCE values**, reflected in the base case, are **not accurate**, then the **base case flows** on the cross-border facilities **may be too high (or too low)**, which **causes ΔE** to be **too low (or too high)** and, **consequently**, **TTC is too low (or too high)**

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# Monitoring BCE

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## Why is it reasonable to compare BCE values to net commercial schedules?

- As explained above, the **BCE values** are **reflected** in the **base case network model**
- Like the other base case assumptions, the **BCE values are** to be "the **best forecast for [cross-border] exchanges** at the time frame considered"
- Therefore, it is **reasonable to expect** that the **BCE values correspond to actual cross-border transactions**

## What time frame should be considered in the screen?

- The **monthly time frame** is the **most appropriate** when examining ATC values because the **monthly ATC market** is the **most commonly** used market in the region
- While some TSOs offer **weekly** and even **daily ATC values**, these are **not as widely used**
- Moreover, the **weekly and daily allocations** are **based on** the **monthly network model results**

# Process for Monitoring BCE



**What is the monitoring process?**

- There are **four steps** to the **monitoring process** for this Screen as well as for most of other Screens
- These steps are:

1) Identify data requirements and request data
2) Use data to calculate screen
3) Identify threshold and compare Screen to threshold
4) Identify action to be taken when threshold is violated

# Explanation of Data Requirements: BCE Values



•The data requirements for this Screen are **BCE values** and **net commercial schedules**:

**BCE Values**

•**Focus** for this Screen is the **monthly network model**

•Therefore, the **data required** are the **BCE values** that **support** the **network model** for the **month being screened**

•The **BCE values are not a direct input** into the **network model**

•The **network model** will **input load** and **resource balances**

•These **balances reflect** the **BCE values** but do **not reveal them** directly

•For example, if the control area has a positive BCE value from an adjacent control area, the control area load will be greater than the resources by the amount of the BCE on all interconnections

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# BCE Values

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- Because the BCE values are not a direct input into the network model, the **TSOs "pre-process" the BCE values**
- In other words, the **BCE values** are **used** to **establish** the **resource balances prior** to the **resource balances being inputted** to the **network model**
- This Screen requires the BCE values that are used to derive the resource balance for the network model
- The following sample data request to the TSO should make it clear:
- *With respect to the monthly network model for November 2009, please provide the base case exchange (BCE) values that support the assumptions concerning the control area net balance. Please provide these only for interconnectors involving the TSO.*

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# Net Commercial Schedules

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**Net Commercial Schedules**

- **BCE values** are intended to be the **"best forecast" for cross-border transactions** for the time frame considered
- The **time period** for this Screen is the **monthly time frame**
- Therefore, the **BCE represents** the **peak monthly net exchange expected on each interconnector**

**Further explanation of Net Commercial Schedules**

- For **every hour** of the particular **month** under analysis, on **each interconnector**, the **TSOs** on both sides of the interconnector (and possibly in both directions) **"nominate" schedules**
- This value should **represent all imports and exports scheduled on the interconnector between any two parties**, **including updates** to such schedules initiated **during the day of operation**

# Net Commercial Schedules



•Hence, for **each hour**, the **net schedules** are **calculated** by **subtracting the total export schedules from total import schedules**:

**Net Commercial Schedules = Imports – Exports**

•A **negative value** means the **TSO is a net exporter** for that hour; a **positive value** indicates it is a **net importer**

•Some **TSOs** may **keep the scheduling data** in **different formats** and use **different conventions**

•It is important to **communicate** with the **TSO** to **determine what data is being provided** so it can be **interpreted properly**

# Peak Net Commercial Schedule

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**How to find the Peak Net Commercial Schedule?**

- The **data** for each month will **consist** of approximately **720 data points**, one for each hour of a 30-day month
- This **data may include hours** when there are **net exports** and hours when there are **net imports**
- On many interconnectors, the **exchanges** are in the **same direction every hour of the month**
- In these cases, the **peak net commercial schedule** is the **hour of the month when the imports or the exports are the greatest** (if export data are presented as negative values, then the greatest net export is the greatest negative value in absolute terms)
- On some interconnectors, **some hours** will **have net imports** and other **next exports**
- In such cases, the hour with highest net export (in absolute value) must be **compared** to the highest net import hour and the **larger** of these two values is chosen as the peak net commercial schedule

# Summary of Data Requirements



## Summary of Data Requirements

- The **BCE screen** is **conducted** on **each cross-border interconnection**
- **For each interconnection** and for **each month** there is a **single BCE value** and a **single value for the peak net commercial schedules**
- The **peak net commercial schedule** will likely have to be **identified from hourly data**
- Potomac Economics will provide a data collection template to assist in collecting and managing this data

## Sample Data Request

- The following is a sample data request:

*For November 2009, please provide total hourly commercial schedules on each interconnection with neighboring TSOs. Commercial schedules refers to all imports and exports scheduled on the interconnection between any two parties, including updates to such schedules initiated during the day of operation. The hourly data should indicate total imports for that hour and total exports*

# Calculation of BCE Screen

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## Calculating the BCE Screen

- The basic calculation of the BCE screen is simple
- There is **one value for each month** for **each interconnector**
- Starting with the monthly peak net commercial schedules on an interconnector, subtract the monthly BCE value on the interconnection:

**BCE SCREEN = Net Peak Commercial Schedules – BCE**

- **Example**:
  - Let Net Peak Commercial Schedules = 230 MW
  - Let BCE= 250 MW
  - Then BCE Screen = 230-250 = 20

# Calculating the BCE Screen Threshold

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## Calculating the BCE Screen Threshold

- The calculated BCE Screen is **only the starting point** for **monitoring the BCE values**
- It was already pointed out that there is a **concern** about the **BCE values** being **"too low"** or **"too high"**
- In **such instances** the **ATC values** could be **distorted**
- For a **BCE value** that is **"too low"**, the **BCE value** is **significantly below the net peak commercial schedules**, giving a **negative value** to the **Screen**
- For a **BCE value** that is **"too high"**, the **BCE value** is **significantly above the net peak commercial schedules**, giving a **positive value** to the **Screen**

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# Calculating the BCE Screen Threshold

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- Because the **BCE value** is a **forecast of commercial exchanges**, we **do not expect** it to be **exactly equal** to the **net commercial schedules**
- **Many network and commercial variables change** between the **time the BCE** value is **established** and the **time** when **peak commercial schedules occur**
- Therefore, some **margin of difference** should be **allowed** when **comparing** the **values**
- We use **15 percent** as the **basic threshold**
- In other words, the **BCE value should not be 15 percent greater** than, **or -15 percent smaller than peak commercial schedules - Threshold violations** are as follows:

**BCE SCREEN/BCE > 0.15, *or* BCE SCREEN/BCE < -0.15**

where **BCE SCREEN** is as defined above:

**Net Peak Commercial Schedules – BCE**

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# Calculating the BCE Screen Threshold

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- The **15 percent threshold value** is a **starting point** for **identifying the need for market monitoring action**
- We wish to **find "sustained" instances** of **commercial schedules departing from BCE values**
- To do this, we **examine the pattern** over a **several-month period**
- Hence, we look **for two indications**:
  1) The first is that the **15-percent threshold is exceeded** in the **current month**, and
  2) The **15-percent threshold** was also **exceeded in two of the past three months**
- These **requirements ensure** that **both** the **difference in BCE** and **net commercial schedules** is **significant** and that it is a **sustained phenomenon**

# Basis of the Threshold



## Basis of the Threshold

- 15-percent values as well as the requirement that 15 percent threshold **be exceeded** in two of the **past three months** are **not derived** from **specific** underlying **economic** or **technical** parameters
- It is **standard market monitoring practice** to **establish tolerance bands** around monitoring screens and indices
- It would **not** be **reasonable** to **expect exact convergence** between **BCE** values and **peak net commercial schedules**
- **Nor** would it be **reasonable** to **launch inquiries** concerning BCE values **based** on a **single month's comparison**
- Therefore, a **threshold** needs to be **set** that **identifies significant departures** that **occur** for a **sustained period**, which initial thresholds establish
- **Once** the monitoring is **initiated** and TSOs are consulted more extensively, it may be reasonable to **adjust the thresholds**

# Action to be taken in Event of Threshold Violation



- If a **sustained violation** of the **threshold occurs** (*i.e.*, in the current month as well as in two of three previous months), then the **regulator** should **contact** the **TSO** to **determine the source of the violation**
- This will likely involve **requesting** the **TSO** to **explain in detail** the **forecasting methods** involved with establishing BCE values

**Reporting**

- SEE Regulators, ECRB (with help of PE) will **report monthly results**
- **Templates** and further description and **instructions on reporting** will be **provided**
- **Accepted** Screen
- **Encourage strong cooperation** among **TSOs** to **harmonize** the **process** of **establishing BCE values**
- **Show** in reports the **BCE** values to help **compare** among TSOs

# Results: Screen 1 BCE Screen

- **BCE Screen calculates Forecast Error between BCE forecast exchanges** (BCE) and **actual exchanges**
- We have data to observe **19 interconnectors**
- Data is available on some interconnectors from both parties; Including the dual observations, we have 23 observations
- Due to missing data, only 19 of the 23 observations have a full four-months of consecutive data
- On **three interconnections** the **BCE Screen was failed**
- This means the **threshold** was **exceeded** in last month and in two of the previous three months

# Screen 2:

# Already Allocated Capacity (AAC)

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# Screen 2: Comparing Cross-Border Reservations to Cross-Border Schedules

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- Introduction: The Logic of Comparing Schedules and Reservations
- Data Requirements
- Calculation of Screen
- Screen Threshold and Interpretation of Results

## Already Allocated Capacity (AAC) Screen

- This Screen is intended to **monitor usage of cross-border transmission reservations**
- **NRAs** and **TSOs accepted** this Screen
- This Screen should be **enlarged** to **show the reservation** and **scheduling data** on the basis of individual participants

# Screen 2: Already Allocated Capacity (AAC) Screen

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- Screen 2 is focused on the **utilization of cross-border capacity**
- In particular, we are interested in the **extent to which participants actually use** (schedule) the **capacity that they reserve**
- **Paths** that are **reserved**,but that are **under scheduled** on a **sustained basis**, **cause** transmission **capacity** to be **withheld from other participants** (or requires **other participants** to **wait until the operating horizon for release** of this capacity)

**What are Schedules and Reservations?**

- A transmission **reservation sets aside capacity** (in the planning horizon) **for use** under a **future "schedule"** (in the operating horizon) - As an analogy, one can view the reservation as an airline ticket and the schedule as the airport "check-in" - The reservations saves your seat, but you must check-in in order to board the airplane
- Likewise, the transmission **reservation saves a place** on the **network**, **but** the **schedule is necessary before** a participant can **physically occupy the network**

# Comparison to Screen 1 BCE analysis



- Screen 1 is somewhat **analogous** to Screen 2
- In Screen 1, we **compared forecast cross-border exchange values** (so-called Base Case Exchanges or BCE values) to **actual exchange programs** (Net schedules)
- This was a **comparison** of **forecast** and **actual *net* exchanges** between TSOs
- In Screen 2, we are **comparing forecast** and **actual *gross* exchanges**
- **Reservations** are what **participants indicate** will be their **exchanges** in a **given direction** in a **given month**
- The ***gross* commercial schedules** in a **given month** are ***non-netted*** and are the actual transactions scheduled
- In Screen 1, there was **single analysis** on **each interconnector** because **BCE values indicate the net exchange**
- In Screen 2, we will have an **analysis in both directions** on the interconnector - For example, both Bosnia & Herzegovina to Serbia and Serbia to Bosnia & Herzegovina will be evaluated

# Theory

## The Evaluation

- **Reservations** on **each interconnector** are represented by **Already Allocated Capacity** ("AAC")
- **Schedules** are **represented** by **"commercial schedules"**
- Both of these concepts are **contract-path concepts**
  - A contract-path value indicates what is exchanged between two parties, usually between TSO control areas. Typically, this full contract amount will not flow physically over the interconnector between the parties.
- We are interested in interconnectors where, on a **sustained basis**, **reservations** (AAC) are **greater** than **commercial schedules**
- In such situations, the participant that has AAC is **not fully using it**
- This means **other participants** may **not be able to reserve capacity** on the interconnector, or they may have to **wait until** it is **released** (under "use-it-or-lose-it rules")
- In either case, the **other participants suffer a competitive disadvantage**

# Importance of ATC levels



**The Importance of ATC levels**

- A **participant** may be **"hoarding"** when **it reserves but does not schedule fully its cross-border capacity**
- However, **"hoarding" only occurs** if **no additional reservations are possible**
- In other words, in **addition** to **under-scheduled reservations**, **hoarding requires** that **ATC** be **at** or **close** to **zero**
- When **ATC=0** or is close to zero, then **hoarding** can be **effective** because other participants cannot reserve the capacity (or can reserve only small amounts)
- If **under-scheduling occurs** but **high enough ATC exists**, then any **attempt to hoard** is **senseless** because participants **can reserve** the **ATC**

**Monitoring Relationship**: we seek to **monitor Commercial Schedules relative to AAC**, but **only** when **ATC=0** or **ATC** is **relatively small** ("small" is to be made precise below)

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# Comparing AAC to Commercial Schedules

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**How to compare AAC values to commercial schedules?**

- **AAC** represents the **total reservations** on an interconnector
- **Commercial schedules** represent **total actual schedules** on an interconnector
- **Reservations** tend to be **more stable** over a given **time period** relative to **commercial schedules**
- For example, **reservations** on an interconnector over a given month **may change only** for a **few days during the month**
- This is because a **monthly reservation** is **usually intended** to **reserve space** for the **peak value** of the commercial schedule over the monthly time period
- **Commercial schedules**, on the other hand, may exhibit **significant day-to-day** and even **hour-to-hour variation**
- Because **AAC** is in **one direction** (e.g., Croatia to Serbia), we **compare actual commercial schedules** in a given **direction without netting schedules** in the **opposite direction**

