Smart grids and clean power

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“There is no question of the lights going out on my watch”

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Chris Huhne, Secretary of State for Energy and Climate Change, 24/6/10

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Clean power needs the smart grid

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The smart grid needs clean power

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Aren’t grids smart already?

- Actively managed
  - Transmission networks
  - Planning, scheduling, trading, balancing
- Not actively managed
  - Distribution networks
  - Fit and forget
- At the end of the chain
  - Small generators, energy users
  - Strike a deal then live with it

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What is a smart grid?

Better metering

On-site generation

Matching renewable generation

Demand response

Profile flattening and shif

Context

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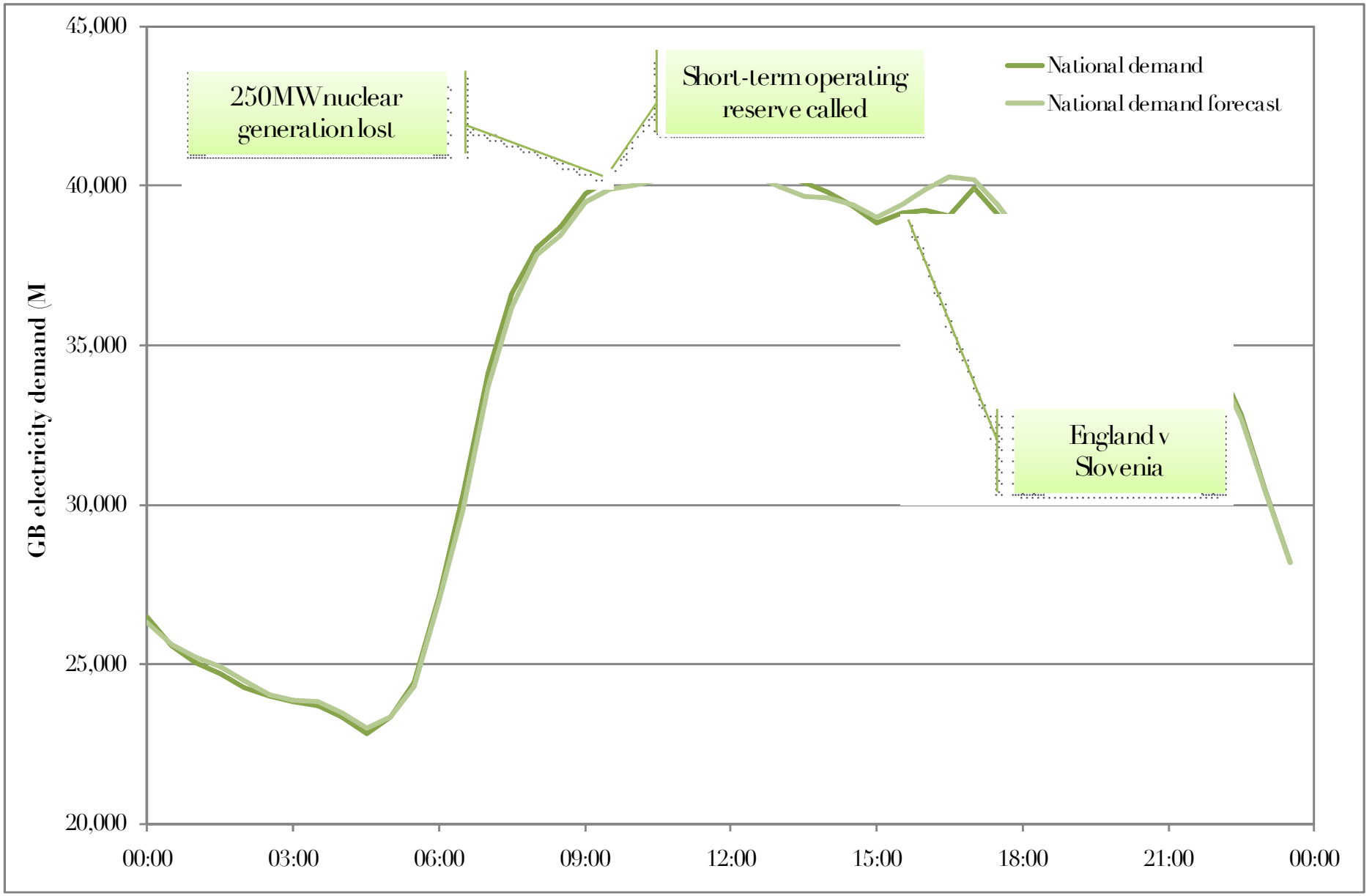

