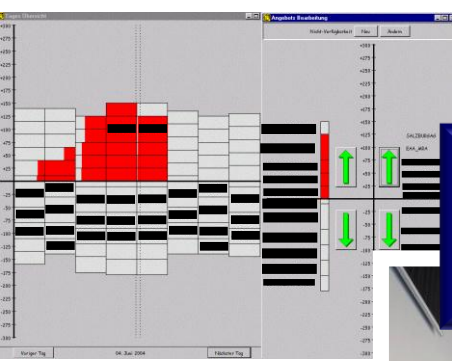


# Network Code Requirements for Generators

Florence Forum  
22-23 May 2012

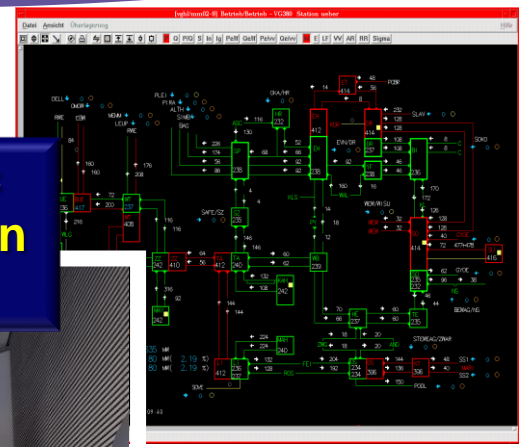
# Efficiently operating the power system – it's getting harder!



**Large wind & solar volumes**



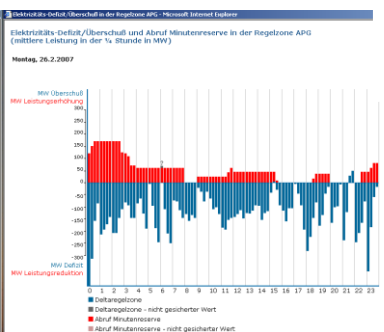
**Geographic concentration of RES**



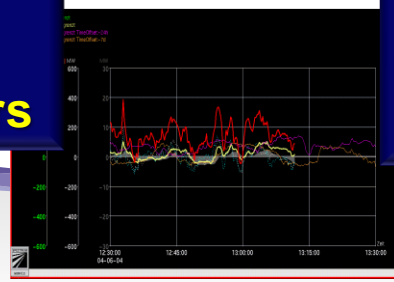
**Increasing Levels of Market driven Flows**