# Timing of the Monitoring Metric

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**What time frame should be considered in the screen?**

- **Reservations** are typically initiated on a **monthly basis**
- These reservations may be made in a **month-ahead auction** or during an **annual allocation process**
- Although **less common**, some reservations are made a **week ahead** and some are made even the **day before** or the day-of
- Therefore, while there is **usually not significant variation in AAC**, it is possible that it changes on a daily or even hourly basis
- Because reservations are typically made on a monthly basis, we find the **monthly time frame** to be the **most appropriate** for **monitoring AAC** and **commercial schedules**
- For **systems** where **AAC varies significantly** within the **monthly timeframe**, **evaluation** within a **shorter timeframe** may be **appropriate**
- Such a determination can be made as experience accumulates with this Screen

# Basic Approach



**The basic approach**

- The **approach** taken in this Screen involves **identifying** the **hour with the greatest volume of commercial schedules (monthly peak schedules)**
- This **hour** is then **matched** and **compared** to the **corresponding AAC for that day**
- The **evaluation** is **conducted** in **both directions** on **each interconnector**
- Therefore, the **TSO** will be **asked** to **provide commercial schedules** and **AAC** in **both directions** on **each interconnector**

# Process for Monitoring AAC



**Monitoring Process**

- There are **four steps** to the **monitoring process** for this Screen as well as most other Screens
- These steps are:
    1) Identify data requirements and request data
    2) Use data to calculate Screen
    3) Identify threshold and compare Screen to threshold
    4) Identify action to be taken when threshold is violated
- We follow these four steps

# Explanation of Data Requirements



- The data requirements for this Screen are **Commercial Schedules**, **AAC values** and **ATC values**

**Commercial Schedules**

- For **every hour** of the particular month under analysis, on each interconnector, the TSO "nominates" schedules against the AAC
- In other words, **market participants with reservations** (AAC), will **schedule** their **transactions** through the **TSO**
- In a given hour, there may be exports, imports, or both exports and imports
- A **negative values** indicates **exports**; a **positive value** indicates **imports**
- Some **TSOs** may **keep** the **scheduling data** in **different formats** and use **different conventions**
- It is important to **communicate** with the **TSO** to **determine what data** is being **provided** so it can be **interpreted properly**

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# Peak Commercial Schedule

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**How to find the Peak Commercial Schedule?**

- The **TSO** will be **asked** for **two values** on each interconnector:
  - **Commercial Schedules** representing **imports**, and
  - **Commercial Schedules** representing **exports** (exports are a negative value)
- The data for each month will consist of approximately 720 data points, one for each hour of a 30-day month
- This **data may include hours** when there are **exports**, and hours when there are **imports** and hours when there are **both exports and imports**
- There will be **two peak values**, one for **exports** and one for **imports**
- These will be **matched against** the **corresponding AAC** for the interconnector

# AAC Values



## AAC Values

- **Focus** for this Screen is **AAC** on the **day** when **Commercial Schedules are at their monthly peak value**
- Therefore, we need to **request daily AAC values**
- These values **may be the same** for **each day of the month**
- We wish to **request daily AAC values** including the **AAC** from **annual, monthly, daily, or day-of- processes** and/or auctions
- On **each interconnector**, there will be **two AAC values**, one in **each direction**
- For example, on the interconnector between Romania and Serbia, there is an AAC for Serbia to Romania and one for Romania to Serbia
- Therefore, for **each interconnector**, the **TSO should provide two AAC values**

# ATC Values

## ATC Values

- Like for AAC, for **most days**, the **ATC values will be the same**
- However, **they can vary**
- We wish to **request daily ATC values including** the **ATC** resulting from **annual, monthly, daily, or day-of- processes** and/or auctions
- Like for the AAC values, there will be **two ATC values** on **each interconnector**, one in **each direction**, e.g., on the interconnector between Romania and Serbia, there is an ATC for Serbia to Romania and one for Romania to Serbia
- Therefore, for **each interconnection**, the **TSO** should **provide two ATC values**

# Sample Data Request: Commercial Schedules

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**Sample Data Request -- Commercial Schedules**

The following is a sample data request:

*For January 2009, please provide (1) total hourly commercial import schedules on each interconnection with neighboring TSOs and (2) total hourly commercial import schedules. Commercial import schedules refers to all imports scheduled on the interconnection between any two parties, including updates to such schedules initiated during the day of operation. Likewise, Commercial export schedules refers to all exports scheduled on the interconnection between any two parties, including updates to such schedules initiated during the day of operation. The hourly data should include total commercial imports for that hour and total exports (exports presented as a negative value)*

# Sample Data Request: AAC

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**Sample Data Request – Already Allocated Capacity (AAC)**

The following is a sample data request:

*For January 2009, please provide the Already Allocated Capacity (ACC) for each day. This AAC should include allocations made in annual, monthly, and intra-monthly processes. For example, AAC may be allocated in an annual auction, a monthly auction, and in weekly and daily processes. We seek the total AAC from all allocation processes and in both directions on the interconnection (i.e., AAC for imports and AAC for exports)*

# Sample Data Request: ATC

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**Sample Data Request – Available Transfer Capacity (ATC)**

The following is a sample data request:

*For January 2009, please provide the Available Transfer Capacity (ATC) for each day. This ATC should reflect allocations made in annual, monthly, and intra-monthly processes. For example, transfer capacity may be allocated in an annual auction, a monthly auction, and in weekly and daily processes. We seek the total ATC from all allocation processes (i.e., ATC for imports and ATC for exports)*

# Calculation of Screen 2



**Calculating the AAC Screen**

- The basic calculation of the **AAC Screen** is **simple**
- There are **two values each month** for **each interconnector**
- **Starting** with the **monthly peak commercial schedules** on an interconnector, **subtract** the **monthly AAC value** on the interconnector:

**AAC SCREEN = AAC - Peak Commercial Schedules**

**Example**:

- Let AAC = 250 MW
- Let Peak Commercial Schedules = 130 MW
- Then AAC Screen = 250-130 = 120

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# The Monitoring Threshold

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**Calculating the AAC Screen Threshold**

- The **calculated AAC Screen** is **only** the **starting point** for **monitoring** the **AAC values**
- We have already pointed out that we are **concerned** about the **AAC values** being **under scheduled**
- Because the **AAC value** is a sort of forecast of commercial schedules, we **do not expect** it to be **exactly equal** to the **commercial schedules**
- **Market conditions may change** between the **time** the **AAC** value is **established** and the **time** when **commercial schedules occur**
- Therefore, some **margin of difference** should be **allowed** when **comparing the values**
- We use **15 percent** as the **basic threshold**
- In other words, the **AAC value should not be 15 percent greater than peak commercial schedules**:

**AAC Screen/Peak Commercial Schedules > 0.15**

# Importance of ATC



**The importance of ATC**

- Recall: concerning the ATC value at the time of the peak commercial schedules:
- **If ATC>0**, then **hoarding is defeated** because **reservation** can still be **made** on the interconnector
- Hence, the **15 percent threshold** above must also **coincide** with **ATC=0** (or close to 0)
- While there is **no formulaic way** to **determine what level of ATC is sufficient** to **undercut a hoarding strategy**, we **judge 25 MW to be sufficient**
- Accordingly, **if ATC>25**, then we **consider it unlikely** for a **hoarding strategy to be effective**

# Sustained Threshold Violations



**Sustained Threshold Violations**

- The **15 percent threshold** value is a **starting point** for **identifying** the **need** for market monitoring **action**
- We wish to find **"sustained" instances** of **commercial schedules departing** from **BCE values**
- To do this, **we examine the pattern** over a **several month period**
- Hence, we look for **two indications**:
  1) The first is the **15 percent threshold is exceeded** in the **current month** (while the ATC < 25 MW); and
  2) The **15-percent threshold** was also **exceeded** in **two of the past three months** (and the ATC < 25 MW in those two months)
- These **requirements ensure** that **both** (1) the **difference between AAC and commercial schedules** is **significant** and (2) it is a **sustained phenomenon**

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# Data and Screening Templates

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**Data and Screening Templates**

- Templates will be issued
- The Templates provide **data collection forms** that the **TSOs** can **use** to **provide** the **data** and which help clarify the data requests
- Moreover, **draft data requests** are also **included** in the **Template**, reflecting the data requests
- The data in the data collection worksheets flows into various calculations supporting the screening analysis
- This ultimately **provides** the **one-month Screen result**

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# The Monitoring Threshold

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**Basis of the Threshold**

- The **15-percent values** as well as the **requirement** that the **15 percent threshold** be **exceeded** in **two of the past three months** are **not derived** from **specific underlying economic** or **technical parameters**
- It is **standard market monitoring practice** to **establish tolerance bands** around **monitoring screens** and indices
- It would **not be reasonable** to **expect exact convergence** between **AAC values** and **peak Commercial Schedules**
- **Nor** would it be **reasonable** to **launch inquiries** concerning **AAC** values **based on a single month's comparison**
- Therefore, a **threshold needs to be set** that **identifies significant departures** that occur **for a sustained periods**, which **initial thresholds establish**
- **Once** the **monitoring is initiated** and **TSOs are consulted** more extensively, it may be **reasonable** to **adjust** the **thresholds**

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# Results: Screen 2 - AAC

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- **Accepted Screen**
- **Enlarge Screen** to show **individual** participant **reservations** and **schedules**

**Analysis**

- We have data to observe 8 interconnectors
- Due to missing data, only 6 of the 8 observations have a full four-months of consecutive data
- Missing data is a larger problem with AAC Screen - Data is required from both participants on an interconnection before a screen can be calculated
- Example: On all six interconnectors evaluated for October 2010, the AAC screen was passed

# Screen 3:
# Critical Facilities Screen

# Screen 3: Monitoring Base Case Simulations

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- The logic of Monitoring Network Model Base Case Simulations
- Data Requirements
- Calculation of Screen
- Screen Threshold and Interpretation of Results

**Screen 3: Critical Facilities Screen**

- This Screen is intended to **monitor accuracy of the output of the Network Model used to calculate NTC**
- NRAs and TSOs **accepted** this Screen
- **Follow-up measures** specified for this Screen **need to be clarified**

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# Monitoring Base Case Simulations

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## Overview

- Screen 3 focuses on a Screen to **monitor simulated power flows on key transmission elements in the *Network Model***
- The **Network Model** is a **simulation of transmission network conditions** that is used to **estimate Net Transfer Capacity** (NTC) values for cross-border transmission
- This simulation **estimates power flows** on **various network** transmission **elements**
- **If** the **simulated power flows do not** reasonably **correspond** to flows **experienced** in actual network operation, then the **network model may produce inaccurate estimates of NTC** and result in unnecessarily restrictive access to the interconnection

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# Monitoring Base Case Simulations

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**How is the Network Model related to NTC values?**

- In assessing NTC, the **Network Model simulates** expected network conditions **using "base case"** assumptions and forecasts, which include: generation output, load, and the physical arrangement of the network projected for the time period studied
- **Inaccurate NTC** values can occur because a **critical purpose** of the Network **Model** is to **identify incremental capacity** that is **available** above the base case conditions
- The Network **Model measures** this **incremental capacity** by **simulating** the **maximum exchange** between two neighboring TSOs
- This simulated exchange is referred to as "$\Delta E$"

# Screen 3



**The Focus on ΔE**

•We know from ENTSO-E that:

**NTC = ΔE +BCE-TRM**

where

- ➢BCE is Base Case Exchanges, and
- ➢TRM is Transmission Reliability Margin

•Focus in Screen 3 is ΔE; ΔE is based on a simulated exchange

•This is simulated by TSOs **exchanging generation** between control areas

•We see ΔE has a direct impact on NTC

•Therefore, **if** the Network **Model** provides an **inaccurate ΔE** value, then **NTC** will be **inaccurate**

As indicated by ENTSO-E, ΔE is the largest exchange possible between TSOs subject to security constraints

# Screen 3



- Therefore, **for a given ΔE**, there should be an associated **security constraint**
- In other words, ΔE would be larger, but a security constraint had been reached in the modeling process
- We are **interested** in this **security constraint** because it is the **critical** link in **limiting ΔE** (and thus limiting **NTC**)
- Cross-border **exchanges** are gradually **increased** by **increasing generation** output in the first TSO and **decreasing** it in the **neighboring TSO**
- This will cause **simulated power flow** from the first TSO to its neighbor
- Most of this will flow over the **direct** interconnector, but **some may "loop"** around through other systems creating a phenomenon known as **"loopflow"**

# Screen 3



**What is a Security Constraint?**

- A security constraint is a **limit on the ability of a transmission facility to transfer safely additional power**
- This can be a **"thermal" limit** whereby a MW limit on a transmission line conductor is at its rated capacity
- But, the limits can also be **related** to **voltage** or **network "stability"**
- In some cases, a security constraint may not be the reason $\Delta E$ is limited
- For example, no limit may be reached even when a simulated exchange has used up all available generation in the neighboring TSOs

# Screen 3



## Monitoring Approach

- For **each interconnector**, the **ΔE** estimated by the TSOs will be **associated** with a **security constraint**
- In most cases, this likely **involves flow limits** on specified transmission **facilities**
- The **base case** Network Model **estimates flows** on these specific **facilities** and, thus, are an **estimate** (or forecast) of the **actual flows**
- **If** this **forecast** is reasonably **accurate** (relative to actual flows), then one can conclude the **ΔE values** are **properly bounded** by the **security constraint**