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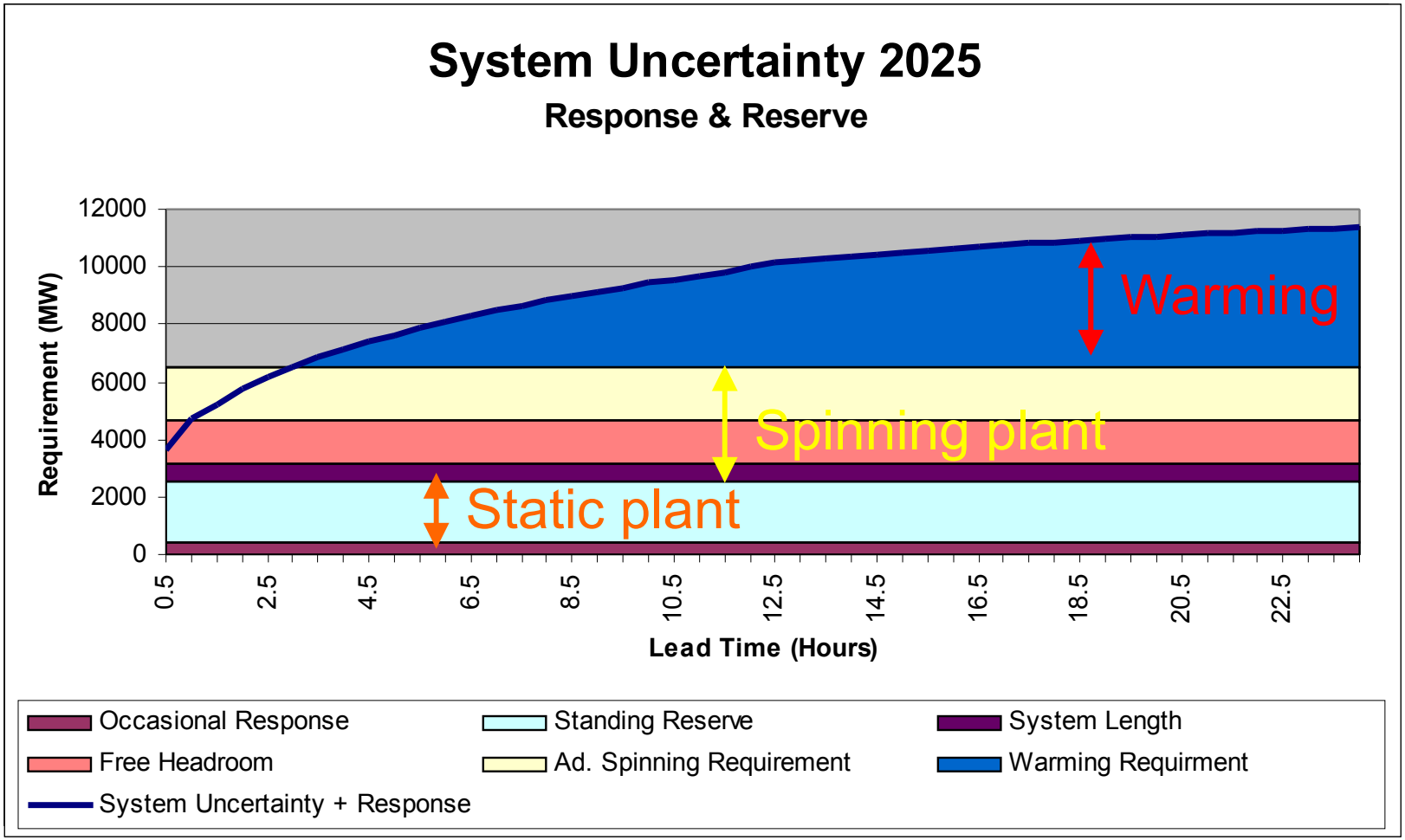

