Electricity Distribution

Headroom – Whole System Thinking

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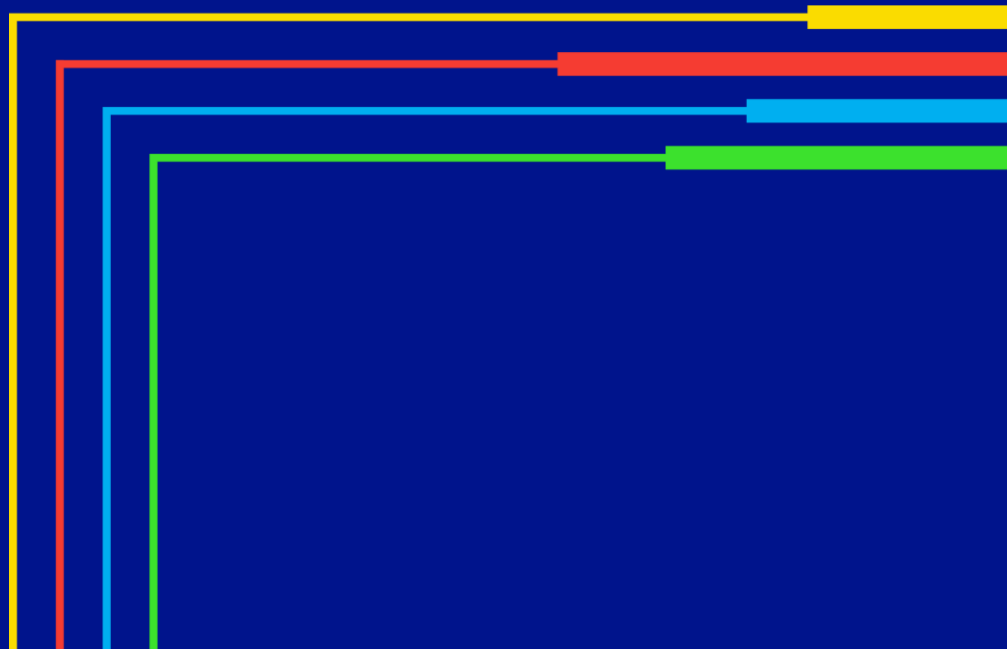
Electricity Distribution

01

Why are we interested in power market modelling?



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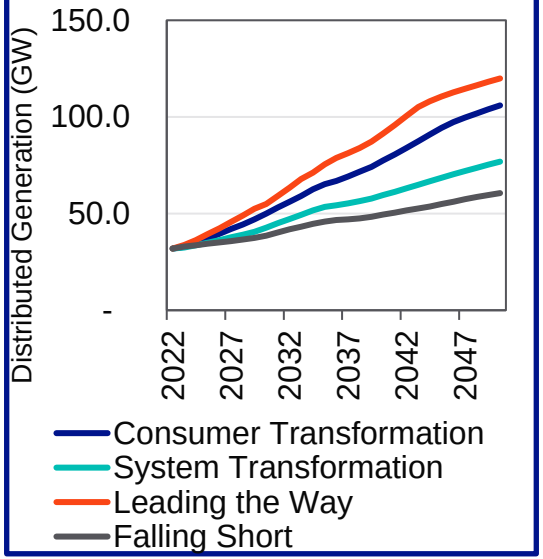
Curtailable connections accelerate connections, but at what cost?

