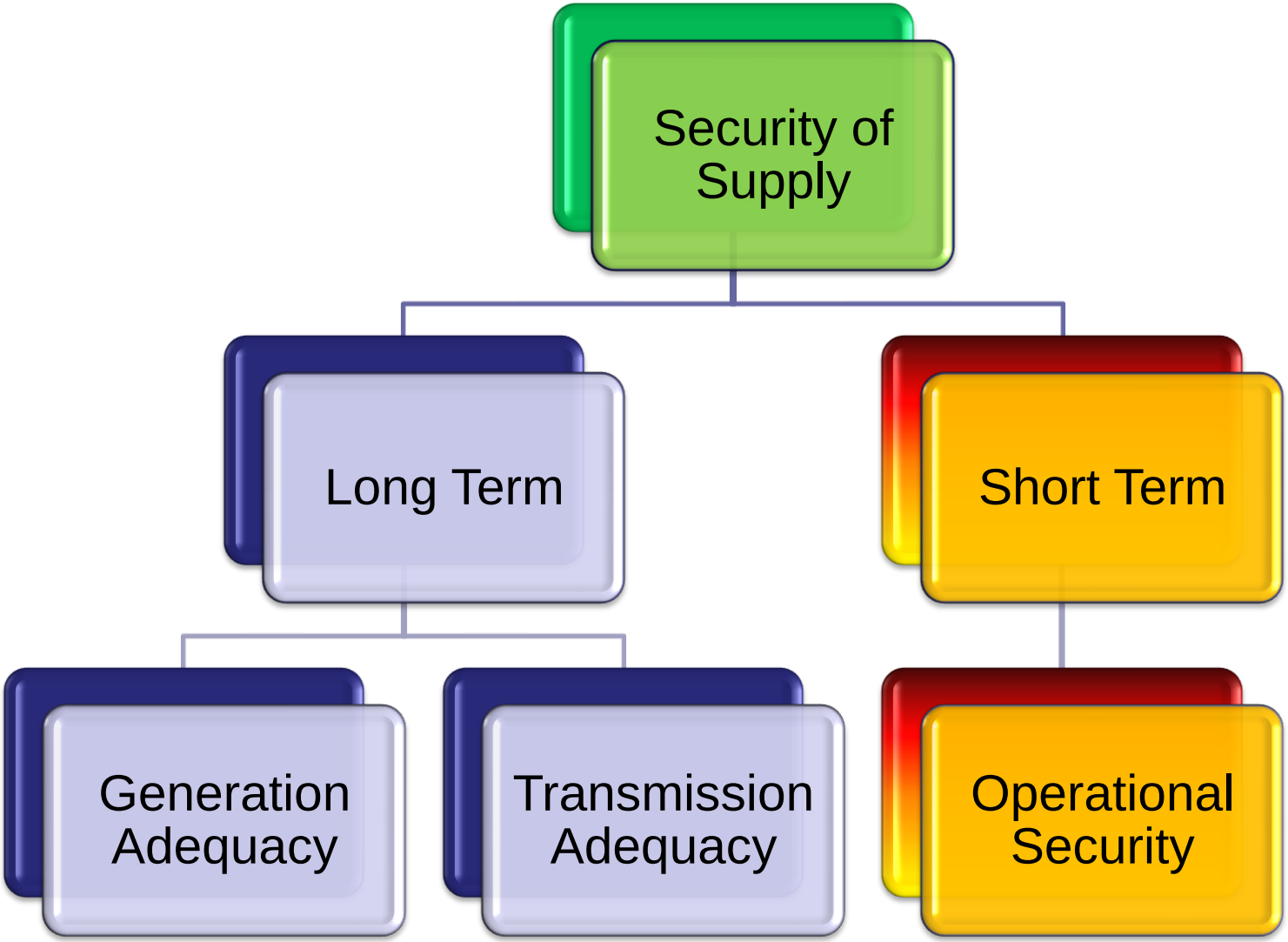
Managing the impact of supply disruption on electricity customers

Marie Hayden

Manager Power System Operational Planning

Presentation

- Managing Security of Supply
- What can go wrong?
- Capacity schemes for large users
- Where can I find out more?