# Screen 3



**Compared to Screen 1**

- **Screen 3** (Base Case Simulation Screen), has **similarities** to the BCE **Screen 1**
- BCE means Base Case Exchanges, which are the forecast exchanges between TSOs in the time period studied in the Network Model
- Just like ΔE, BCE values also directly affect NTC, because:

$$\mathbf{NTC = \Delta E + BCE\text{-}TRM}$$

- In Screen 1, we compared the forecast BCE value used in the base case Network Model to the actual exchanges (net commercial schedules)
- Now, in Screen 3, we wish to **monitor** the **accuracy of ΔE**
- However, **ΔE** is an **output of the Network Model**, not an input, like the BCE values
- Therefore, we seek to **monitor the critical determinants of ΔE**, which are the **simulated flows** on the binding security constraint

# Screen 3



## Comparing Base Case flows to Actual Flow

- It is important to explain **why the simulated power flows on security-constrained facilities in the Network Model should be compared to the power flows on those facilities under actual operations**
- The base case conditions in the Network Model are meant to reflect anticipated conditions in the time period studied, including: generation dispatch, load, and exchanges between TSOs
- Therefore, the resulting simulation should produce flows on the security-constrained facilities that correspond to the flows in the actual network operations

# Screen 3



- It is important to note that we are seeking to **monitor the simulated flows in the base case**, not the flows in the alternative case that tests the level of ΔE
- In other words, there are **two key Network Model results**:
  - One is the base case, which is the best estimate of conditions during the study periods, and
  - there is the case of the simulated exchange, (ΔE)
- It is the base case that is supposed to be the best forecast of future conditions and, hence, is the most appropriate comparison to actual experience

**A Caveat**

- It is well-known, of course, that **expected operations** and **actual operation** will almost **never correspond** because of **changing conditions** between the **time** the **forecast is made** and the **time** when the **network actually operates**
- However, if a divergence between forecast and actual is large and sustained, then grid access may be unnecessarily restricted

# Screen 3



**What time frame should be considered in the Screen?**

- The **monthly time frame** is the **most appropriate** when **examining NTC values** because the monthly transmission capacity market is the **most commonly-used** market in the SEE region
- While **some TSOs** offer **weekly** and even **daily** cross-border transmission **products**, these are **not** as **widely used**
- Moreover, the **weekly** and **daily allocations** would be **based** on the **monthly network model** anyway
- Therefore, accuracy NTC values in the monthly network model would imply accuracy in the shorter time frames

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# Monitoring Process

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- **The monitoring Process**
- Like in the previous Screens, we follow **four steps** in the monitoring process for this Screen
- These steps are:
  1) Identify data requirements and request data
  2) Use data to calculate screen
  3) Identify threshold and compare  screen to threshold
  4) Identify action to be taken when threshold is violated

# Explanation of Data Requirements

The **data requirements** for this Screen:

**1)identity** of the **security constraint** on each interconnector

2)the **power flows** on the **security-constrained element** from (1) in the **base case Network Model**

3)the **actually hourly power flow** on the **security-constrained element**

**Identity of security-constrained facility on each interconnector**

•For the **estimate on NTC** on each interconnector, the **TSO** will have **simulated** the **maximum safe exchange** over the **interconnector** (ΔE)

•This **maximum exchange** is **limited** by a **security constraint**, which in most cases is expected to be a **specific transmission line**

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# Sample Data Request

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The following sample data request to the TSO should make it clear the requested data:

*Request: In the February 2009 Network Model used to establish NTC values, please identify the security constraint on each interconnection that limits the magnitude of $\Delta E$, as $\Delta E$ is used on page 8 of ENTSO-E, op. cit. In providing this information, please indicate the type of facility involved, e.g., line conductor, transformer, and the nature of the security constraint, e.g., thermal, voltage. Please provide these only for interconnections involving the TSO*

# Screen 3

**Simulated Power Flows on Security-Constrained Element**

- For **each security-constrained elements**, the **Network Model** will record the **simulated power flow** on the **element under base case conditions**
- We are interested in the **simulated flow** under base case conditions, **not the flows under the simulated**, ΔE exchange
- The following sample data request to the TSO to help make it clear:

*With respect to the monthly network model for February 2010, and with respect to each security-constraint identified in the data request above, please provide the simulated power flow on the security-constrained element under the base case simulation. Please provide these only for interconnections involving the TSO*

# Screen 3



**Actual Power Flows on Security-Constrained Element**

- The **basic** monitoring **approach** is to **compare** the **simulated power flows** on the security-constrained elements to the **actual flows**
- Therefore, the following request asks for hourly flows on the security-constrained elements:

*With respect to each security-constraint identified in the data request above, please provide the actually hourly power flow on the security-constrained element. Please provide these only for interconnections involving the TSO*

# Calculation of Screen 3



**Calculating the Base Case Simulation Screen**

- The **basic calculation** of the Base Case Simulation Screen is **simple**:
- It is a **comparison** of the **simulated peak flow** to the **actual peak flow** on **security-constrained facilities**
- There is **simulated value each month** for **each interconnector**
- Starting with the **monthly peak actual flow** on the security-constrained facility, **subtract** the **monthly simulated flow value**:

**Base Case Simulation Screen =**

**Actual Peak Flow – Simulated Peak Flow**

# Calculation of Monitoring Threshold

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**Calculating the Base Case Simulation Screen Threshold**

- The calculated Base Case Simulation Screen is only the **starting point** for **monitoring the base case simulations**
- We are **concerned** about **simulations** that do **not correspond** to the **actual flow experience**
- In general, this is a **problem if** the **simulated flow is "too high"** and **significantly exceeds** what is observed in **actual experience**
- In that case, the **simulated exchange** ($\Delta E$) may be **underestimated** and, thus, lead to an **underestimating of NTC**
- It may also be the case that the base case **simulated flows are too low**, in which case **NTC would be over estimated**
- In such a case, **reservations** on the interconnector could cause an **over-scheduling** to occur, which would **require more frequent** use of **real-time congestion management procedures**
- In such cases, curtailments of cross-border schedules could be required to ensure security

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# Calculation of Monitoring Threshold

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- We are more **concerned** with instances where the **simulated flows** are **over stated**, leading to **smaller NTC values**
- In such cases, cross-border **access** is unnecessarily **restricted** and **competition is injured**
- In the opposite case, where the **simulated flows** are **too low**, the market effect is to an **increase real-time curtailments** of **cross-border schedules**
- This effect may **increase market risk** due to the threat of more frequent curtailments
- However, we view this market effect as **less injurious to competition than the understating of NTC**
- Hence, initially, will be focused on case where the simulated flows on security-constrained facilities are significantly greater than the actual experience

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# Calculation of Monitoring Threshold

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- Because the simulated flow value is akin to a forecast of commercial exchanges, we do **not expect** it to be **exactly equal to actual experience**
- **Many network and commercial variables change** between the **time** the Network Model is **estimated** and the **time** when peak flows **occur**
- Therefore, some **margin of difference** should be **allowed** when comparing the values
- We use **15 percent** as the **basic threshold**
- In other words, the **base case simulated flow** on the **security-constrained facility** should **not be greater than 15 percent of the actual flows at the peak flow hour**:

**(Actual Peak Flow– Simulated Peak Flow)/Simulated Peak Flow > 0.15**

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# Calculation of Monitoring Threshold

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- The **15 percent threshold value** is a **starting point** for identifying the **need** for market monitoring **action**
- We wish to **find "sustained" instances** of the simulation departing from the actual
- To do this, we **examine the pattern** over a **several month period**
- Hence, we look for **two indications**:
  1) The **15 percent threshold is exceeded** in the **current month**, and
  2) The **15-percent threshold** was also **exceeded** in **two of the past three months**
- These requirements **ensure** that **both** the difference in the simulated flows and the actual flows is **significant** and that it is a **sustained phenomenon**

# Screen 3



## Basis of the Threshold

- The **15-percent values** as well as the requirement that the 15-percent threshold be exceeded in two of the past three months are **not derived from specific underlying economic** or **technical parameters**
- It is **standard** market monitoring **practice** to **establish tolerance bands** around monitoring Screens
- It would **not be reasonable** to **expect exact convergence** between simulated values and actual values
- **Nor** would it be **reasonable** to launch **inquiries** concerning any such divergence **based** on a **single month's comparison**
- Therefore, a **threshold needs to be set** that identifies **significant departures that occur for a sustained periods**, which initial thresholds establish
- **Once** the **monitoring is initiated** and TSOs are consulted more extensively, it may be **reasonable** to **adjust the thresholds**

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# Results: Screen 3 Critical Facilities Screen

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- **Accepted** Screen
- Clarify **potential mitigation procedures** when Screen is exceeded
- We have data to observe 30 interconnectors
- Example: For the month of October 2010, the Screen threshold was violated in 13 of 30 instances
- This does not create at Screen violation because four months of data has not been collected

# Screen 4:
# Load Forecast Screen

# Screen 4: Monitoring Load Forecasts in the Network Model

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- The logic of Monitoring Network Model Load Forecasts
- Data Requirements
- Calculation of Screen
- Screen Threshold and Interpretation of Results

**Screen 4: Load Forecast Screen**

- o This Screen is intended to **monitor accuracy of the inputs to Network Model used to calculate NTC**
- o NRAs and TSOs **accepted** this Screen

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# Monitoring Load Forecasts

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## Overview

- Screen 4 focuses to **monitor load forecasts in the *Network Model***
- The Network Model is a **simulation** of transmission network **conditions** that is used to **estimate Net Transfer Capacity** ("NTC") values for cross-border transmission
- This simulation **estimates power flows** on **various** network transmission **elements**
- These **simulated flows** are used to **estimate** the **limits** on cross-border interconnectors (i.e., NTC)
- **If** the **simulated power flows** do **not** reasonably **correspond** to flows **experienced** in **actual** network **operation**, then the **Network Model** may **produce inaccurate estimates of NTC** and **result** in unnecessarily **restrictive access** to cross-border interconnectors

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# Monitoring Load Forecasts

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**How is the Network Model related to NTC values?**

- In assessing NTC, the **Network Model simulates** expected network **conditions** using "base case" assumptions and forecasts, which include: generation output, load, and the physical arrangement (topology) of the network projected for the time period studied
- **Inaccurate NTC** values **can occur** because a **critical purpose of the Network Model** is to **simulate** an **exchange** between **two neighboring TSOs** in order to **identify incremental capacity** that is available above the base case conditions

**Importance of Load Forecasts**

- Because the **simulations** are **based** on **forecast load conditions** (among other forecasts), it is **important** that the **load forecasts are accurate**
- Hence, this monitoring Screen is intended to **monitor the accuracy of the load forecasts**

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# Monitoring Load Forecasts

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**Monitoring Approach**

- The monitoring approach is straightforward
- We simply wish to **compare** the **load forecast used in the Network Model** to the **load actually experienced**
- We wish to **determine** whether there is a **sustained divergence** between the **forecast** and **actual values**

**Comparison to Previous Screens**

- This “Load Forecast Screen” has similarities to previous Screens
- It is most similar to the Screen 1 BCE
- The BCE Screen **monitors the accuracy of forecast net exchanges between control areas in the Network Model**, much like Load Forecast Screen **monitors the accuracy of forecast load**
- It is also similar to the Screen 2 AAC, which **monitors what participants reserve on the interconnectors** (which is forecast usage) compared to **what they actually use**

# Monitoring Load Forecasts



## A Caveat

- It is well-known that **expected load** and **actual load** will almost **never exactly correspond** because of **changing conditions** between the **time** the **forecast is made** and the **time** when the **network actually operates**
- However, **if** a **divergence** between **forecast** and **actual** is **large and sustained**, then **grid access** may be unnecessarily **restricted**

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# Monitoring Load Forecasts

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**What time frame should be considered in the screen?**

- Monitoring load forecasts is aimed at **ensuring the accuracy of NTC values** produced in the **Network Model**
- The **monthly time frame** is the **most appropriate** when examining **NTC values** because the monthly transmission capacity market is the **most commonly-used** market in the SEE region
- While **some TSOs** offer **weekly** and even **daily** cross-border transmission **products**, these are **not as widely used**
- Moreover, the **weekly** and **daily allocations** would be **based** on the **monthly network model** anyway
- Therefore, **accurate NTC values** in the **monthly network model** would imply **accuracy** in the **shorter time frames**

# Monitoring Process



## The Monitoring Process

•Like in the previous Screens, we follow **four steps** in the **monitoring process** for this Screen

•These steps are:

1) Identify data requirements and request data
2) Use data to calculate screen
3) Identify threshold and compare  screen to threshold
4) Identify action to be taken when threshold is violated

# Explanation of Data Requirements



- The data requirements for this Screen are straightforward:
  1) load forecast used in the monthly Network Model; and
  2) the actual monthly peak load

**Load Forecast used in Monthly Network Model**

- **TSOs** publish **monthly NTC values** for **month-ahead** transmission service
- This is **based on a monthly Network Model** that uses forecast peak load for the month
- For this Network Model, we wish to request the **forecast peak load**

# Load Forecast used in Monthly Network Model

The following is the recommended data request to the TSO:

*<u>Request</u>: For the Network Model used to establish monthly NTC values for the referenced month, please identify the control area load. The Network Model for the referenced month means the model used to establish NTC for on-peak month-ahead transmission service*

# Screen 4



**Actual Monthly Peak Load**

- The second data element necessary for the Screen is the **actual monthly control area peak load**
- This will be **derived** from **actual hourly load data**
- Here is the recommended data request:

*Request: With respect to the referenced month, please provide the actually hourly control area load*

# Calculation of Screen



**Calculating the Load Forecast Screen**

- In order to monitor the relationship between the forecast and actual load values, we use a simple Percentage Error given by:

***Percentage Error (PE)= [Forecast load-Actual Load]/Actual Load***

- This gives a measurement of a one-period forecast error
- We are interested in measuring the forecast error over a sustained period
- Hence, we propose a moving average of the Mean Percentage Error
- A moving average simply means an average of a number of the most recent months
- For example, a 6-month moving average is the average value of the most recent six months
- The **Mean Percentage Error** is:

$$\mathbf{MPE = 1/T\ \Sigma_{t \le T}\ [Forecast_t - Actual_t]/Actual_t\}}$$

- If T=6, then the MPE is a six-month moving average

# Calculation of Monitoring Threshold

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**Load Forecast Monitoring Threshold**