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IPA

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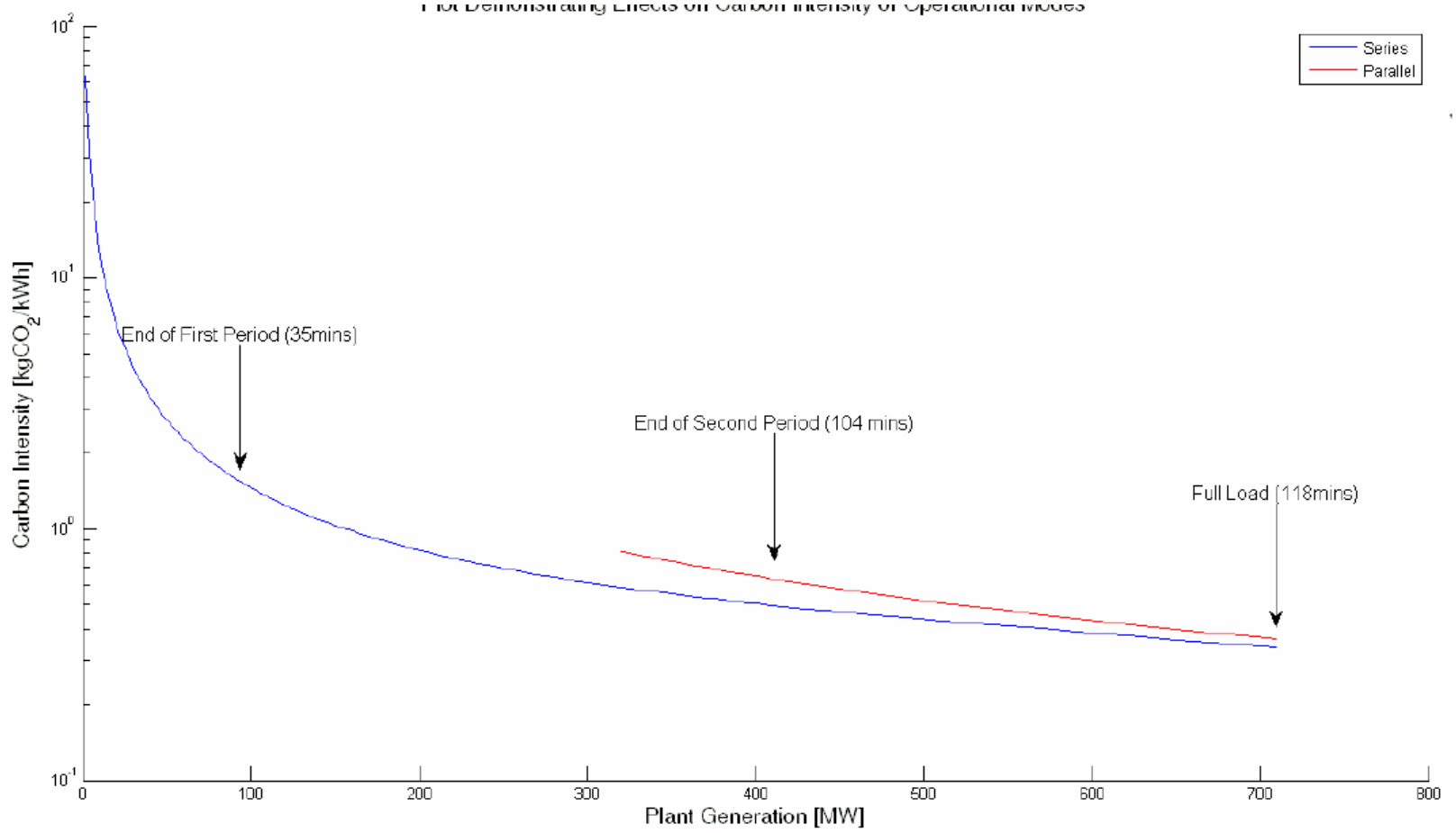
Ineff ciency of part-loading



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Need for a new balancing act