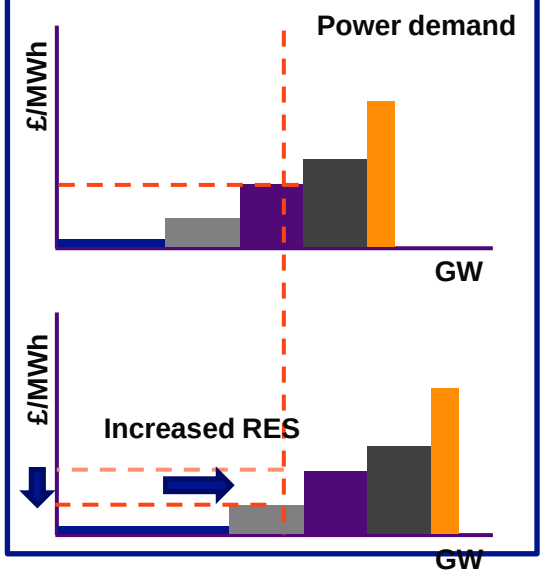
Growth of Active Network Management

- Accelerates connection process
- Increasingly higher percentage curtailment forecasts
- Customer satisfaction falling
- DCP404 – Curtailment Cap and Purchasing Flex

Increase in renewables connected to Distribution Network

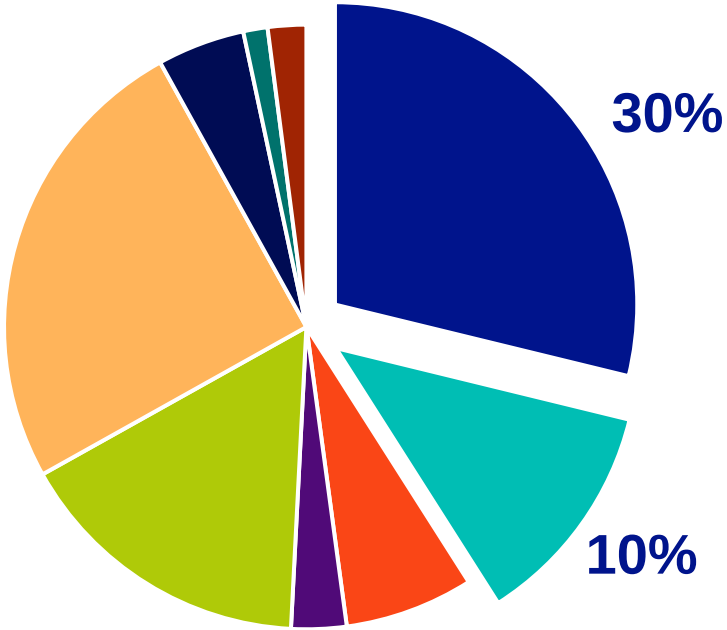


Impact of curtailing generation on wholesale cost and carbon



Why do we want to understand curtailment on our networks?

- Wholesale costs
- DUoS
- TUoS
- BUoS
- Operating costs
- Environmental and social obligation costs



Source: Ofgem – data correct from August 2021

Outcomes from Sensitivity work has directed Stage 2 towards benefit

Stage 1: Sensitivity Study

Network Modelling	• LV – EHV study in EATL's Transform • NGED's SCT to study 4 GSPs
Market Modelling	• Wind, Solar, Battery, Gas curtailment calculated in PLEXOS • Upper & lower bound £ and CO_2 benefit

Sept 23 – Mar 24

Stage 2: Developed Forecast

Network Modelling	• Abnormal topologies • Improved battery profiles • V2G export • Seasonal Profiles
Market Modelling	• Cost curves • Voltage level sensitivity • Ancillary services model