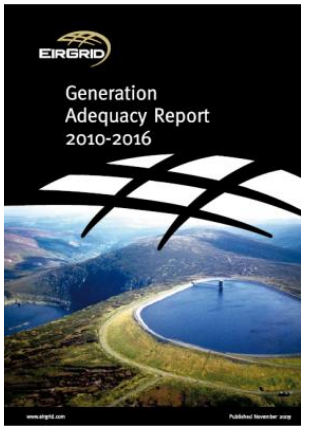

Security of Supply
Long Term
Short Term
Generation Adequacy
Transmission Adequacy
Operational Security

Long Term Security of Supply

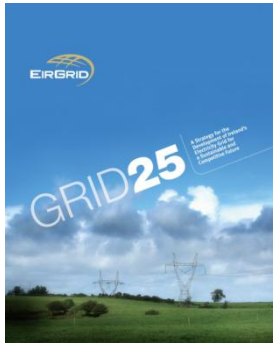
GENERATION & TRANSMISSION ADEQUACY

Long Term Security of Supply

- Generation Adequacy Report



- Grid 25



- East West Interconnector

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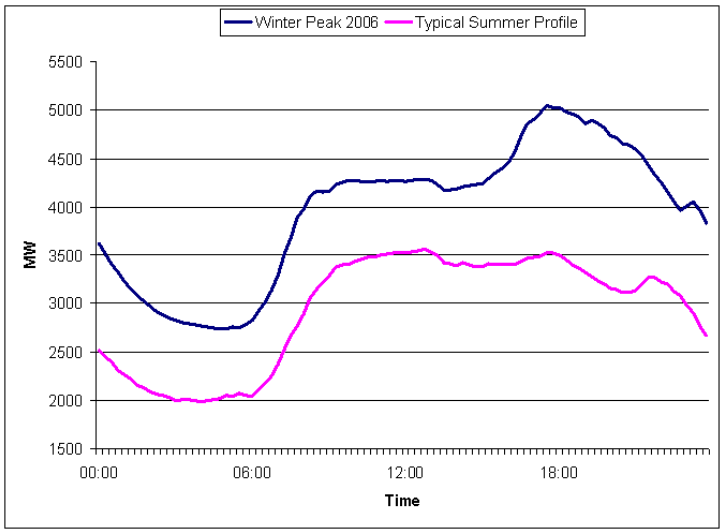
Short Term Security of Supply