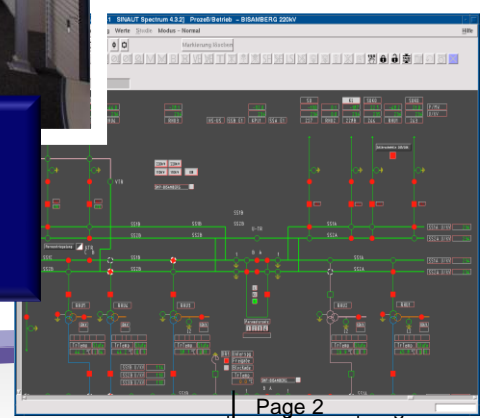
**Delays in building infrastructure**



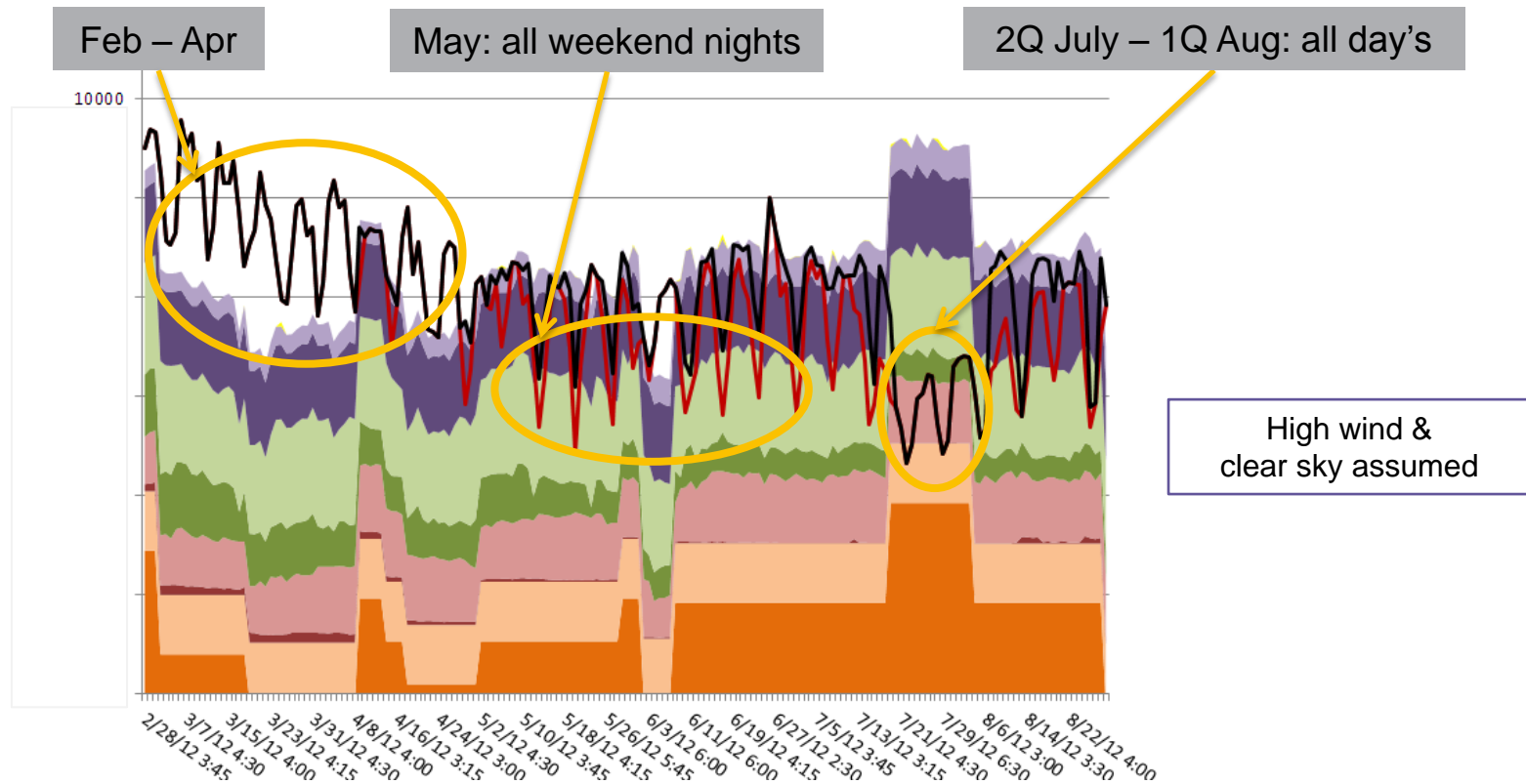
**Frequency Deviations between hours**



**Rules on Priority Dispatch**



# Generation/demand flexibility becomes an issue



*+ where?*

Need for flexible plants, running only a few hundred hours at full power per year