- Dispatchable generation
  - Enough in planning to exceed minimum demand
  - Older stations closing
  - Saves fuel but not capacity
  - Part-load penalty
  - Flexibility of "cleaner coal"?
- Nuclear
- Nuclear capacity 140%
  - Largest single point of failure
  - Economic constraints
- New sources of demand
  - Technical constraints

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How the smart grid helps

Part 1: what happens now

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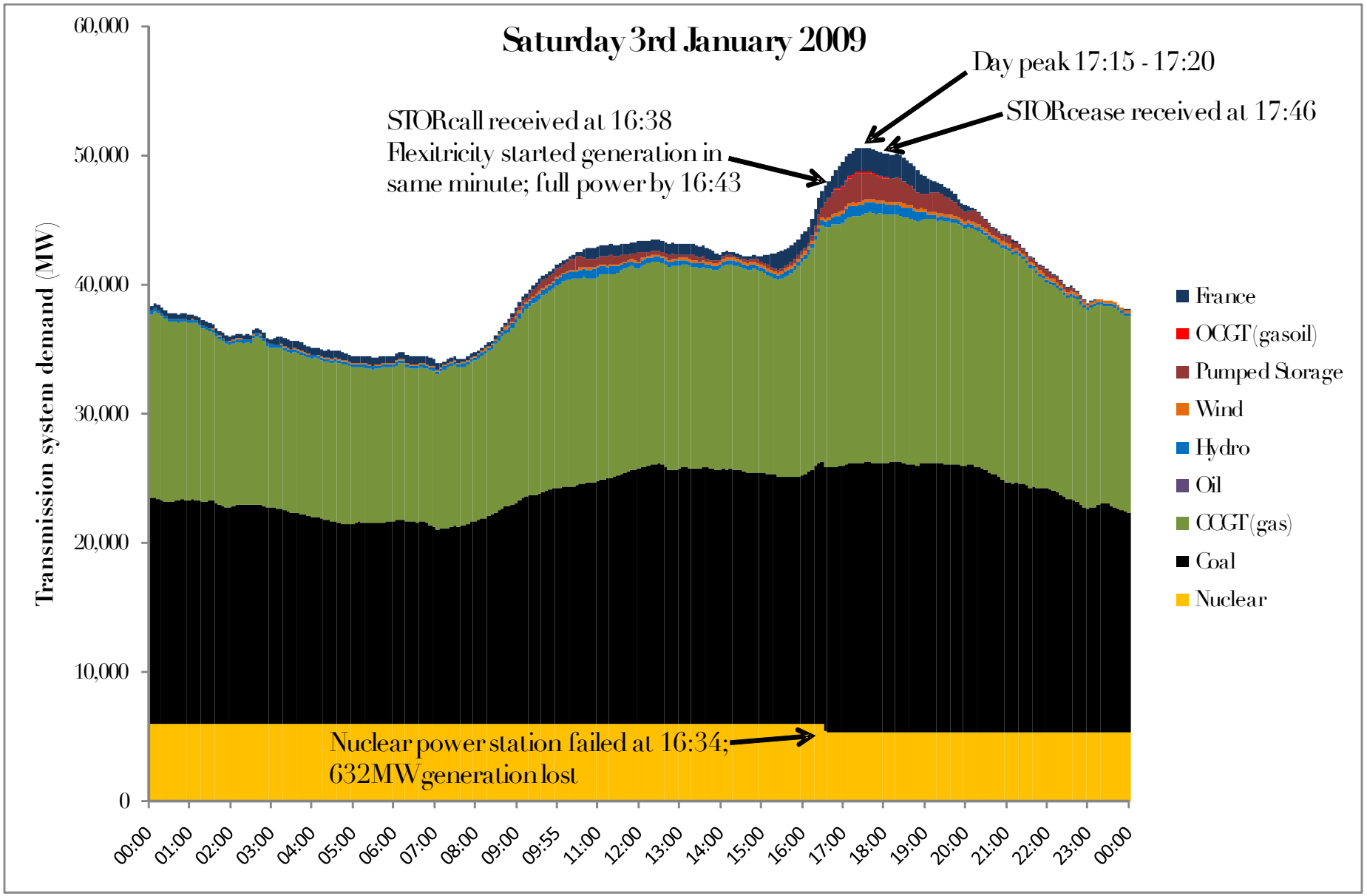