- The **simple six-month** moving average of the MPE is **good starting point** for monitoring the load forecast in the Network Models
- We do **not expect** the forecast to be exactly equal to actual experience
- Load is variable and unpredictable
- However, we would expect to see the **forecast to be "close" to the actual** and, over a time series, we would **expect any "error" to be above and below the forecast**, **not predominantly high** or **not predominantly low**
- The **six-month** moving average of the MPE will **allow** this monitoring
- There are a range of statistical methods that can be used to identify a threshold for indicating the accuracy of a forecast
- For the short-term, a threshold of +/-10 percent was proposed

# Calculation of Monitoring Threshold

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**Applying the Threshold**

- The **+/- 10 percent threshold** for **six-month** moving average MPE will **indicate** whether a particular **load forecast** series **tends** to be **higher** or **lower** than actual load
- **If** the moving average **MPE is > 10 percent** or **MPE < -10 percent**, then the **Screen** would be **failed**
- It should not be implied that an average forecast error less than 10 percent is an accurate forecast
- These **thresholds** are **for monitoring only**, not for officially recognizing the accuracy in some statistical sense, although the Screen can later be used for such purposes

**Basis**

- The **+/-10-percent threshold** for the moving average mean percentage error is **based** on the **consultant's experience** in **monitoring electricity systems**
- A +/- 10 percent threshold range is rather broad, as experience indicates most forecast errors average less than 5 percent

# Results: Screen 4 - Load Forecast Screen

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**Screen Failure**

- The Load Forecast Screen is meant to detect inaccurate load forecast in order to ensure accurate Network Models and, consequently, accurate NTC values
- When the Load Forecast Screen fails, it may indicate a faulty forecasting methodology
- Upon screen failure, the regulators should initiate discussion with the TSO as to the source of the forecast error and what can be done to improve the forecasting
- **Accepted** Screen 4
- We have data to observe 5 Control Area/data providers
- Only three control areas have a complete three-month series
- **None** of these three control areas **experienced** a **Screen violation**
- Note: The threshold in Screen four was established with a three-month series - Later to use a three-month series for all screens

# Screen 5:
# Generator Output Screen

# Screen 5: Monitoring Generator Output in the Network Model

- The logic of Monitoring Network Model Generator Output
- Data Requirements
- Calculation of Screen
- Screen Threshold and Interpretation of Results

# Monitoring Generator Output

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## Overview

- Screen 5 focuses to **monitor generator output forecasts in the *Network Model***
- The Network **Model** is a **simulation** of transmission **network conditions** that is used to **estimate Net Transfer Capacity** ("NTC") values for cross-border transmission
- This simulation **estimates power flows** on **various** network transmission **elements**
- These **simulated flows** are used to **estimate** the **limits** on cross-border **interconnectors** (i.e., NTC)
- **If** the **simulated power flows** do not reasonably **correspond** to **flows experienced** in **actual network operation**, then the Network **Model may produce inaccurate estimates of NTC** and **result** in unnecessarily **restrictive access** to cross-border **interconnectors**

# Monitoring Generator Output

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**How is the Network Model related to NTC values?**

•In assessing NTC, the Network **Model simulates** expected **network conditions** using **"base case" assumptions** and **forecasts**, which include: generation output, load, and the physical arrangement (topology) of the network projected for the time period studied

•**Inaccurate NTC values** can **occur** because a **critical purpose** of the Network **Model** is to **simulate** an **exchange** between **two neighboring TSOs** in order to **identify incremental capacity** that is **available** above the base case conditions

**Importance of Generator Output Forecasts**

•Because the simulations are based on generator output forecasts (among other assumptions and forecasts), it is **important** that the **generator forecasts are accurate**

•Hence, this monitoring Screen is intended to **monitor the accuracy of these forecasts**

# Monitoring Generator Output

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**Monitoring Approach**

- The monitoring approach is straightforward
- We simply wish to **compare** the **generator output forecasts used** in the **Network Model** to the **output actually experienced**
- Like previous Screens, we wish to **determine** whether there is a **sustained divergence** between the **generator output forecasts** and **actual output**

**Comparison to Previous Screens**

- This "Generator Output Screen" has similarities to the previous Screens
- It is most similar to the Screen 4 Load Forecast Screen
- The Load Forecast Screen **monitors the accuracy of load forecast used in the Network Model**, much like Generator Output Screen **monitors the accuracy of generator output forecasts**
- It is also similar to the Screens 1 and 2 (BCE and AAC Screens)

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# Screen 5: Generation Forecast Screen

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- **A Caveat**
- It is well-known that **expected generator output** and **actual output** will almost **never exactly correspond** because of **changing conditions** between the **time** the **forecast is made** and the **time** when the **network actually operates**
- However, **if** a **divergence** between **forecasts** and **actual values** is **large** and **sustained**, then **grid access** may be unnecessarily **restricted**
- Similar to previous Screens, this Screen **compares forecast generation output** in **Network Model** to **actual Generation output**
- **Rationale: Forecast generation output affects simulations in the Network Model, which can affect NTC values**
- Some TSOs have claimed this **data** is **confidential**, although most TSOs have not
- **Recommend adding** to 8th Region Guidelines

# Screen 5: Generation Forecast Screen

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**What time frame should be considered in the Screen?**

- Monitoring generator output forecasts is aimed at **ensuring** the **accuracy of NTC values** produced in the Network Model
- The **monthly time frame** is the **most appropriate** when examining NTC values because the **monthly transmission capacity market** is the **most commonly-used** market in the SEE region
- While **some TSOs** offer **weekly** and even **daily** cross-border transmission **products**, these are **not as widely used**
- Moreover, the **weekly** and **daily allocations** would be **based** on the **monthly network model** anyway
- Therefore, **accurate NTC values** in the **monthly network model** would imply **accuracy** in the **shorter time frames**

# Monitoring Process



- **The monitoring Process**
- Like in the previous Screens, we follow **four steps** in the monitoring process for this Screen
- These steps are:
    1) Identify data requirements and request data;
    2) Use data to calculate screen;
    3) Identify threshold and compare  screen to threshold;
    4) Identify action to be taken when threshold is violated

# Explanation of Data Requirements



- The **data requirements** for this Screen are straightforward:
  1) **generator output forecasts** used in the monthly Network Model
  2) the **actual generator output**

**Generator Output Forecasts used in Monthly Network Model**

- TSOs publish monthly NTC values for month-ahead transmission service
- This is **based** on a **monthly** Network Model that uses generator output forecasts for the month
- For this Network Model, we wish to request the generator output forecasts used in the model
- We will **request the data only for the ten largest generating units**
- **Some** control areas have **over 100 units**, most which are **very small** (usually small hydro units)
- By requesting **only the largest**, we can **monitor the most important ones** and also keep the data collection and analysis to a **manageable level**
- **Experience** may **indicate** a need to **extend the analysis to more units**

# Explanation of Data Requirements

The following is the **recommended data request** to the **TSO** for the **generator output forecasts**:

*Request: For the Network Model used to establish monthly NTC values for the referenced month, please identify the output assumed in the model for the largest 10 control area generating units (as measured by maximum seasonal capacity). The Network Model for the referenced month means the model used to establish NTC for on-peak month-ahead transmission service*

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# Explanation of Data Requirements

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**Actual Monthly Generator Output**

- The second data element necessary for the Screen is the **actual monthly generator output**
- This will be **derived from actual hourly output data**
- Here is the recommended data request:

*Request: With respect to the referenced month, please provide the actually hourly output of the largest 10 control area generating units (as measured by maximum seasonal capacity)*

# Note on Regulation EC 1228/03

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## Applicability to Regulation EC 1228/2003

We note the applicability of the Regulation EC1228/03 (Congestion Management Annex, Section 5.10):

> ***TSOs*** *shall* ***exchange regularly*** *a* ***set*** *of sufficiently* ***accurate network*** *and* ***load flow data*** *in order to* ***enable load flow calculations*** *for each TSO in their relevant area. The same* ***set of data*** *shall be made* ***available*** *to the* ***Regulatory Authorities*** *and to the European Commission* ***upon request****. The* ***Regulatory Authorities*** *and the European Commission shall* ***ensure the confidential treatment*** *of this* ***set of data****, by themselves and by any consultant carrying out analytical work for them of the basis of these data.*

# Note on Regulation EC 1228/03

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## Applicability to Regulation EC 1228/2003

Section 5.10 of the **Congestion Management Annex** envisions the **Regulatory Authorities receiving** the underlying power flow case **data**

The Section also indicates that the **power flow data** shall be **"sufficiently accurate"**, which is the purpose of requesting the actual generator output and is consistent with Section 1.10 of the Annex:

*The national Regulatory Authorities shall regularly evaluate the congestion management methods, paying particular attention to compliance with the principles and rules established in the present Regulation and Guidelines and with the terms and conditions set by the Regulatory Authorities themselves under these principles and rules. Such evaluation shall include consultation of all market players and dedicated studies.*

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# Calculation of Screen 5

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## Calculating the Generator Output Forecast Screen

- In order to **monitor the relationship between forecast generator output and actual output**, we want to **find the hour when total output was maximum**
- We want to **use** this **particular hour** because the Network **Model will correspond to peak conditions**, which will **correspond to the hour with highest output**
- **Once** this **highest output hour** is **identified**, the **output of each generator in that hour** is **compared** to the **forecast output used in the Network Model**
- Therefore, reference to the “actual output” value, is the actual output that occurs at that “highest-output” hour

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# Calculating the Generator Output Forecast Screen

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- **Once** the **peak hour** is **identified** and the **actual output** is **identified**, we use a **simple Percentage Error formula** to monitor the relationship:

***Percentage Error (PE) =***

***[Generator Output forecast-Actual Output]/Actual Output***

- This gives a **measurement** of a **one-period forecast error**
- We are **interested** in **measuring the forecast error over a sustained period**
- Hence, we propose a **moving average** of the Mean Percentage Error
- A moving average simply means an **average of a number of the most recent months**
- For example, a **6-month moving average** is the **average value of the most recent six months**
- The **Mean Percentage Error** is:

$$\mathbf{MPE = 1/T\ \Sigma_{t \le T}\ [Forecast_t - Actual_t]/Actual_t\}}$$

- If T=6, then the MPE is a six-month moving average

# Calculation of Monitoring Threshold



**Generator Output Forecast Monitoring Threshold**

- While there are many possible ways to measure forecast error, the **simple six-month moving average of the MPE** is **good starting point** for monitoring the generator output forecast in the Network Models
- We do not expect the **forecast** to be **exactly equal** to **actual experience**
- **Generator output** is **variable** and **unpredictable**
- However, we would **expect** to see the **forecast to be "close" to the actual** and, over a time series, we would **expect any "error" to be above and below the forecast**, **not predominantly high or not predominantly low**
- The **six-month moving average** of the MPE will allow this monitoring
- There are a range of statistical methods that can be used to identify a threshold for indicating the accuracy of a forecast
- For the short-term, a **threshold of +/-10 percent** was proposed

# Calculation of Monitoring Threshold



**Applying the Threshold**

- The **+/- 10 percent threshold** for six-month moving average MPE will **indicate** whether a **particular generator output forecast** series **tends to be higher or lower than actual output**
- **If** the **moving average MPE** is **> 10 percent** or **MPE < -10 percent**, then the **Screen** would be **failed**
- It should **not be implied** that an average forecast error **less than 10 percent** is an **accurate forecast**
- These **thresholds** are **for monitoring only**, not for officially recognizing the accuracy in some statistical sense, although the screen can later be used for such purposes

**Basis**

- The +/-10-percent threshold for the moving average mean percentage error is based on the consultant's experience in monitoring electricity systems

# Calculation of Monitoring Threshold



**Screen Failure**

- The **Generator Output Screen** is meant to **detect inaccurate generator output forecast** in order to **ensure accurate Network Models** and, consequently, **accurate NTC values**
- **When** the Generator Output Screen **fails**, it **may indicate** a **faulty forecasting methodology**
- Upon Screen failure, the **regulators** should **initiate discussion** with the **TSO** as to the **source of the forecast error** and **what can be done to improve the forecasting**

# Results: Screen 5
# Generation Forecast Screen

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- This Screen has not been recommended by EWG yet…
  - Croatia has not been able to secure TSO participation for this Screen
- We have data to observe six control Area/data providers
  - Only three control areas have a complete four-month series
  - None of these three control areas experienced a Screen violation
  - In the event of a violation, a notification would be sent to the data provider
- We anticipate broader results over time as data is collected and more participants complete the four-month time frame
- Screen compares actual monthly peak generation to peak generation used in Network model
  - Actual peak generation is derived from hourly generation data
  - EWG members have faced some resistance from TSO on providing hourly data
- EWG requested considering whether monthly peak data would be sufficient
  - We determined that monthly peak is sufficient and that the Screen 5 has been amended

# Screen 6:

# Transmission Reliability Margin Screen

# Screen 6: Transmission Reliability Margin

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- **Screen 6 - Transmission Reliability Margin: Monitors the calculation of TRM**
- Seeks to identify process of setting TRM and establishing monitoring metric
- We are still collecting information on the precise procedures used by TSO to calculate TRM
- Screen **may be different** for **each TSO**
- Recommend continuing development
- We have data to observe 5 control Area/data providers
- Screen 6 is still under development pending further consideration of specific methods used by TSOs to calculate TRM – however there is the final proposal
- We anticipate broader results over time as data is collected to complete the four-month time frame for more participants

# Screen 7:
# Control Area Balance Screen

# Screen 7: Control Area Balance Screen

- **Screen 7 - Control Area Balance Screen: Monitors the control area balance to detect sustained departures from schedules**
- Similar to previous Screens: Screen seeks to **compare forecast load** and **resource balance** to **actual load and resource balance**
- Rationale: Schedules and generation should match load, otherwise unofficial use of assets may be occurring
- **Recommend adding** to 8th Region Guidelines