# What are the crucial aspects of system security

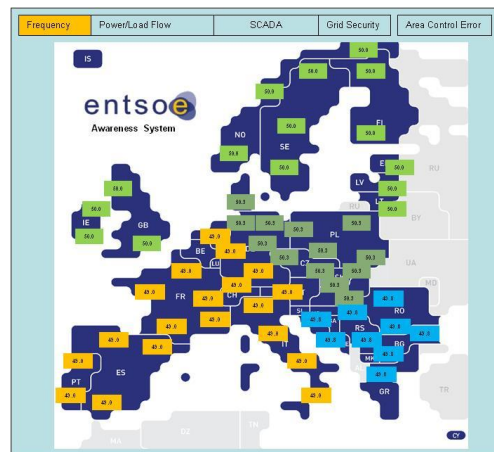
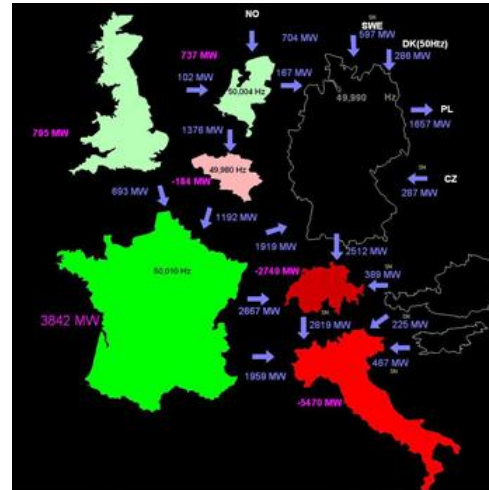
Build and maintain transmission network for bulk power flows

Reinforce upstream transmission network for connection of new generation

Design market mechanisms for facilitating trading at all time horizons

Continuous evolution of operational and coordination measures

Generators should be able to provide ancillary services requested by system conditions



Visualization of Disturbance 4/11/06

Data exchange

(e.g. DACH process, on line measurements)

ENTSO-E Awareness System

Coordinated remedial actions

(eg. PSEO-50Hertz, or the rescheduling of HVDC links over the Baltic Sea)

CWE Phase-Shift Transformer management

Inter-TSO cooperation

(eg CORESO, TSC, SSC)

NC Operational Security (03/2013)

NC Operational Planning and Scheduling (04/2013)

# What are the crucial aspects of system security

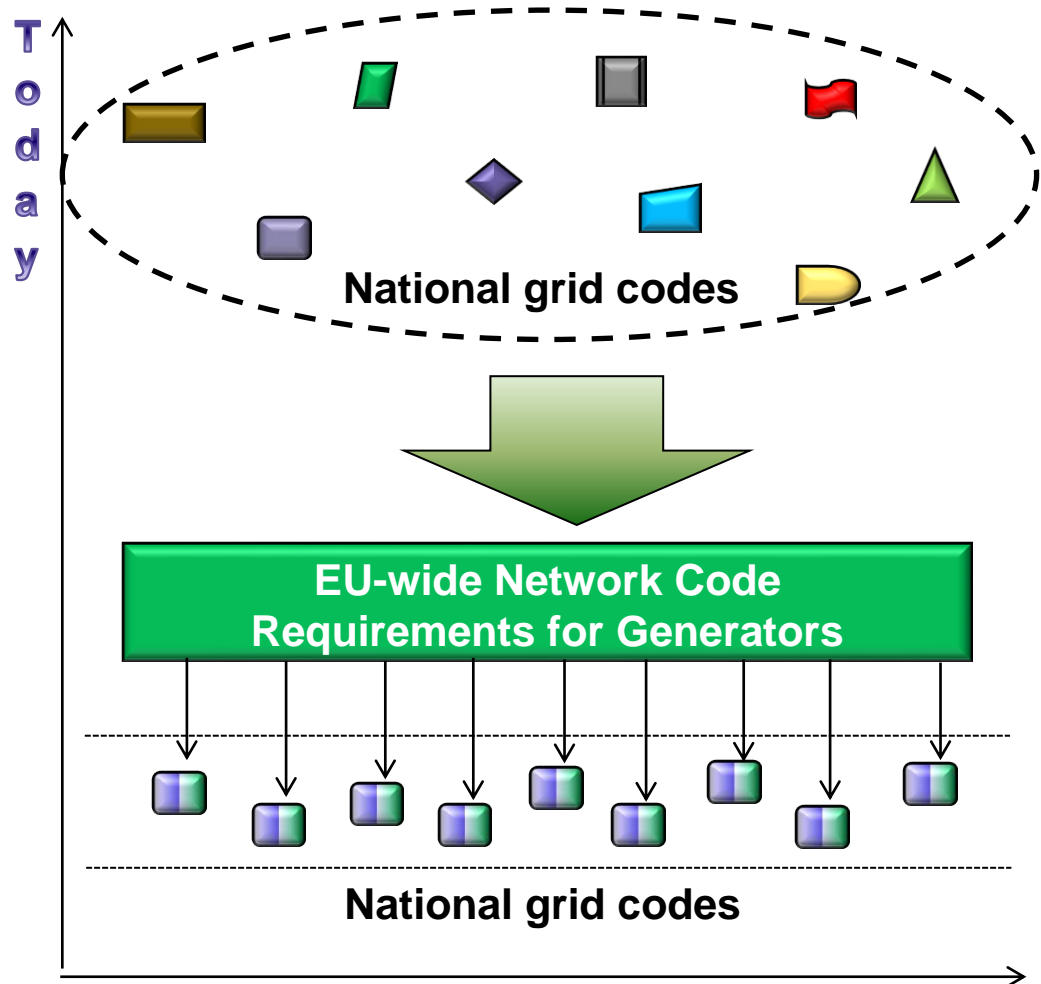
Build and maintain transmission network for bulk power flows