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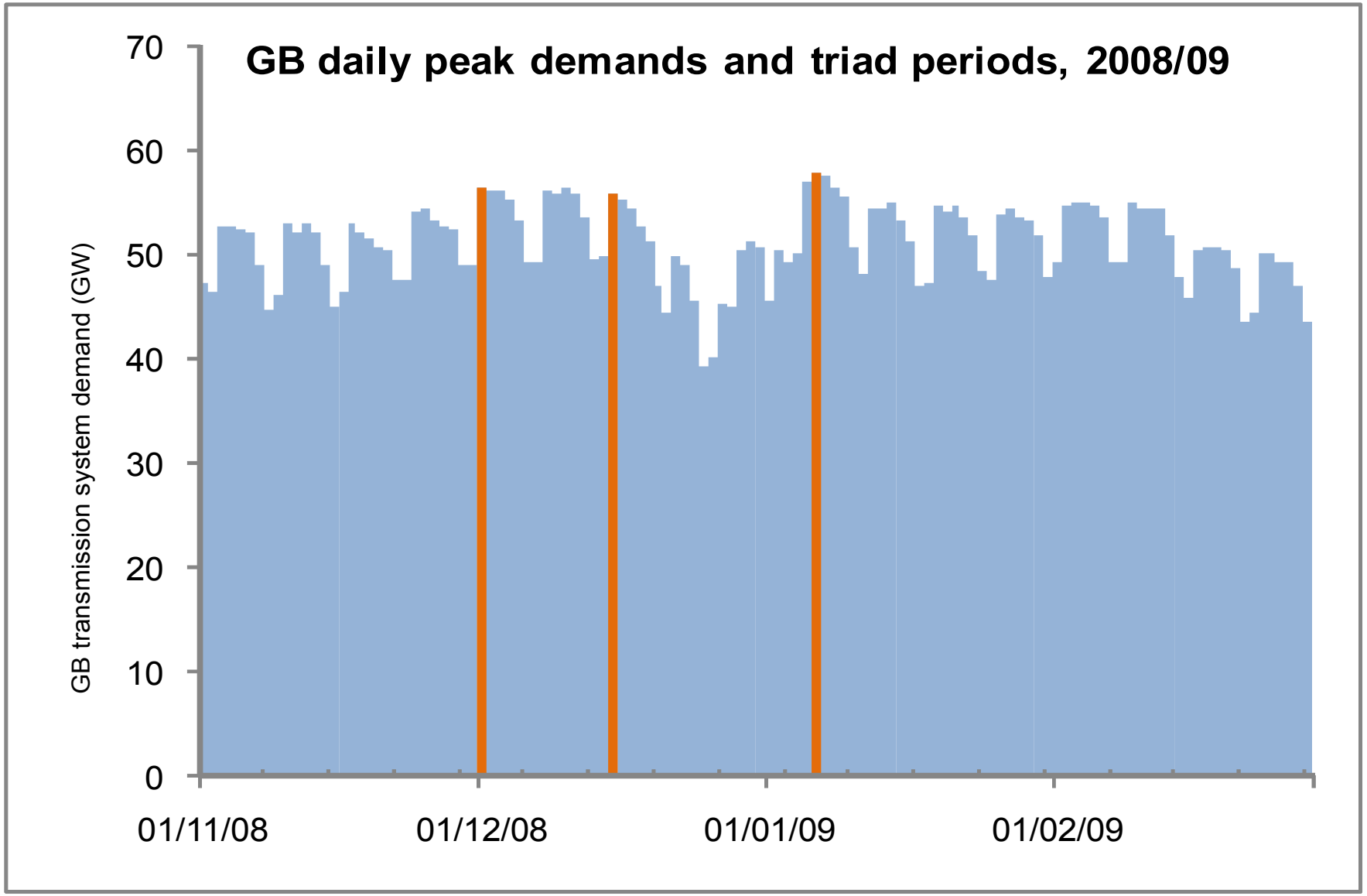