Jun 24 – Feb 25

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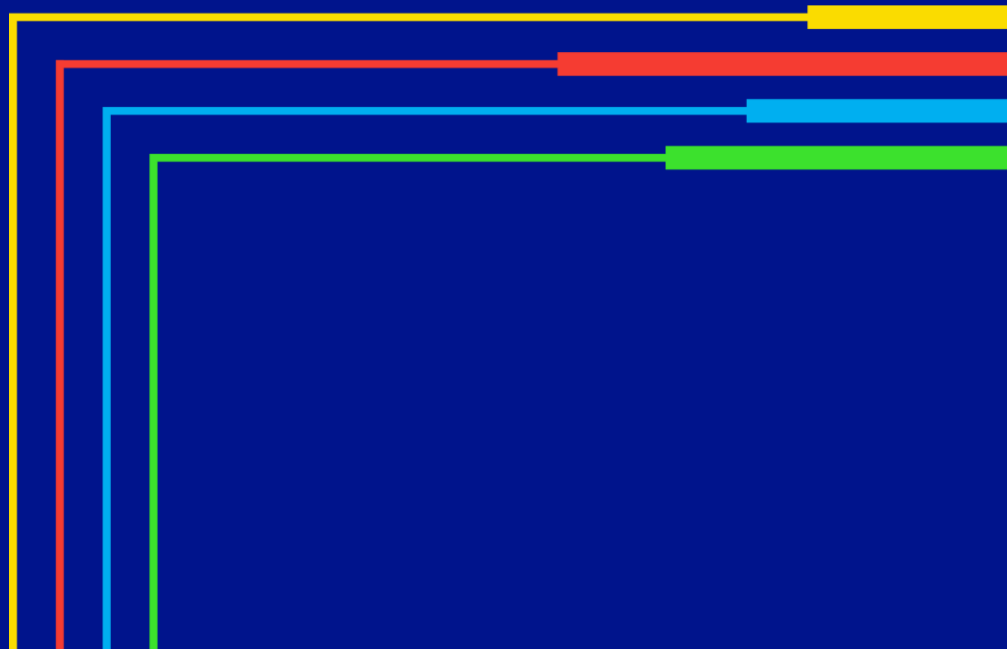
02

What has our sensitivity work taught us?



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Releasing headroom could benefit to the GB system by £300 million to £17 billion over the next 12 years

'Network Curtailment' scenario

- Curtailment Simulation – **EATL Network Model Simulation**
- Years Simulated – **2023, 2028 & 2034**
- Curtailed months – **June to August**

- 12-year accumulated system benefit:

£324 million

(£27 million per year on average)

- 12-year accumulated carbon cost:

£116 million

(£10 million per year on average)

'Maximum Constrained Generation' scenario

- Curtailment Simulation – **NGED SCT Simulation**
- Years Simulated – **2034**
- Curtailed months – **January to December**

- 12-year accumulated system benefit:

£17 billion

(£1.4 billion per year on average)

- 12-year accumulated carbon cost:

£753 million

(£63 million per year on average)

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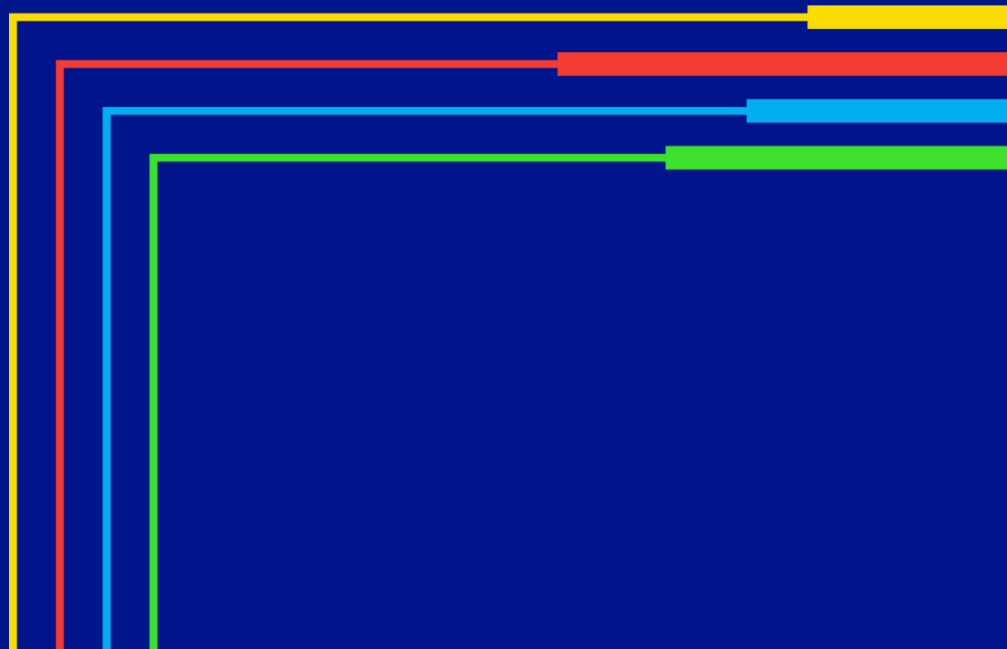
03