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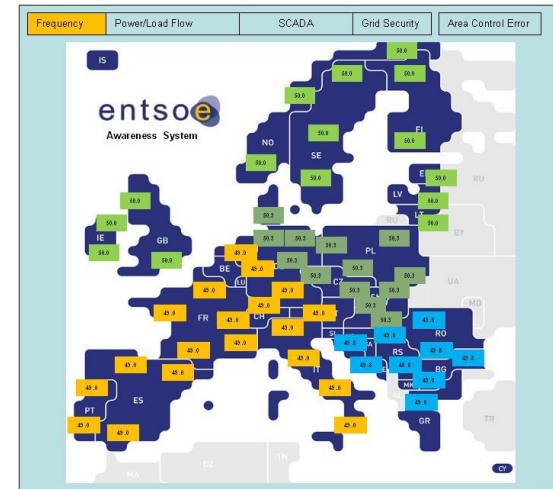


needed today

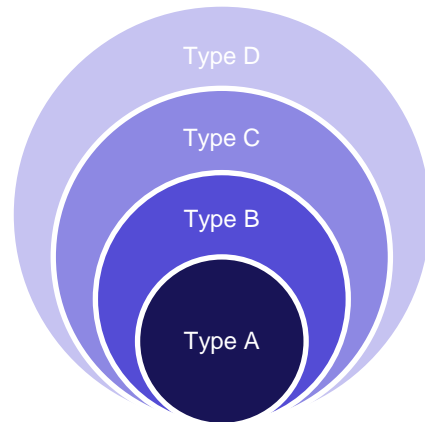
- need for wider frequency ranges and
- reduction of power at high frequencies

- need for wider frequency ranges and
- increased compliance testing for all generation