# Combining Screen 6 and Screen 7

- Screen 6 was initiated to monitor TRM
  - It currently collects TRM data, but does not involve an explicit screen
- Screen 7 was initiated to monitor control area balance;
  - The screen collects data to monitor for balanced trading
- PE **recommended the combining of Screen 6 and Screen 7**
  - The same data will be collected
  - The control area exchanges monitored by Screen 7 will continue to be monitored
  - The control area balance data will be used to monitor TRM

# Combining Screen 6 and Screen 7



- According to ENTSO-E, TRM should be (at most) the sum of:
  - UE + Ur
  - UE is the cross-border capacity set aside for emergency exchanges
    - These values should be known in advance and reported to on each interconnector
  - Ur is k*σ
    - where σ is the standard deviations of regulation deviation (ACE); This is based on the historical values collected in the Screen 7
    - k =3, (3 standard deviations typically will encompass more than 95 percent of all observations in a randomly-disturbed process)

New Data to be Requested under Screen 6

Calculated from current Screen 7 data

# Combining Screen 6 and Screen 7

- Ur is what must remain on the interconnectors in order to allow the system to use the interconnectors to recover from a temporary imbalance
  - The value would be distributed across all interconnectors in proportion to their impendence (highly correlated with import TTC)
- For each interconnector, an index value is calculated as:
  - $I_{TRM}$ =UE + *w**Ur
  - *w* is the portion of the import TTC relative to all control area import TTC

# Combining Screen 6 and Screen 7

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- $I_{TRM}$ should be the maximum TRM value on a interconnector
  - ➢The Screen is a percentage error measure (TRM – $I_{TRM}$)/TRM (where the term TRM is the actual posted TRM values)
- The Screen Threshold is based on historical screen values using the 85th percentile
  - ✓This is similar to the threshold used throughout the Market Monitoring Guidelines
  - ✓The original Screen 7 is retained and reported within the Screen 6 framework
    - ➢This screen identified periods when sustained imbalances occurred
- **Recommendation**: PE recommend the combining of Screen 6 and Screen 7 for more complete monitoring of TRM

# Auction Screening Data

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# Auction Screening Data

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- DataRequest
- In Yearly, Monthly, Weekly, and Intraday Auctions
  - Offered Capacity in Auction
  - Allocated Capacity to each Participant
  - Marginal Price
  - Capacity Resold and repurchased by each participant
- Curtailment Data
- Screens
  - Market Share
  - Herfindahl-Hirschmann Index – HHI: capacity portion concentration measurement
- Thresholds
  - ✓ 20% Market Share
  - ✓ 2500 HHI

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# Further activities

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- **Improve Format** of data collection (Potomac Economics)
- **Provide review** of **reports** by **NRAs for data errors** - change the reporting process to ensure reports are reviewed by NRAs for data errors - any error on input TSOs data validity could be detected after outcomes' analysis/reports and it should be reported ASAP by all: TSOs, NRAs and the consultant/PE
- Include **Standard Deviation with Mean Forecast Error**
- Need to address **NRA staff resources**
- NRAs to consider adding MM Guidelines to Grid Codes – **Information Code**
- According to details on **Regional MM** mechanism/procedures in order enable NRAs to **define appropriate entity** for this task on regional level; proposal to be checked with ECS where involvement by ECS would be foreseen
- **Coordinated Auction**
  - Dry Run Screens could be used in future CA,
  - Especially with respect to NTC model, but also flow-based model

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# Market Monitoring Web-based Interface:

# SEEAMMS.COM

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# Web-Based Data and Reporting Interface

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- A key element of the implementation of the 8th Region Market Monitoring Guidelines is the Web-Based data collection and reporting data base system/Interface;
- South East Europe Automated Market Monitoring System (SEEAMMS) - SEEAMMS.COM
- This interface is intended to:
  - Simplify and Standardize data collection - Allow Direct Upload of Data
  - Check errors, organize data, regulate access
  - Automate screen and threshold calculations;
  - Report screen results;
  - Report screen violations;
  - Provide Regulator access to the data base
- Potomac Economics/USAID/IRG are continuing to work on development of the scope and structure of the tool
- PE has initiated contact with SEE TSO to assist in identifying standard data structures

# SEE Automated Market Monitoring System

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- Current Efforts Underway
- Data base elements have been identified
  - Market Monitoring Data for Dry Run Screens
  - Data identified by EWG Task Force 1 on Coordinated Auction Monitoring
- Potomac Economics has initiated contact with Serbian and Croatian TSO to assist in identifying standard data structures

# Market Monitoring Web-based Interface SEE

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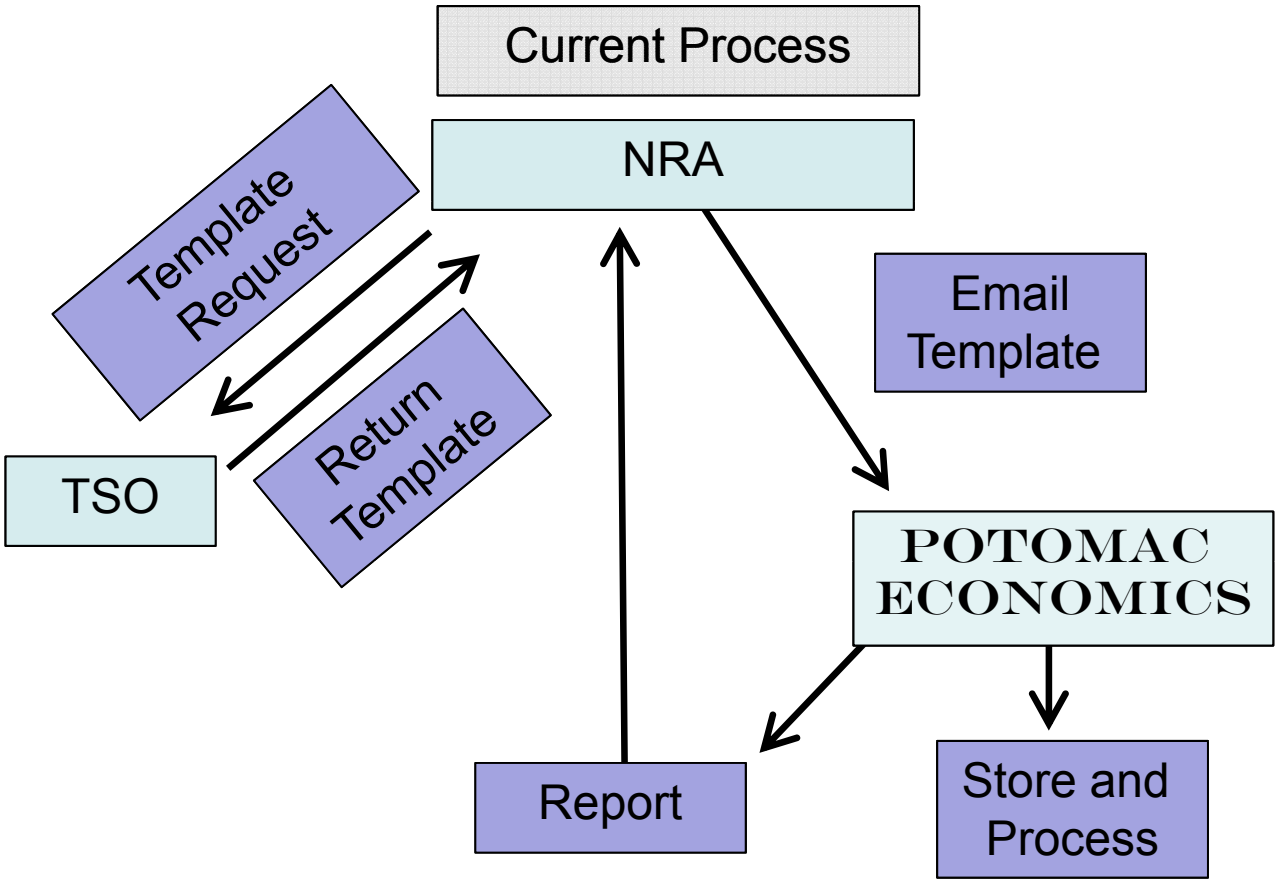
Defined Tasks:

1. Develop web-based interface for data entry collection
2. Automate the storage and processing of data;
3. Automate reporting of charts and tables;
4. Validate data
5. Send automated alerts for screen violations;
6. Minimize resources required for maintaining system;

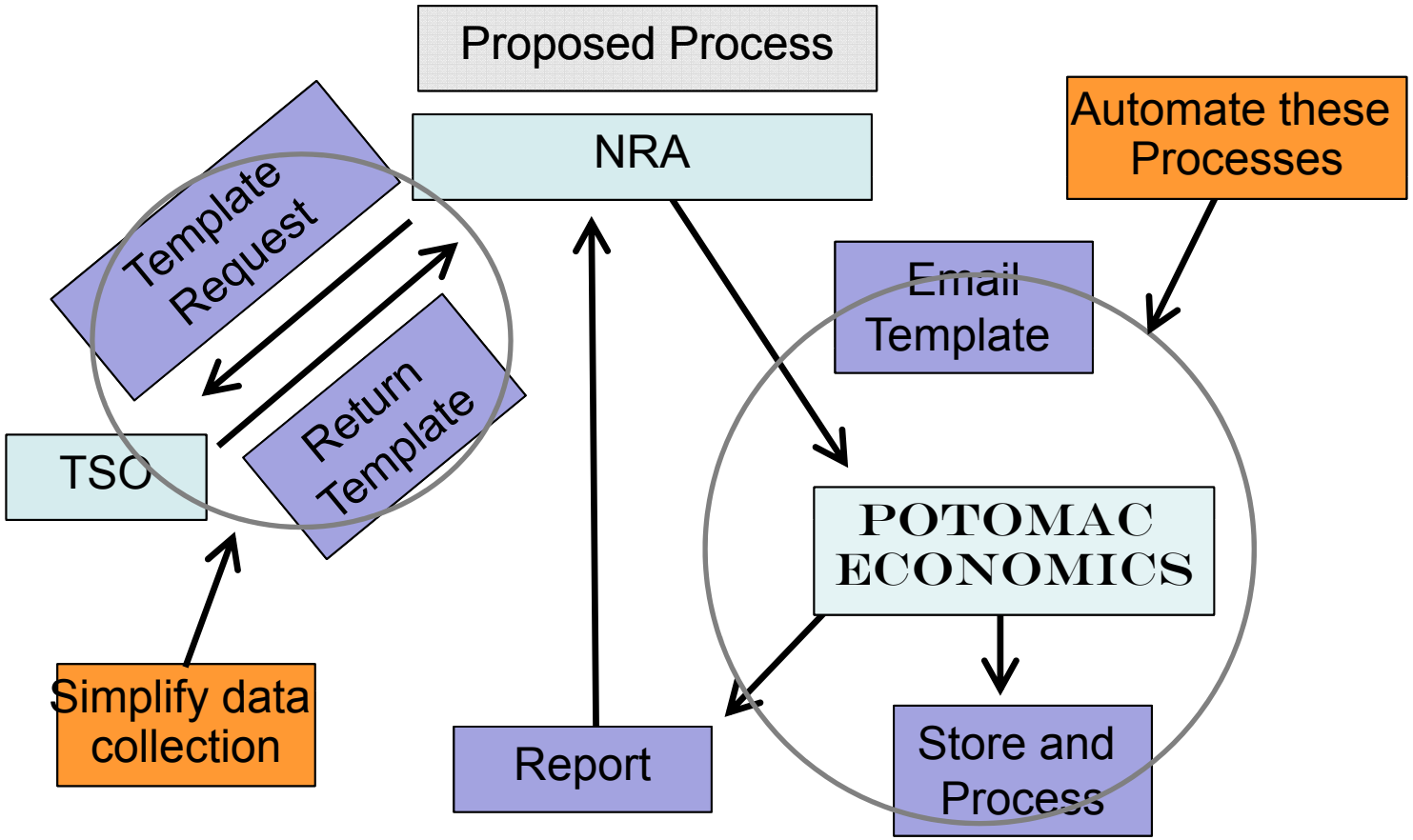
# Interaction with Other Data Bases

- No duplication on collection same data from TSOs (transparency and regulatory purposes)
- Our preliminary investigation into linkages to other regional data bases indicated that no standard data collection is present in the SEE region
- Data to ENTSO-E, for example, is sent manually
- EU is not having standardized MM structure, nor regional MM platform
- SEEAMMS is likely to be the leading data collection interface in the region
- Work on SEEAMMS can lend support to other processes, e.g., Entso.net (formerly ETSO-vista)