OPERATIONAL SECURITY

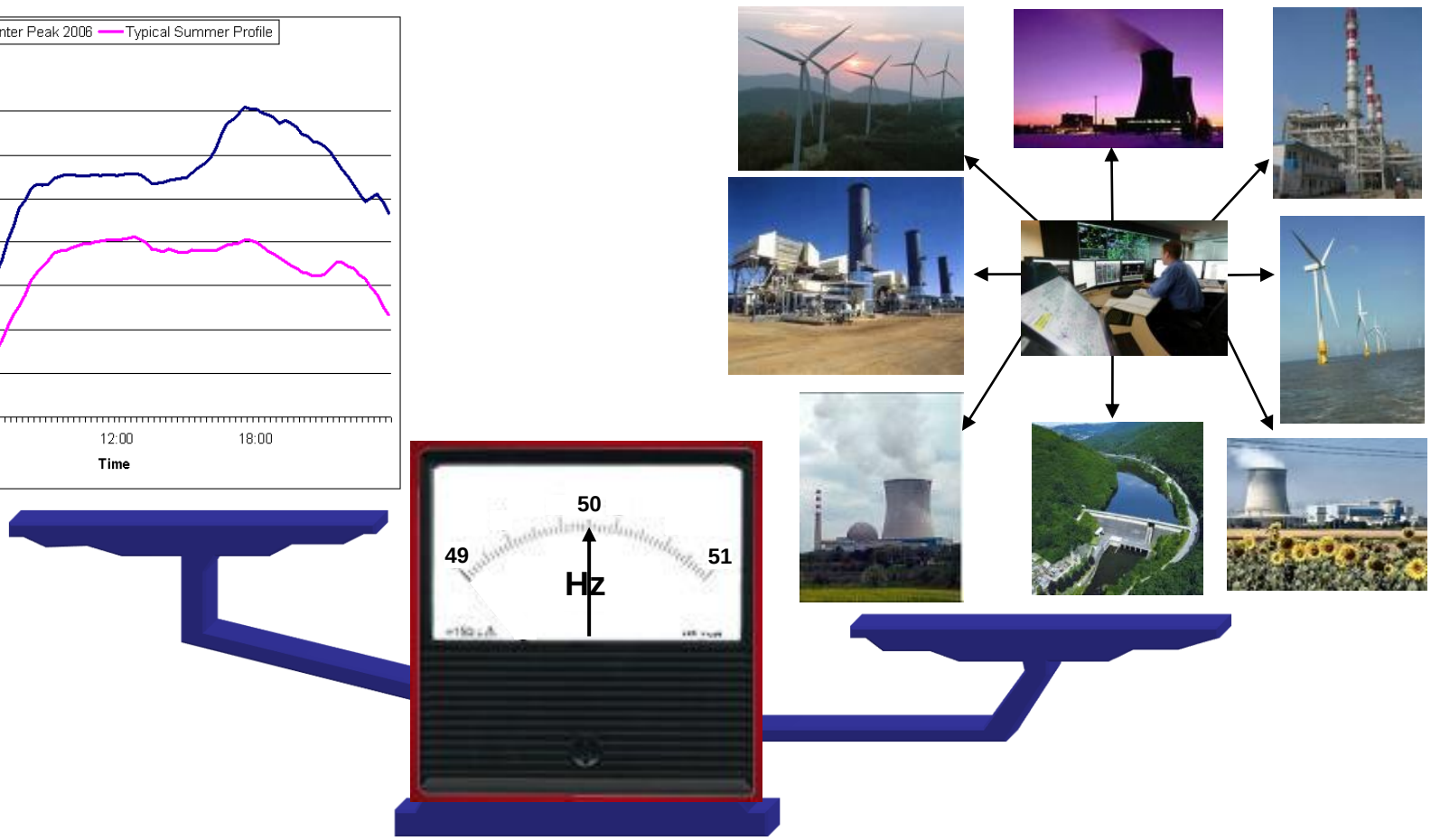
EirGrid's National Control Centre

Demand – Generation Balance

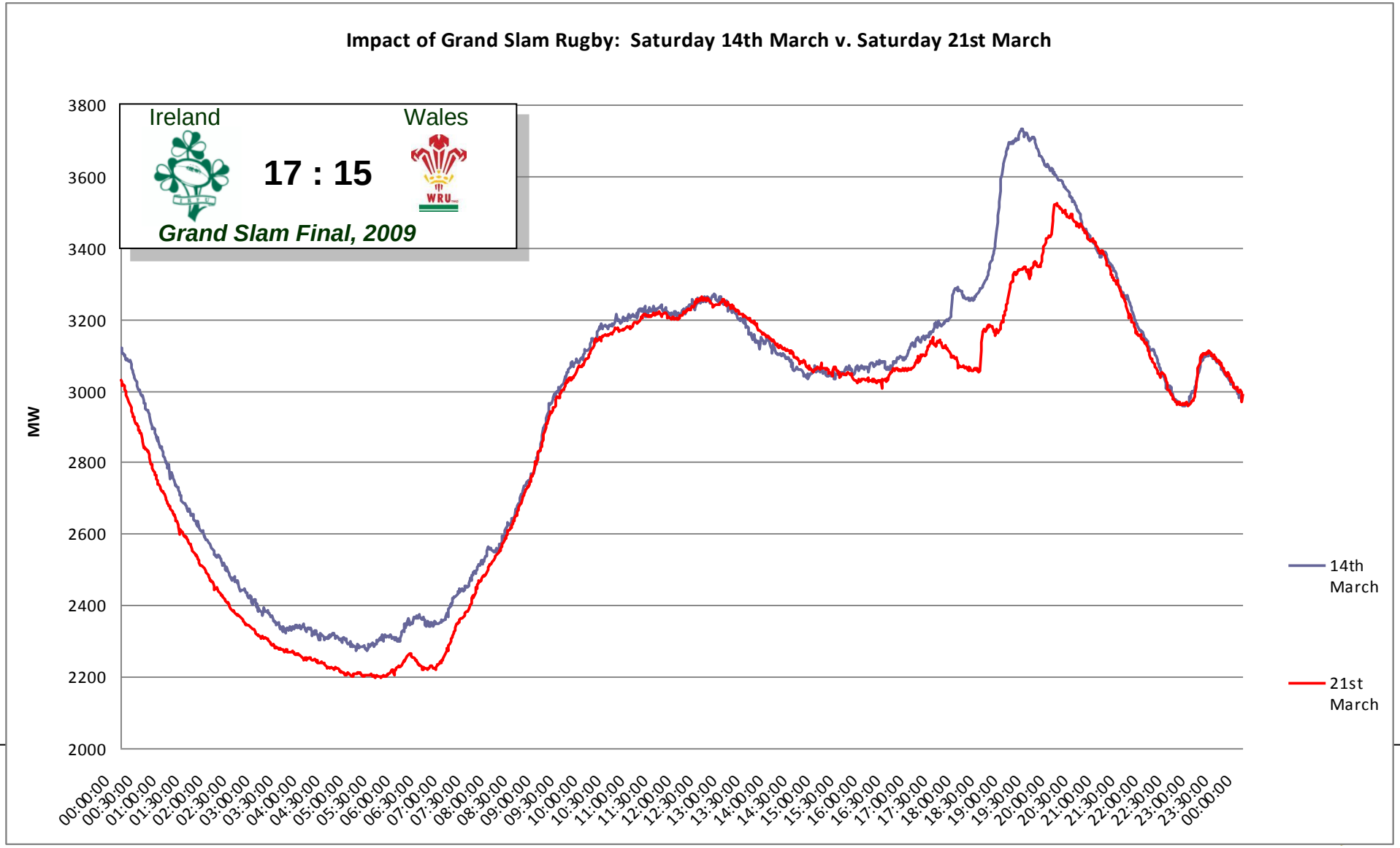
Load changes through the day …



…Generation output must match this



Demand is usually Predictable



What can go wrong?

Generation and Transmission Events

What can go wrong?

Insufficient Generation to meet demand

Possible Causes

- A generation unit or units trip
- There is not enough generation scheduled on to meet the demand
  - Demand is much higher than expected
  - Wind Generation is much lower than expected
- There is not enough capacity installed (long term)