- need for requirements for maintaining voltage stability



**In a proportional, non-discriminatory and technology-independent manner – “significant grid users”**

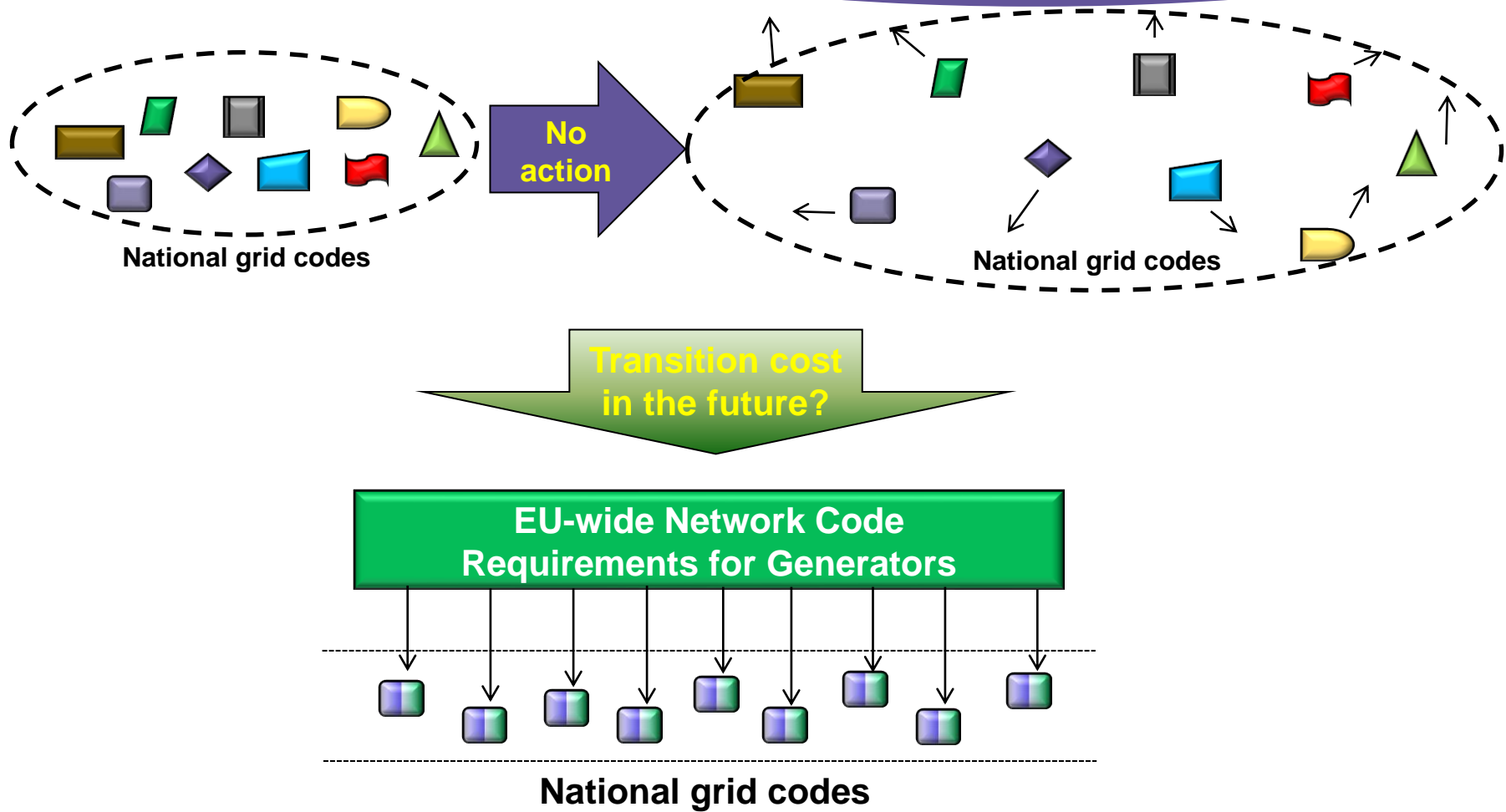


Stable and controllable dynamic response capabilities covering all operational network states

Automated dynamic response and resilience to operational events including system operator control

Basic capabilities to withstand wide-scale critical events; limited automated response/operator control

# Why a Network Code on grid connection / EU-law is needed **today**



# How to ensure that support for system security is there when needed

## DIRECTIVE 2009/72/EC

“Each transmission system operator shall be responsible for [...] ensuring the availability of all necessary ancillary services, including those provided by demand response [...]”