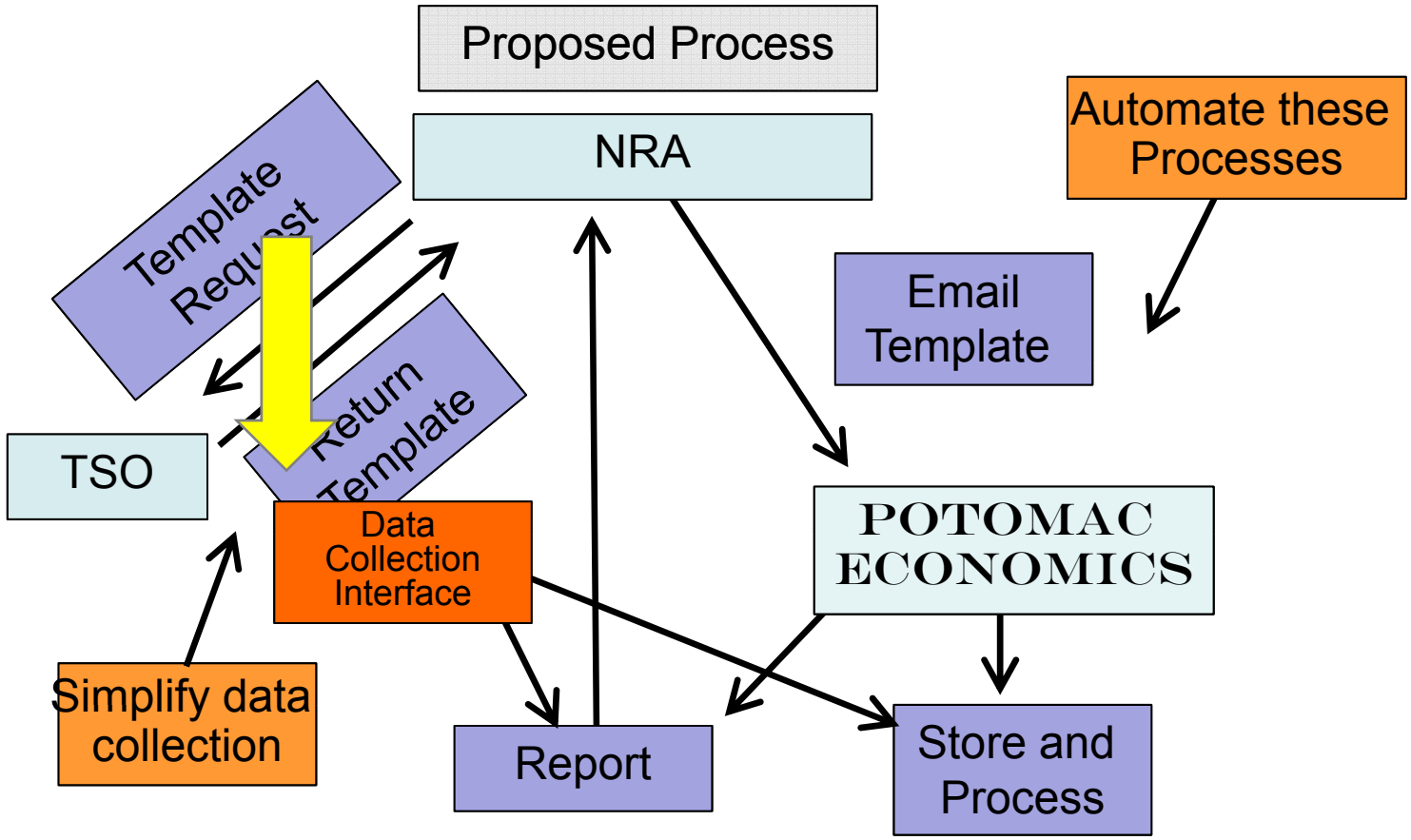
# Market Monitoring Interface
# South East Europe



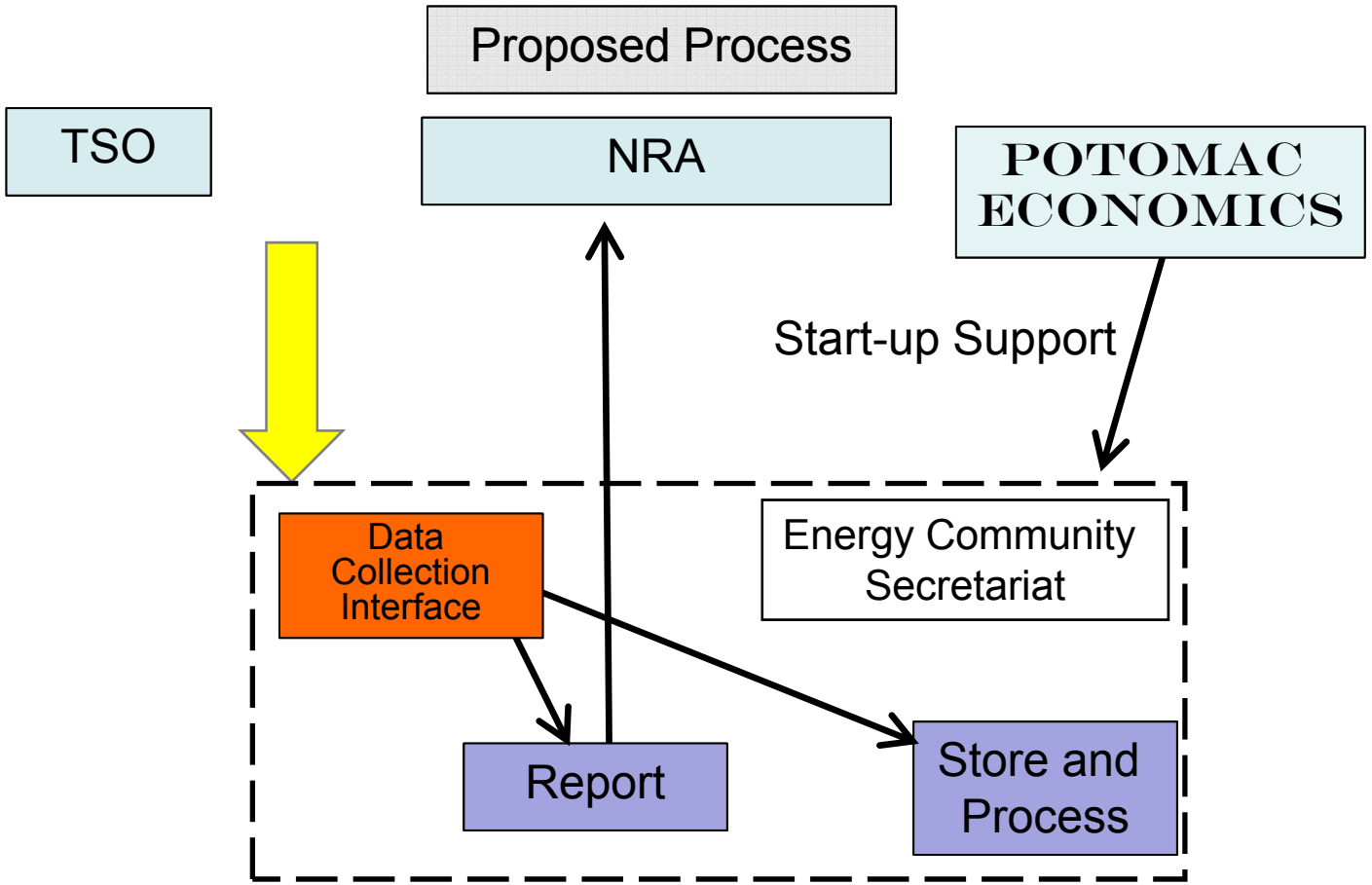
# Market Monitoring Interface South East Europe

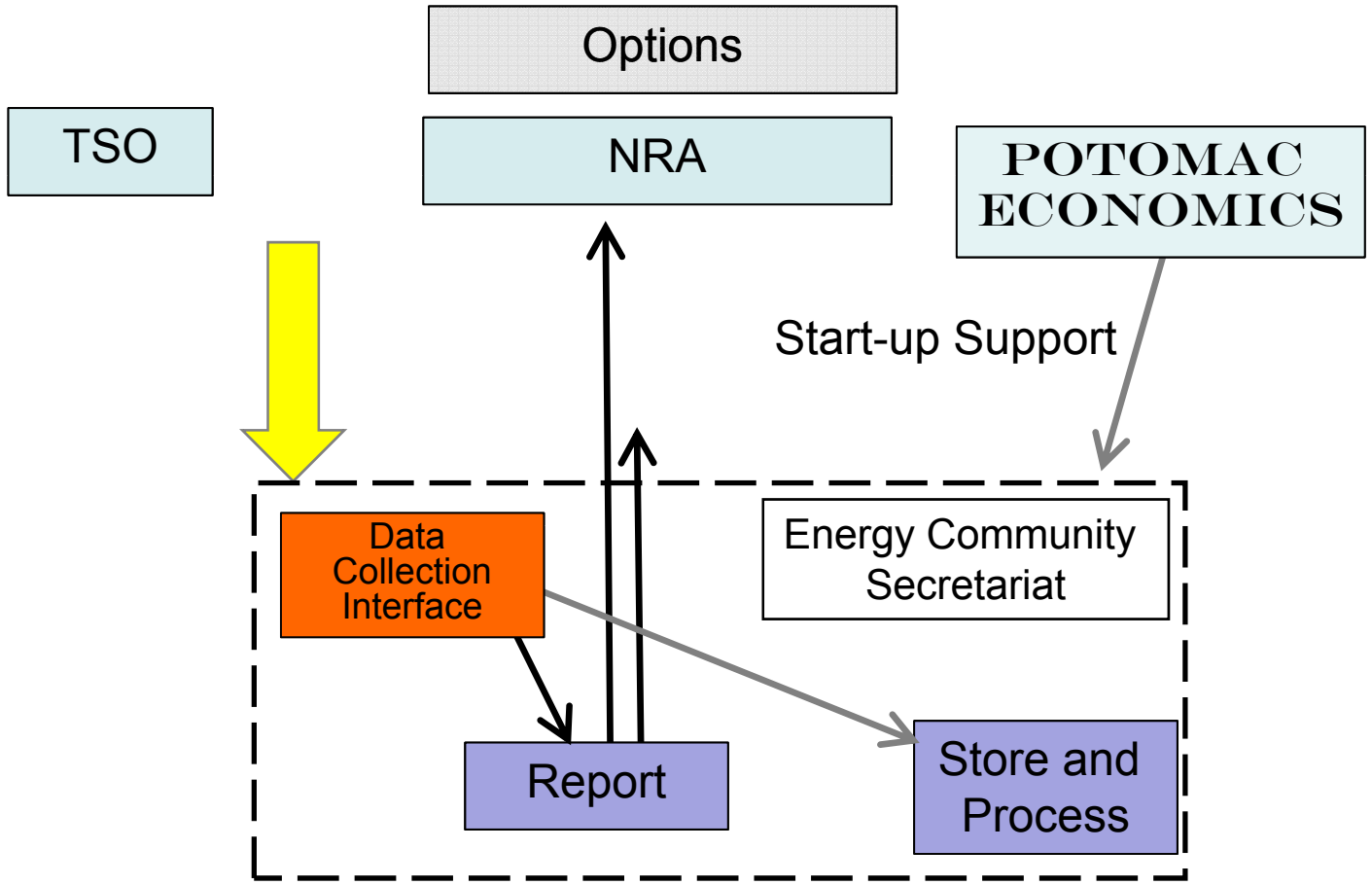


# Market Monitoring Interface South East Europe



# Market Monitoring Interface South East Europe

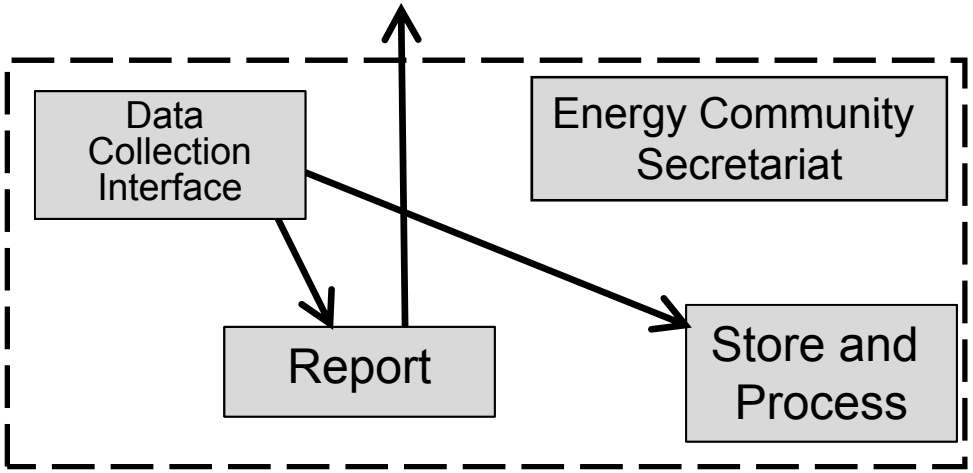



Options
TSO
NRA
POTOMAC ECONOMICS
Start-up Support
Data Collection Interface
Energy Community Secretariat
Report
Store and Process

Options

GOOGLE Apps

SQL Data Base



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# Option #1 GOOGLE APP

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GOOGLE Apps

- Google Apps environment includes username/password, spreadsheets, sites
- TSO users populate Excel template with hourly data
- A web form would be used to import monthly results to Google Spreadsheets
- Google Spreadsheets work like an online and real-time version of Excel
- Analysis would be automated using formulas as in Excel
- Results presented graphically using Google Sites

# GOOGLE Apps



**ADVANTAGES**

- Quick setup time
- Workgroup management

**DISADVANTAGES**

- Require additional step to maintain database
- Limited graphing capability
- Limited support from Google

# Option #2 SQL Data Base



Option #2 SQL Data Base

- Web-based environment
- TSO users upload CSV file containing hourly data
- Data is validated at time of upload and stored in a MySQL database
- Calculations occur either as data is uploaded or as reports are viewed
- Screens presented graphically on a site to be determined

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# SQL Data Base

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## ADVANTAGES

- Ease of use (data imports)
- Data validation
- Graphing capabilities and presentation of results
- Data base functionality

## DISADVANTAGES

- Maintenance by outside contract
- Excel and Google Apps are more intuitive than MySQL, Jboss, and Java
- Cost, we recommend ongoing maintenance contract;
  - When new screens are added
  - When screens are modified

# Recommended First Steps



- Integration of data templates to a single template to simplify data collection (avoids duplication)
- Continue to develop chosen alternative to data base construction
- Begin reporting protocol manually
  - This means Potomac Economics will send reports that are expected to be sent by data interface.
- Coordinate with ECRB EWG TF1