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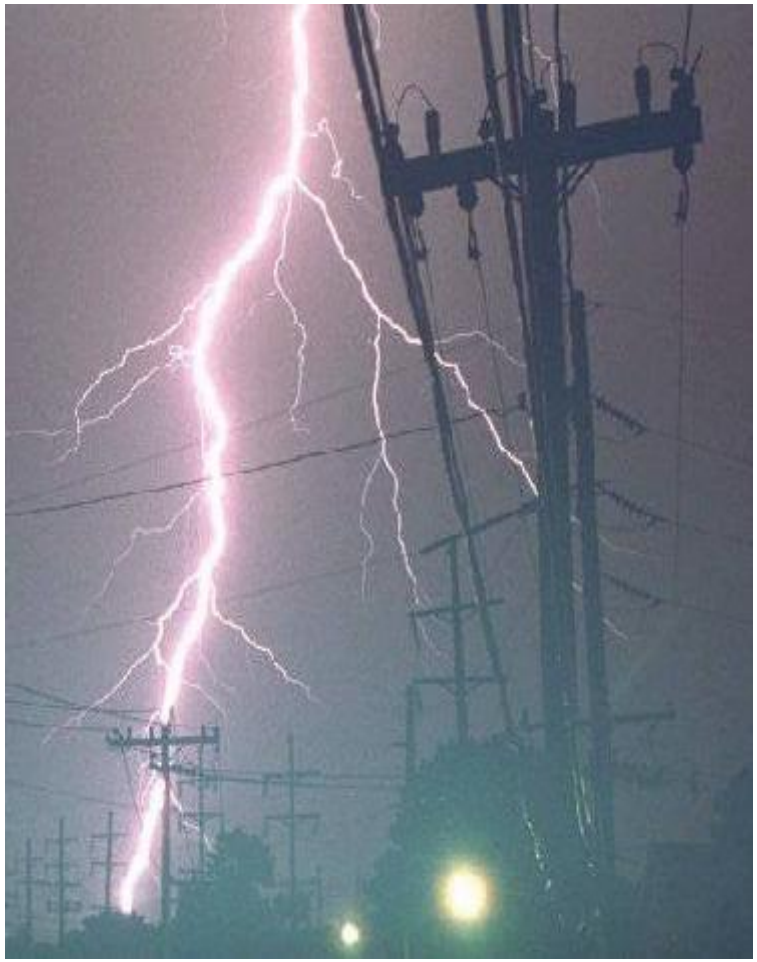
Managing generation events

- Operating Reserve is used to manage the unexpected loss of the largest generation unit
  - **Operating Reserve could be called on to operate several times a week**
- Under-frequency load shedding relays are used to disconnect up to 60% of demand for larger losses
  - **UF Relays were last called on to operate in August 2006**
- Rota Load Shedding is used when shortfalls are significant and foreseen
  - **Rota Load Shedding was last called on to operate in April 1991**