- The NC for Generators defines the **necessary ability** of generating facilities to **contribute to the secure operation** of the system
- A limited set of the NC requirements = crucial system security = mandatory
  - no action today = major risk for the system tomorrow
- **The NC does not apply to existing users**
  - unless cost-benefit analysis under NRA approval



# ENTSO-E Network Codes – how do they fit together?



**TYNDP scenarios and other TSO forecasts  
Past and present experience**

**Background information  
for the anticipated  
challenges**

## **NC Requirements for Generators**

**14 requirements apply  
directly at EU level**

**e.g. frequency  
voltage**

**36 requirements to be  
specified at MS level**

**e.g. remote switch  
data exchange  
fault-ride-through**

**9 requirements are  
not mandatory**

**e.g. black start  
synthetic inertia**

# ENTSO-E Network Codes – how do they fit together?



## NC Requirements for Generators

Independent of operational and market conditions

Minimum generation contribution to system security on which the Operational Security and Balancing NCs should build upon

requirements that apply directly

requirements that must be specified at national level

requirements that are not mandatory

Guidance on how to implement provisions at national level for detailing requirements

## NC Operational Security

- Build upon the capabilities of generators and demand
- Define security principles
- Elaborate coordination of operations



## NC Balancing

- Build upon the capabilities of generators and demand as well as security requirements
- Design balancing markets to maximize social welfare, efficiency and security

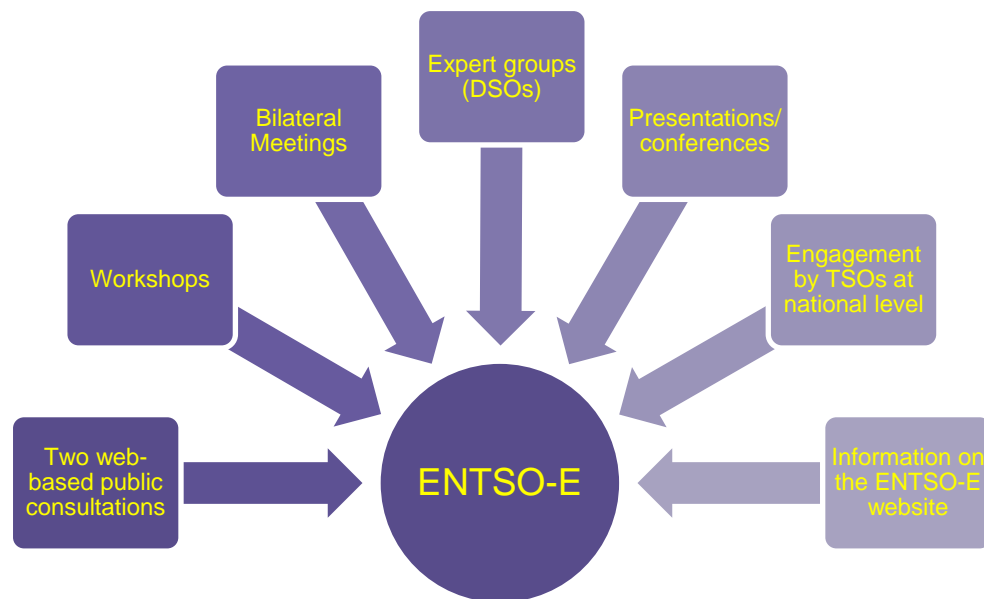


## ➤ Many concerns remain

- More vs less detailed requirements
- Narrower vs wider scope
- Application at national level
- “Minimum” vs “necessary”
- Comprehensiveness vs simplicity
- Relationship with other NCs
- Cost recovery

## ➤ Extensive report to be published end of June 2012 of how stakeholder input has been taken into account or not.

## ➤ NC Requirements for Generators = Pilot Code with a learning process both for procedural and drafting issues



- **Discussions with EC, ACER and stakeholders ongoing**
- **Submission of NC to ACER on 30 June 2012**
- **ACER Opinion on the NC by end September 2012**
- **ENTSO-E will further elaborate relevant information throughout the coming months and ensure the coherency of forthcoming NCs**



- **Power System changing at an unprecedented pace !**
- **Maintaining security of supply = major issue**
  - **Build transmission infrastructure on time**
  - **Market integration at all time horizons**
  - **Intense coordination in operations**
  - **Generators' capabilities supporting system security, when needed**
- **Delaying NC = higher operational risk and ... higher costs**
- **Investment decisions = affect system security for decades**

**Thank you very much for your attention!**