**Next Steps:**

- Finalize SEEAMMS software and conduct workshop in Fall 2011 and initiate Dry Run
- Implement SEEAMS (December 2011)
- Future Work: Add monitoring of wholesale markets, Poyry, BETSEE; CAO

# Other Regional Initiatives

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# Other Regional Initiatives

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- Other Regional Initiatives
  - SEE CAO IG and ECRB on SEE CAO Monitoring, performed by ECRB EWG TF1
  - Electricity Regional Initiative (ex-ERGEG ERI)
- Data elements proposed by the other projects will be useful for SEE Market Monitoring
- Substantial **overlap** of the data
- Non-overlapping data elements do indeed have value in general monitoring of SEE market activities
  - Dry Run project seeks to identify specific conduct, as opposed to more general metrics
- Some of the data must be combined with generator output, which may not be adequately available until spring 2011

# Other Regional Initiatives

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| Data Requested in Dry Run | Level | Term | Screen | Other Projects |
|---|---|---|---|---|
| **Base Case Exchange (BCE)** | Interconnection | Monthly Network Model | BCE Screen | Task Force 1; |
| **Commercial Schedules** | Interconnection | Hourly | BCE Screen; AAC Screen; Control Area Balance Screen (proposed) | Task Force 1; ERI |
| **Already-Allocated Capacity** | Interconnection | Hourly | AAC Screen | Task Force 1; ERI |
| **Available Transfer Capacity (ATC)** | Interconnection | Daily | AAC Screen | Task Force 1; ERI |
| **Critical Facility (CF)** | Interconnection | Hourly | Critical Facilities Screen | Task Force 1; |
| **Flow on CF in Base Case** | Control Area | Monthly Network Model | Critical Facilities Screen | Task Force 1; |
| **Load** | Control Area | Hourly | Load Forecast Screen; Control Area Balance Screen (proposed) | |
| **Load in Base Case** | Control Area | Monthly Network Model | Load Forecast Screen | |

**Data Used in Screens 1-4**

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# Other Regional Initiatives

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| Data Requested | Level | Term | Screen | Other Projects |
|---|---|---|---|---|
| **Generator Output** | Control Area | Hourly | Generation Output Screen | Task Force 1 |
| **Generator Output in Base Case** | Control Area | Monthly Network Model | Generator Output Screen | Task Force 1 |
| **TRM** | Interconnection | Daily | TRM Screen | ERI |
| **Net Transfer Capacity (NTC)** | Interconnection | Daily | TRM Screen | Task Force 1;<br>ERI |
| **Generator Output (Aggregate)** | Control Area | Hourly | Control Area Balance Screen | Task Force 1; |

**Data Used in Screens 5-7**

# Other Regional Initiative Data Elements
# Non-Overlapping Data Elements



## Simultaneous Nominations

- This is an hourly recording of participants that schedule on an interconnector in both directions
- Applicability to Market Monitoring: The AAC Screen (Screen 2) of the Dry Run, which compares reservations and schedules, attempts to detect withholding of cross-border capacity
- It is not clear how examining simultaneous nominations/schedules can add to the Screen
- It is worth further discussion

## Schedules and Physical Flows

- Hourly data on cross-border schedules and actual physical flows
- Applicability to Market Monitoring: An effective monitoring screen would be one where cross-border physical flows are compared to physical flows from schedules
- However, the schedules must be converted to actual flows using PTDFs
- Screen 7 addresses these issues

# Other Regional Initiative Data Elements

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**Curtailments**

- Hourly Transmission curtailments
- Applicability to Market Monitoring: Curtailments can be useful to detect vertical market power – i.e., the transmission provider favoring its own generators in the open market by curtailing rivals
- Need generator ownership data

**Balancing**

- Hourly procurement of system-wide balancing energy
- Applicability to Market Monitoring: This data is on an aggregate control area basis - good for general overall market trends
- A Screen requires further development
- No balancing market

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# Other Regional Initiative Data Elements

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**Market Share of Interconnection Capacity**

- Annual, monthly, daily, and intraday day shares by participant of cross-border transmission capacity
- Applicability to Market Monitoring: The market shares of cross-border capacity could be analyzed in a screen once generator market shares are available

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# Regional Market Monitoring Process

# Regional Market Monitoring



- There are **three elements** to Regional Market Monitoring:

1. **Coordination** among **regulators** to **establish** a consistent **set of market monitoring Screens**
   - GGP have been initiated
2. **Exchange of data** among **regulators** to enable **calculation of Screens** and **sharing of Screen results**
   - SEEAMMS allows collection and sharing of data
3. **Coordination** among **regulators** to **share Screen results** and to **coordinate response to Screen violations**
   - Instances can arise where a sustain screen violation will be addressed by coordination with neighbouring NRA;
   - Example, in Screen 1, Guidelines suggest:

"Temporarily using the BCE values provided by a neighbouring TSO that has superior forecasts"

# Regional Monitoring



- **Regional Monitoring** can be **beneficial** and can be conducted through **"cooperation" among NRAs**:
  - ➢ In a transition to a sustainable function in the region, **NRAs can conduct** national/control area MM through **issuing standardized common minimum set of Screens**
  - ➢ **Regional MM requires an entity** to **facilitate** "cooperation" among NRAs
  - ➢ **NRAs** should have an **explicit role** in **detecting anomalies or deviations** to Market according to MM reporting, and **react accordingly** (reporting to Competition Authorities or reacting by themselves in line with their authority)
  - ✓ SEE regulators (EWG) shall decide on the structure of a Regional MM when Consultant offers additional details on proposals

# Regional Market Monitoring Process

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## Regional Market Monitoring

- Markets extended beyond a single regulatory authority, **requiring coordination among regulators** conduct market monitoring
- Regional Market Monitoring is the **collection and screening of data** so that **regulators can detect regional market failures** or **abuse** and **respond in a coordinated manner**
- To **conduct** Market Monitoring in the 8th Region, 8th Region **regulators must collect and analyze data on a consistent basis** and **respond in a coordinated fashion to instances of market failures and abuse**

# Regional Market Monitoring Structure

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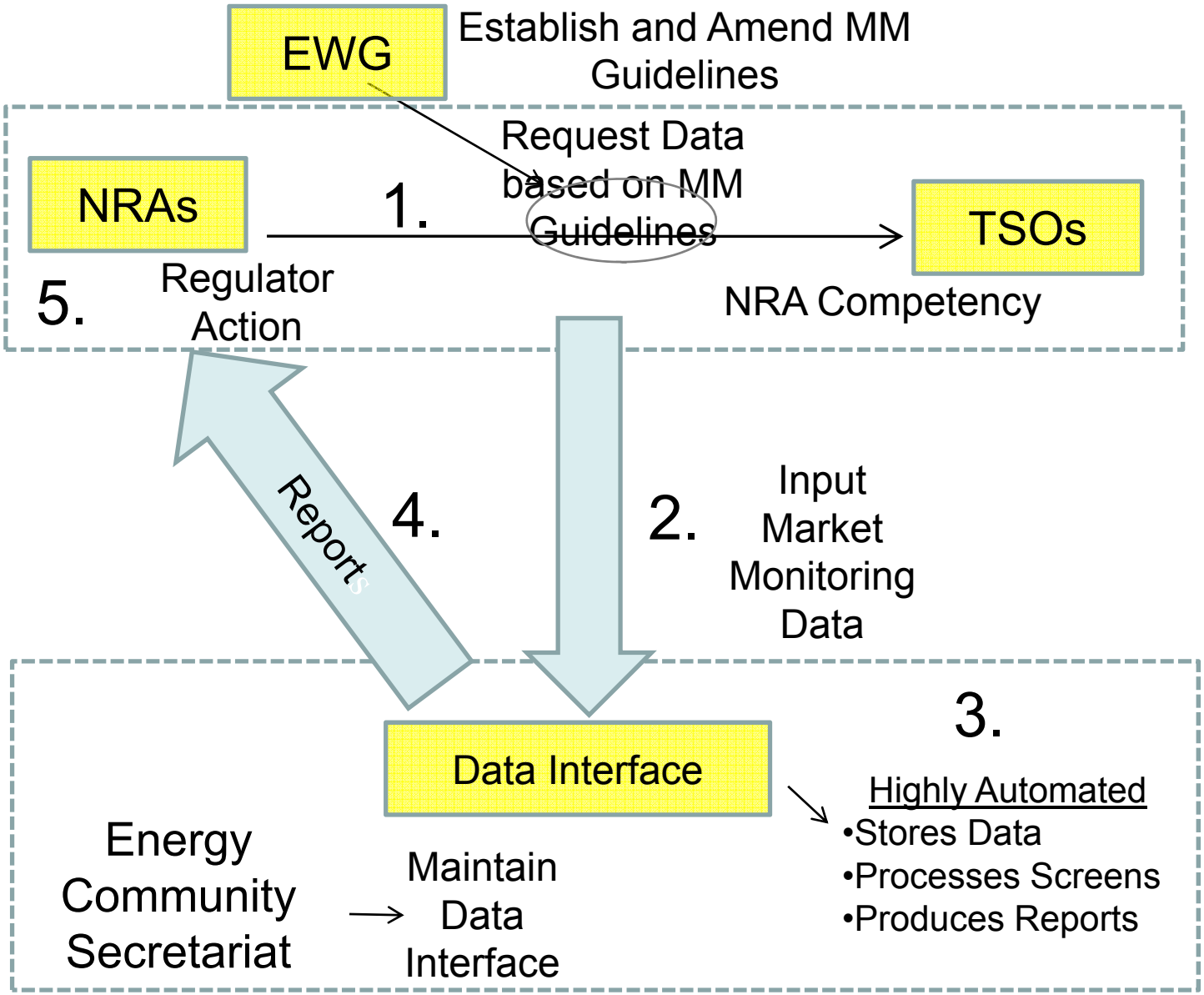
**Regional Cooperation**

- Regulators establish a **consistent set of market monitoring Screens** so that **all regulators are working with the same data and market issues**
- ECRB EWG, in cooperation with USAID/PE, has **already facilitated the cooperation** among 8th Region regulators in **developing the 8th Region Market Monitoring Guidelines** ("Market Monitoring Guidelines")
- The second level of cooperation is the **sharing of data and analyses produced in accordance with the Market Monitoring Guidelines:** This cooperation is facilitated by regulators collecting data and **submitting the data to a central entity for processing and reporting**
- **Coordination** is **required** for **regional monitoring** when a **Market Monitoring Screen may be violated**: Under such conditions, there may a **need for a coordinated response by two or more regulators**

# Regional Market Monitoring Structure



# Regional Market Monitoring Structure

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- The **Dry Run** is developing the capacity for NRAs to do their own National monitoring, **but**…
- Furthermore, there is a **need for regional analysis**
- **Determine a structure** within which ECS or ECRB facilitates cooperation among NRAs and EWG for monitoring and **contributes regional analysis for periodic reports**
- **Who** is going to analyze the data on a regional level to help NRAs and EWG to “cooperate”…
- **We do not believe it require establishing new authority** for existing entities or a new supra-regional entity
- There are **two options** that appear to be **practical**:

# Regional MM: Proposals



## ECRB-Section Support to ECRB

The Consultant's Recommended approach

- EWG proposes a Market Monitoring Work Plan for the approval by ECRB (8th Region Market Monitoring Guidelines)
- NRAs will issue Screens and conduct follow-up with market participants based on pre-defined screening thresholds
- ECRB-S coordinates the collection of data and analysis and summary of Screens and advises NRAs
- ECRB-S will prepare an ECRB Market Monitoring Report for the ECRB based on the analysis of Screens (with USAID transition support through Potomac Economics)
- The EWG/NRAs will advise and review the ECRB-S report before sending to ECRB for final approval
- The reports will be produced in time for review and approval at each ECRB meeting (approx. quarterly)

# Regional MM: Proposals

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**Alternative Option: ECS prepares Regional Report**

This is an alternative to the preferred ECRB-S approach

- NRAs will issue data requests and conduct follow-up with market participants based on pre-defined screening thresholds
- NRAs will submit data to ECS
- ECS will conduct MM analysis based on data provided by NRAs
- ECS will prepare a Market Monitoring Report based on the screens and analysis
- The EWG/NRAs will offer comments, but the ECS has full discretion in the Report's content
- EWG/NRA comments not accepted will be placed in an appendix
- The reports will be quarterly