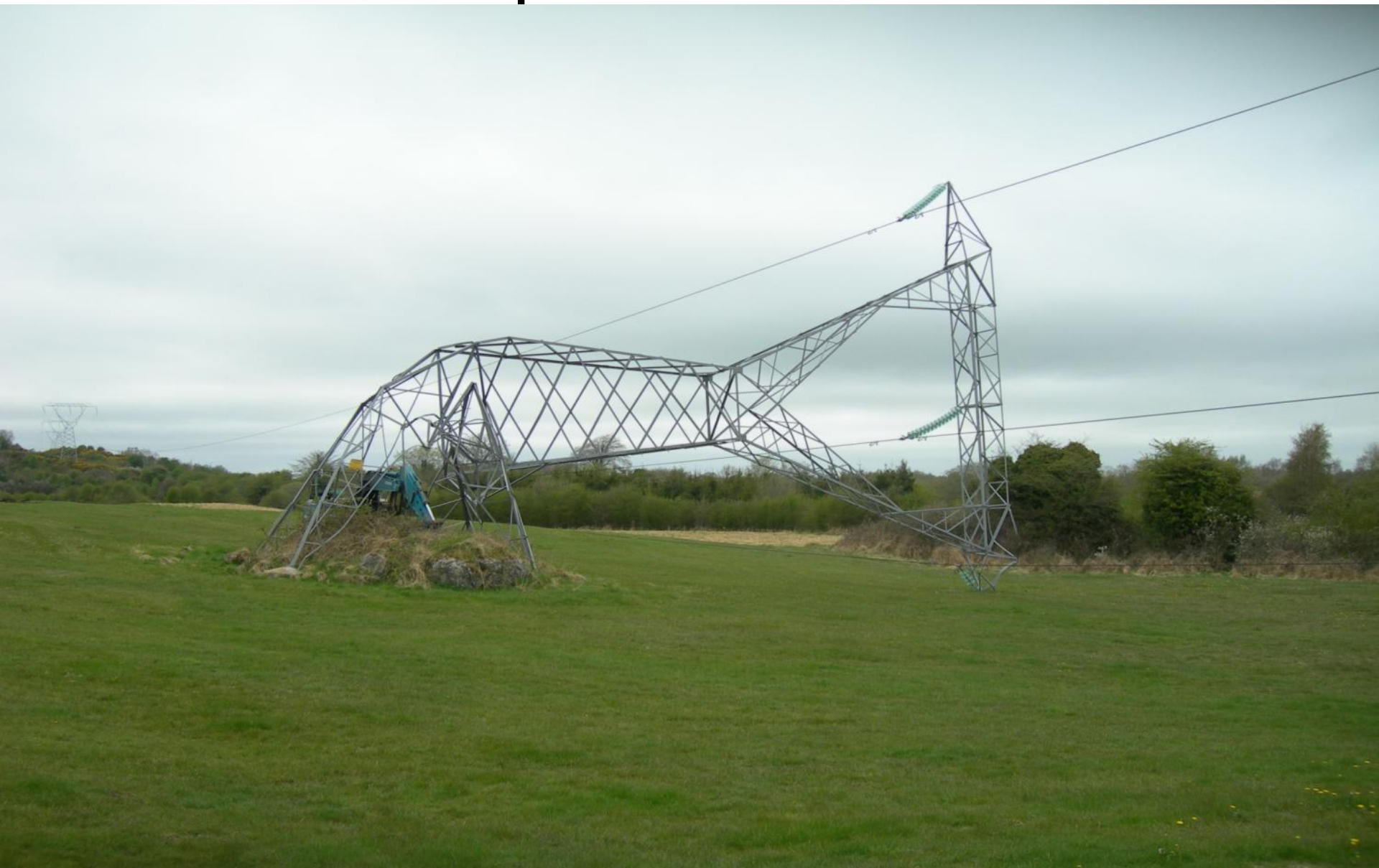
Transmission Faults

CAUSES

- Environmental Factors
  - Lightning
  - Storms
  - Wind
- Indirect Causes
  - Mal Operation of Protection
  - Trips for un-cleared faults
- Equipment Failure
- Human Error



A less predictable event



Feeder Fault Rates

Voltage Level	10 Year Average Faults per KM per year	2009 Faults per KM per year	2009 Number of Faults
400kV 439 kilometres	0.21	0.23	1
220kV 1725 kilometres	0.93	0.46	8
110kV 3890 kilometres	1.13	0.44	17

63% of faults that impact the transmission system occur on the transmission system with the remainder originating elsewhere

What can go wrong?

Managing transmission faults

- The system is operated to ensure that it remains stable following the loss of any one item of transmission plant

- Protection Relays are used to clear faults off the system very quickly to minimise power quality issues