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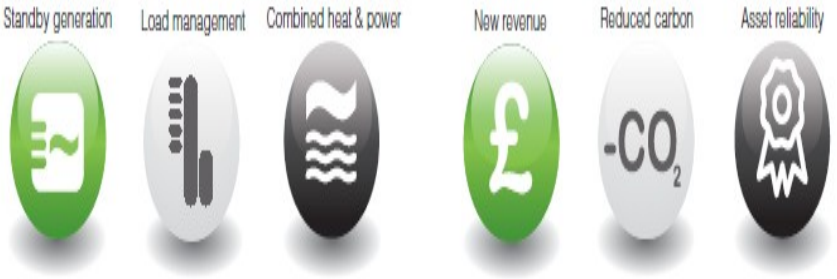
Who participates



- Standby generation
  - Replaces or improves test regime
- Combined heat and power
  - Heat storage
- Load management
  - Opportunities for short duration load reduction
- Small hydro
  - Flexing of reservoirs

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Who participates

- Banking
- Cold storage
- Communications
- Community heating
- Datacentres
- Leisure
- Logistics
- Horticulture
- Manufacturing

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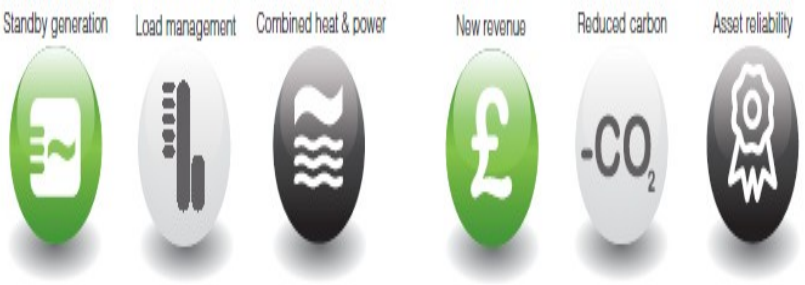
What they want



- Revenue
- Reliability
- Reduction in electricity-sector emissions

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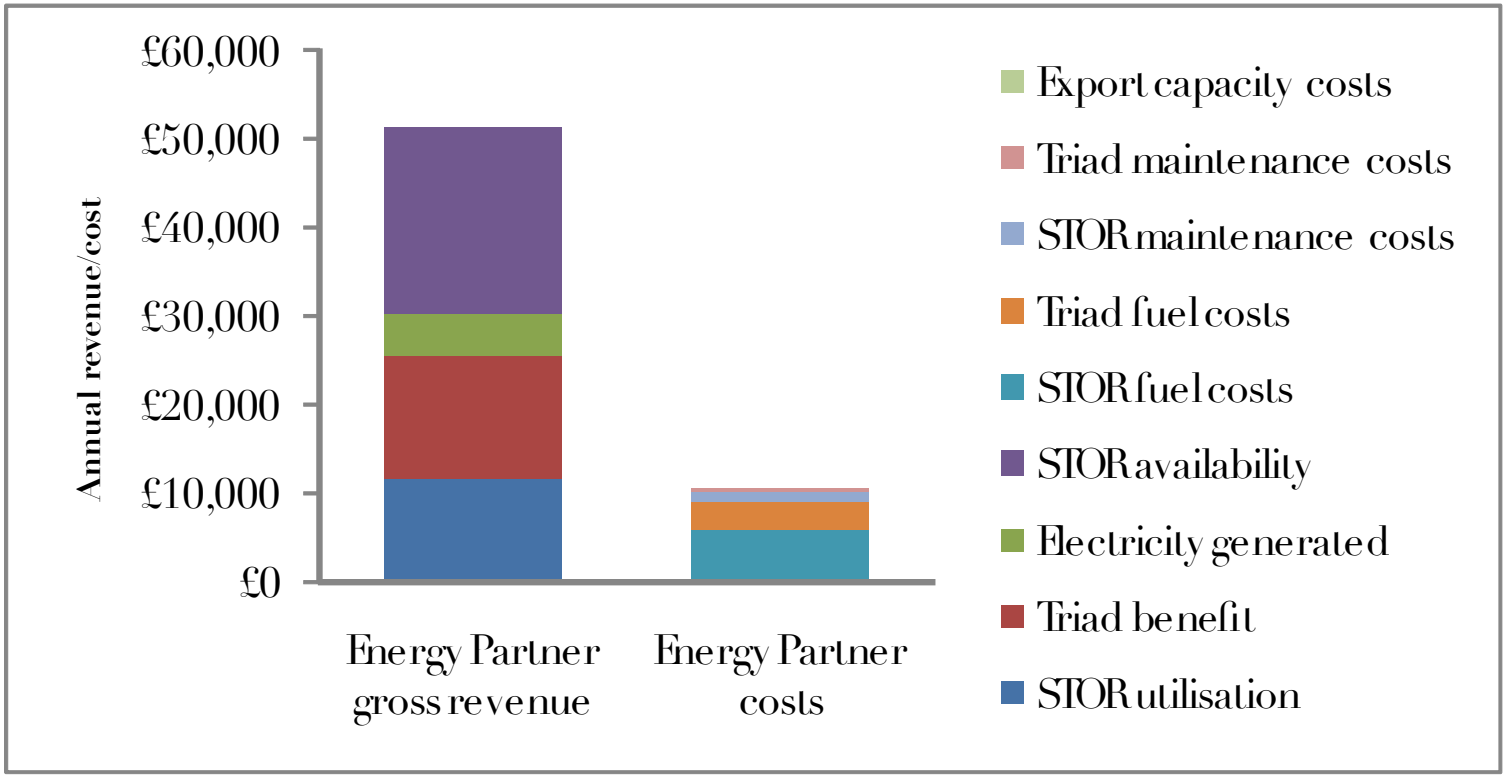
The Milton Keynes Megawatt