# Reporting

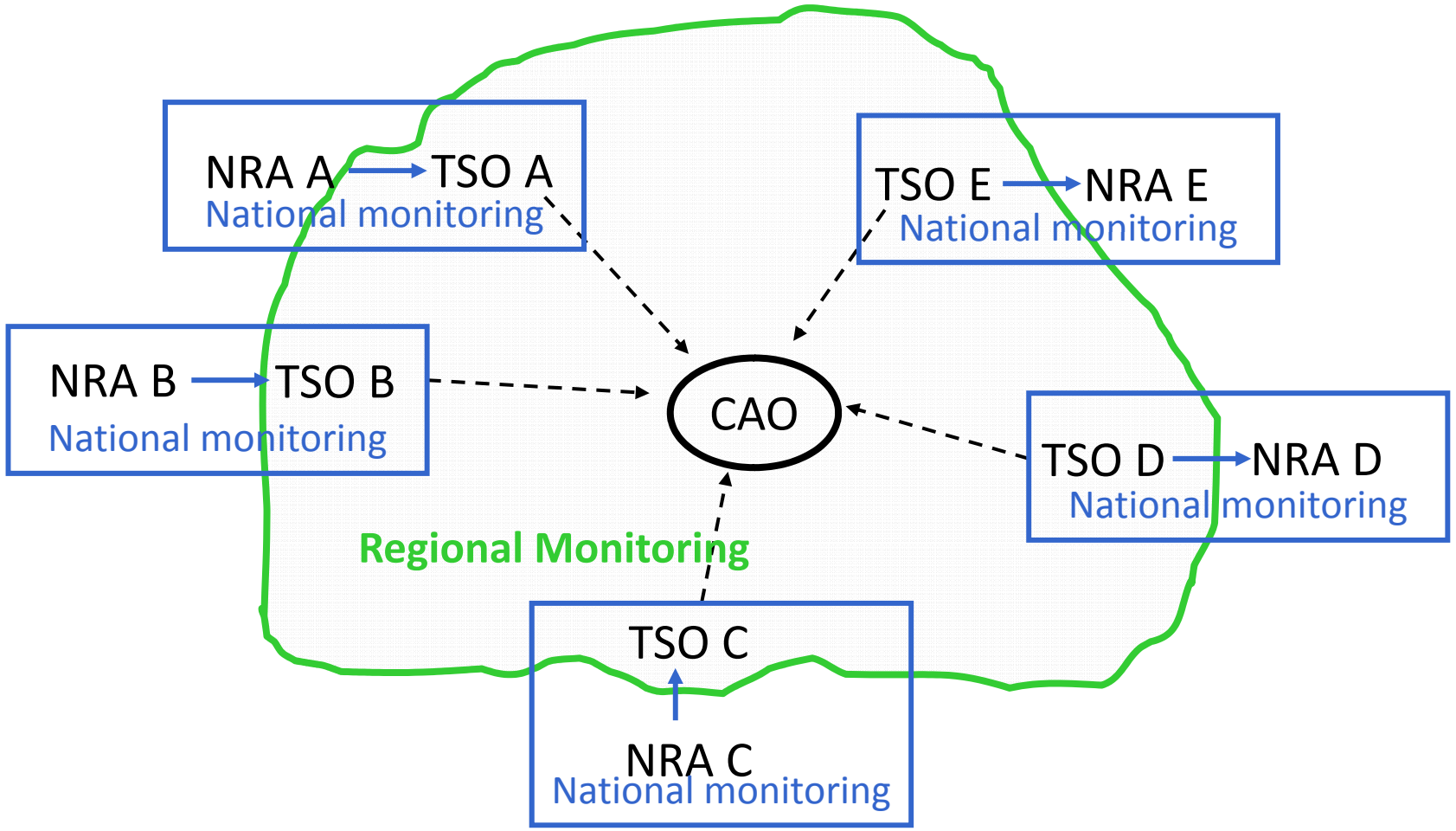


## Quarterly Reporting

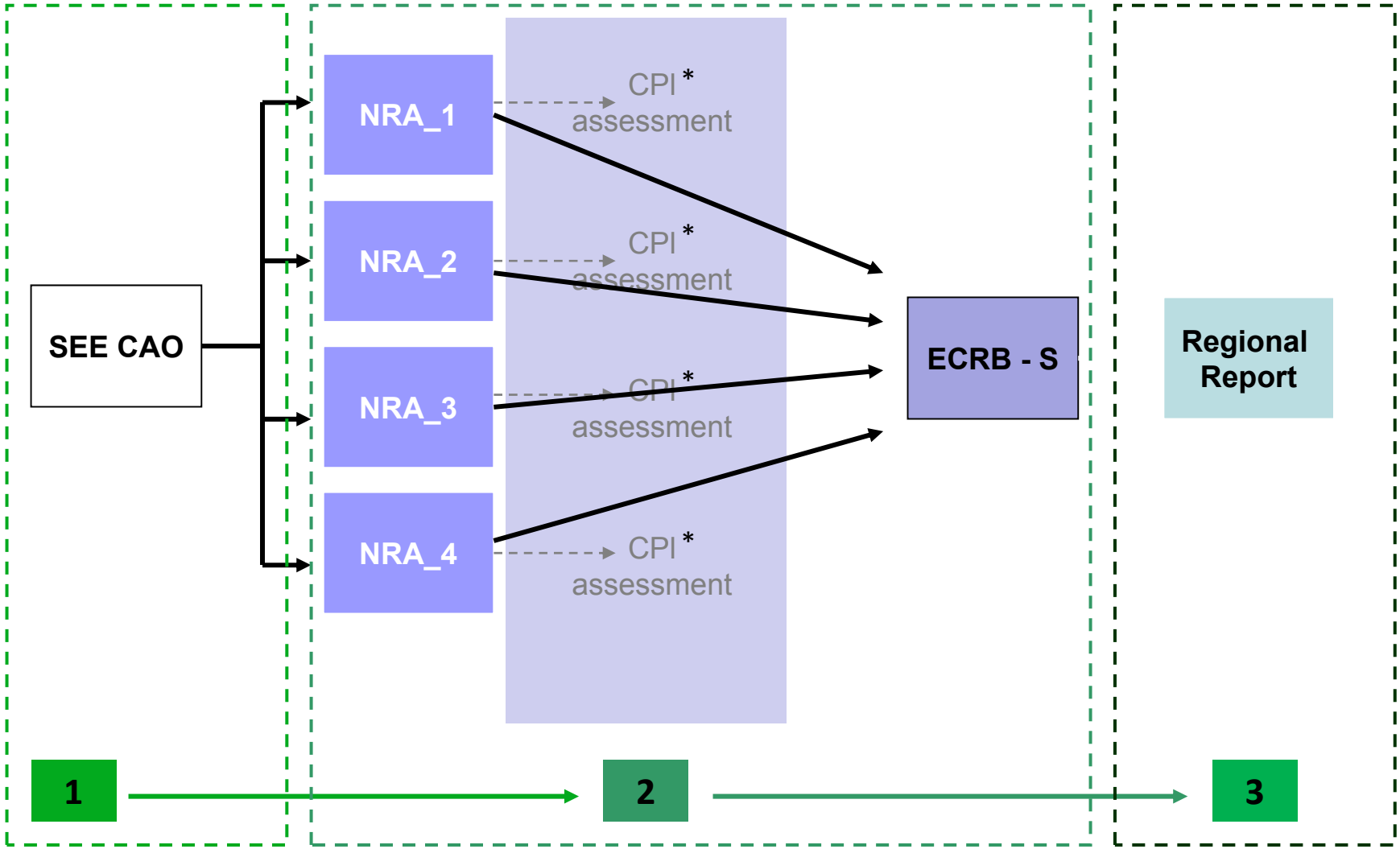
- Reports would summarize:
  - the results of the monthly screens
  - other activities, follow-up (such as information requests to participants), other market impediments
- Special reports could be issued when clearly identified problems emerge as a result of screening and follow-up information

# SEE CAO Monitoring

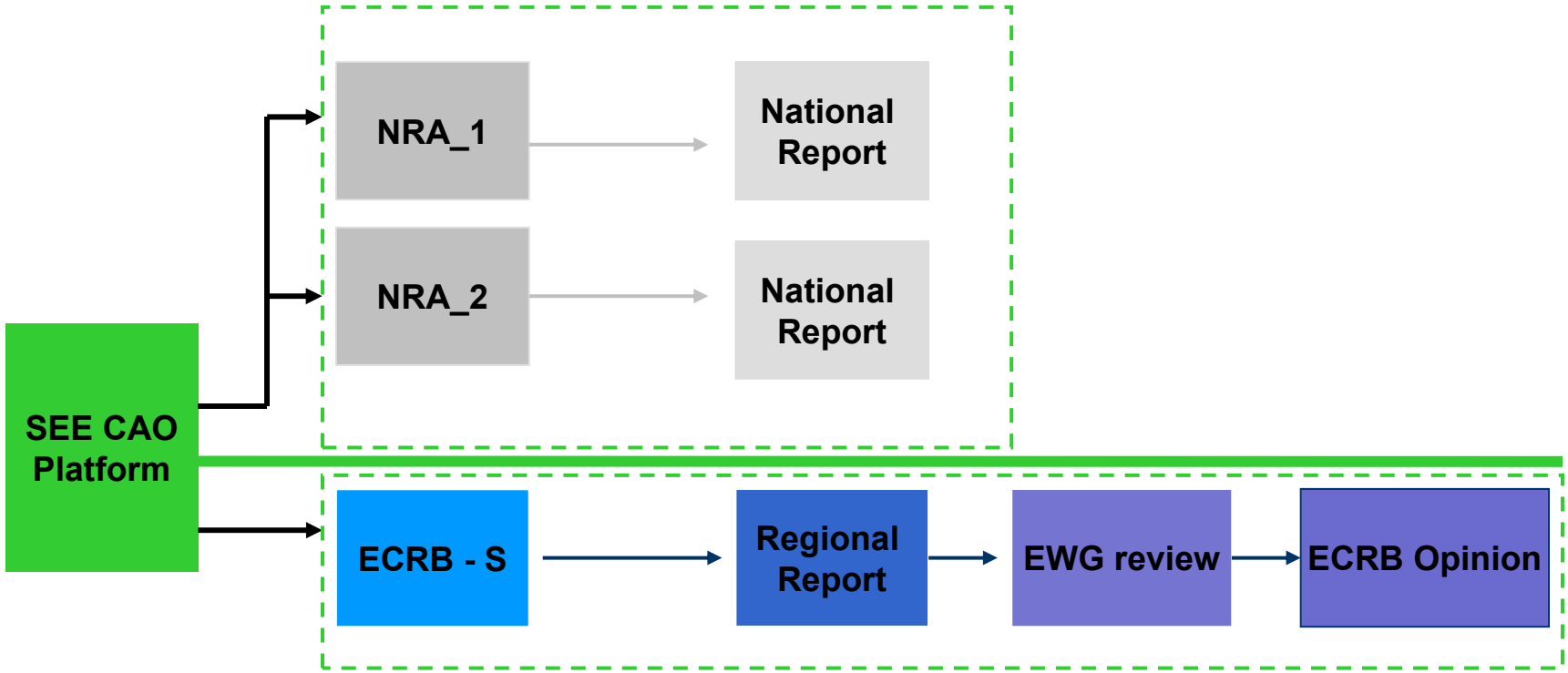
# SEE CAO Monitoring: ECRB Position: 2 layers – national & regional



# SEE CAO Monitoring: How to undertake regional CAO monitoring?



# SEE CAO Monitoring: Option discussed by ECRB



# SEE CAO Monitoring: Details of CAO Monitoring model under discussion



- **FORMAT/PROCEDURE**
  - SEE CAO to establish a data platform
  - Access for:

  1. NRAs → national monitoring of compliance with rules approved by NRA according to powers
  2. ECRB Section → regional monitoring report ([1] quarterly reports, [2] weekly tables?) → ECRB/ECS?

- **WHICH DATA?**

***a. IMPLEMENTATION AUCTION RULES***

  - National and regional monitoring

***b. MARKET PERFORMANCE***

  - Regional report to assess independently (→ ECRB/ECS?)
  - Not beyond powers of NRAs !
  - Beyond powers of NRAs → left to NRAs to cooperate to competition authorities etc.

# SEE CAO Monitoring: Next Steps

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- CA/CAO Monitoring mostly concentrated on procedural issues in this phase
- Indicator definition and explicit data requirements shall be postponed as EWG cannot define or discuss it before SEE TSOs issue Draft SEE CAO Auction Rules
- Should regulators/EWG be included in the work on drafting SEE CAO Auction Rules from the very beginning, or wait for the final draft version of the document, drafted by PT?
- SEE CAO and Regional CA/CAO Monitoring entity, e.g. ECRB-S or ECS, shall require an advanced data electronic base and software which would enable producing all kind of raw CA/CAO Monitoring data in table format upon explicit request at all time horizons: daily, weekly, monthly, etc.
- More detailed reports which would include comparisons and analysis in written form could be produced on longer time period, e.g. monthly level

# Action Items
# Next Steps

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# Other Action Items

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- Develop an improved approach to collecting data and calculating Screens, possibility an “on-line” interactive approach
- Potomac Economics will present a system for consideration in fall 2011
- PE identified and proposed all cross-border Screens and identified data requirements in order to consider harmonizing with ERGEG data requirements
- Potomac Economics has issued Screens 5-7 and thus this completed their recommendation for Screens relating to cross-border transmission capacity
- Potomac Economics has also issued a short report addressing the data requirements outlined in the ERGEG ERI project and the EWG Task Force 1 project (CAO monitoring)

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# Other Action Items

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- Provide a final proposal on a regional monitoring mechanism to enable NRAs to define appropriate procedures and entities for market monitoring in the 8th Region
- Potomac Economics has drafted a proposed approach to 8th Region Monitoring
- Change reporting process to ensure reports are reviewed by NRAs for data errors and develop an automated error detection system
- Reports that include data will be sent to each NRA before wider circulation - In addition, the web-based interface can include an error-detection system that automatically request NRA to re-check anomalous data

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# Other Action Items

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- Include Standard Deviation with Mean Forecast Error
- Average values presented in reports or other analysis will include standard deviation
- Development of staff resources at NRA's for MM tasks
- The web-based interface will be proposed to reduce NRA resources needed for administering the Market Monitoring
- Initiate discussion on future training workshops
- Draft Market Monitoring Guidelines: Potomac Economics has submitted a draft of the 8$^{th}$ Region Market Monitoring Guidelines – EWG is reviewing it
- NRAs consider adding data from ECRB-approved MM Guidelines to Information Codes or other appropriate policy document in order to ensure and provide frequent and continuous collection of TSOs data for MM purposes

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# Hot questions on MM in SEE

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- Who will “coordinate” NRAs in the monitoring process?
- Who will facilitate the “Regional Analysis”?
- Who Publishes Reports?
- We ask:

*can the Dry Run Process be converted to a permanent “Live” Process?*

- Who will undertake the function of the USAID Consultant?

# Next Steps



## Next Steps

- EWG develop MM Guidelines - fall 2011
- ECRB approves Guidelines – till the end of 2011
- ECS or ECRB facilitates cooperation among NRAs and EWG and contributes regional analysis for periodic reports – 2011/12
- MM Dry Run and SEEAMMS continues to develop further additions to the Guidelines that will be reviewed by EWG and approved by ECRB
- Through USAID, Potomac Economics continues transition support to ECRB-S and EWG

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