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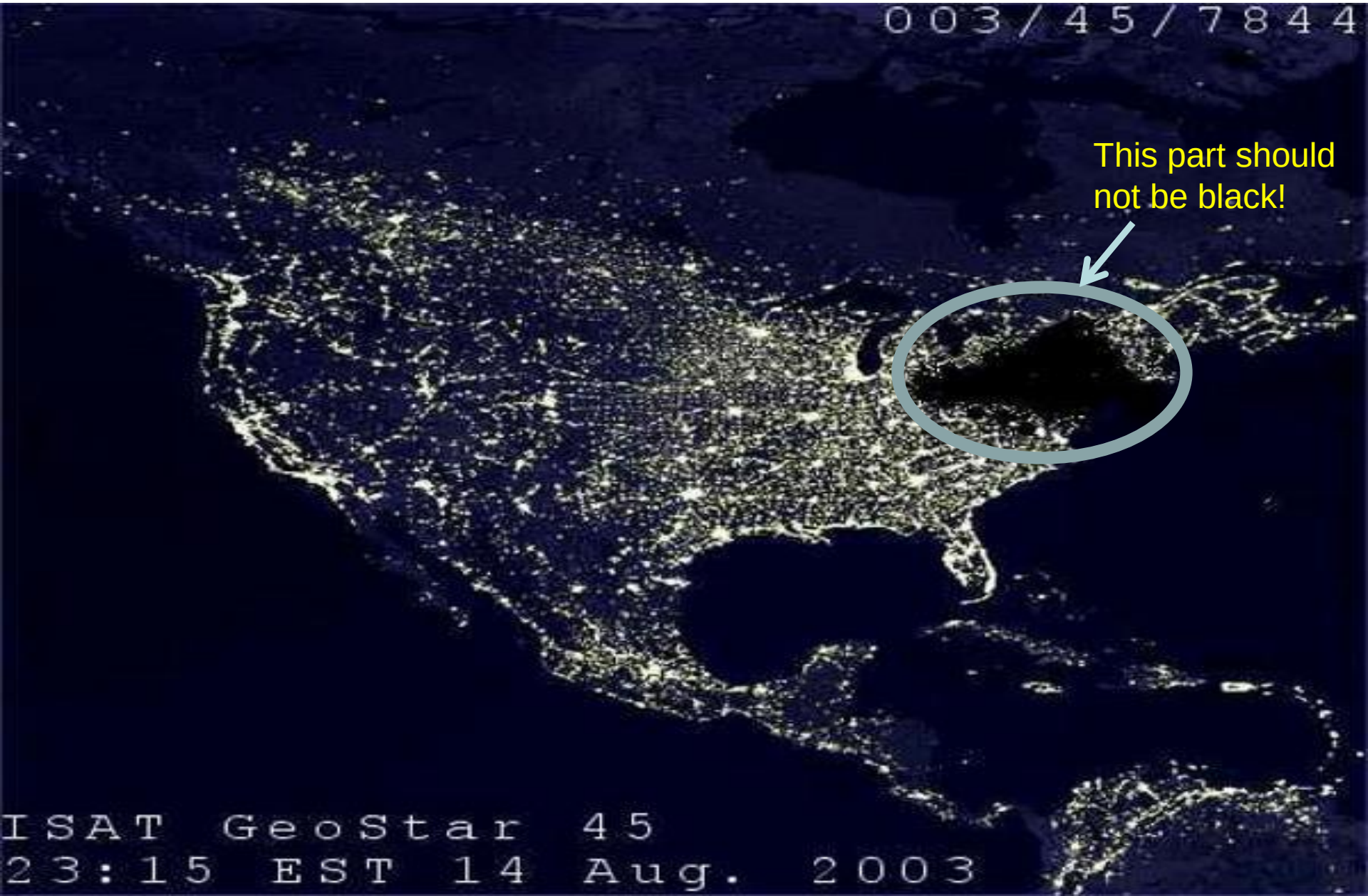
Worst Case – The Blackout



Planning to Manage a Blackout

- Typically power system blackouts are caused by one of two things:
  1. A major generation event
  2. A major transmission event – more common

- We plan and operate the transmission system in a way that aims to prevent a blackout.

- In the event that we fail to prevent a blackout, we have a plan to manage one.

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Power System Restoration Plan

- A plan to restore the power system following a total blackout
- Assumes no generation station has any power supply
- Based on “Blackstart” stations – power stations that can start without any external supply
- Continually reviewed and updated
- Regular Testing & Training

Crisis Communications

- Having effective communications plans and systems in place is critical to managing emergencies
- At EirGrid there is a strong focus on reviewing, testing and training our emergency communications plans
- This renewed focus is also happening at a government level and we closely work with
  - Task Force for Emergency Procedures
  - Department of Communications, Energy and Natural Resources
  - Commission for Energy Regulation

Capacity Schemes for Large Energy Users

Capacity Schemes Involving Large Energy Users

Demand Side Management Schemes

- Short Term Active Response (STAR)
  - **Customers make some/all of their load available for interruptions (day hours only).**
  - **Immediate interruption, without notice.**
- Winter Peak Demand Reduction (WPDRS)
  - **Rewards reduction in customer loads from 17:00 to 19:00 each business day over the November to February winter period.**
- Power Save
  - **Incentivises voluntary reduction in customer loads at times when a shortage is foreseen by EirGrid**

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Where can I find more information?

www.eirgrid.com or e-mail us on info@eirgrid.com


Thank You