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What does this achieve?

- Premium, short-notice power
  - Power station failures
  - Demand peaks
  - Interconnector failures
- Information
  - Reserve availability is monitored
  - Reserve delivery is visible in real time

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How the smart grid helps

Part 2: the future

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What do we need next?

- More premium, short-notice power
- Unlocking of distribution networks
- Electrif cation of transport
- Decarbonisation of heating
- Resource following

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Future of: standby generators

- Will always be best for premium, short-notice power
- Delivered energy won't be low carbon or low cost
- A few GW
  - 20% of available capacity

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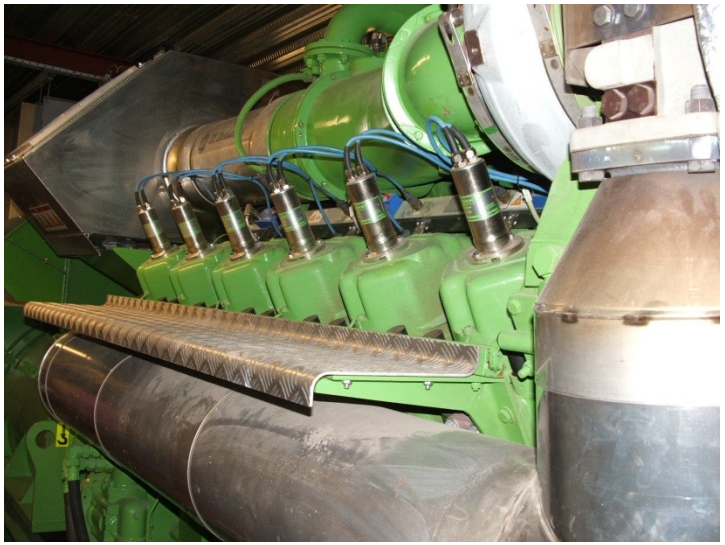
Future of: CHP and hydro

- Greater use of f exibility
- Changed business cases for developers
  - No more base-load design
  - Increased generation and storage capacity
- Hours days
- Most new projects will be smart-grid ready



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Future of: load management

- Industrial and commercial
  - Several GW
  - Widely varying capabilities
  - Disruption not tolerated
- Harder sectors
  - Domestic
  - Electric vehicles
  - SMEs

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Clean power goals

carbon reserve and reduction in peak load source, and more distributed generatio

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Smart grid contributions

I&C, small generators As above, flexible loads, EVs, batteries As above, flexible loads

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Smart grid dependencies

…ndling (not Unbundling (not in GB) Technology Constrained in GB CO2 price, Big Six, DNOs, EU regulation

When?

Now Now ? 2011 (but already started)

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Clean power:
cleaner than it says on the tin

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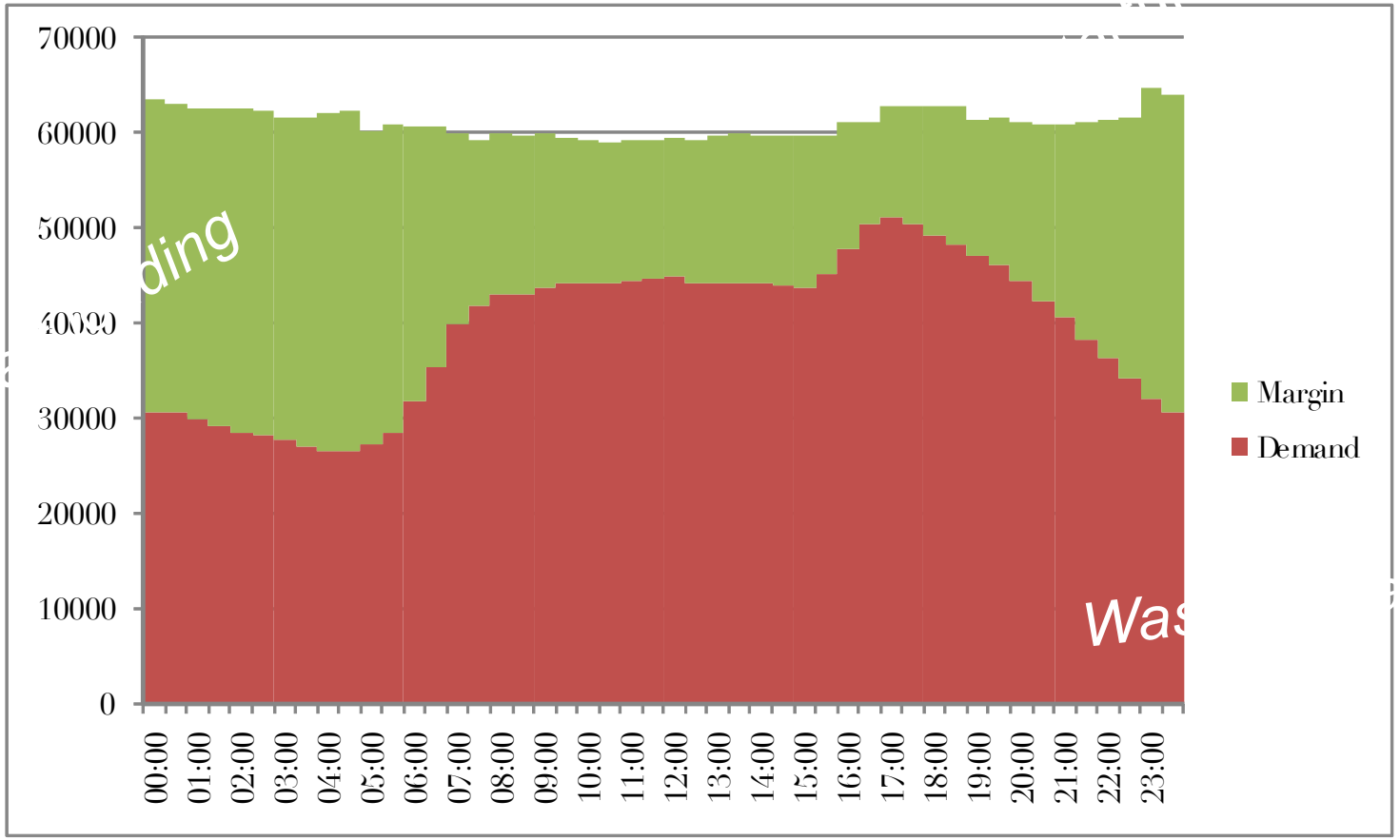
Wasting energy



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