Developed network curtailment forecasting



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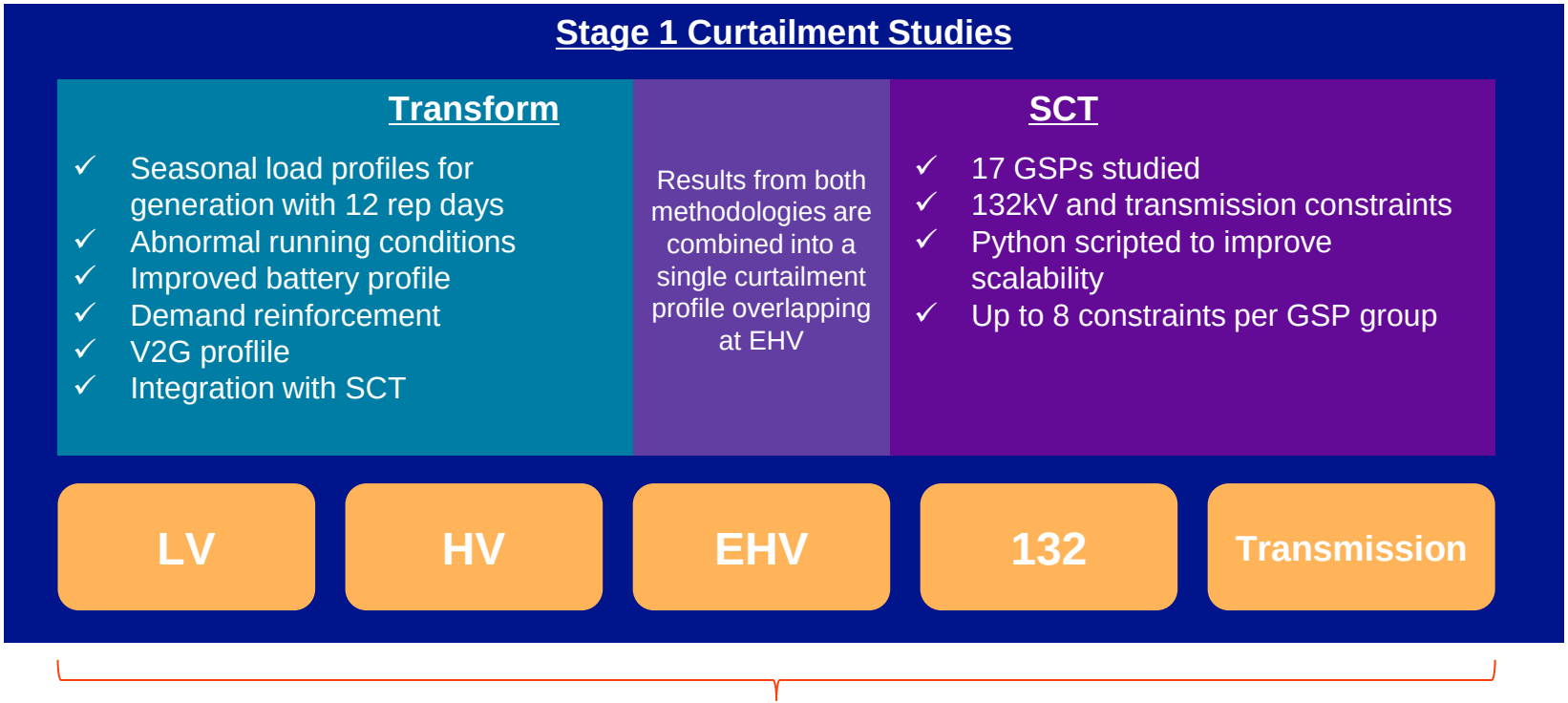
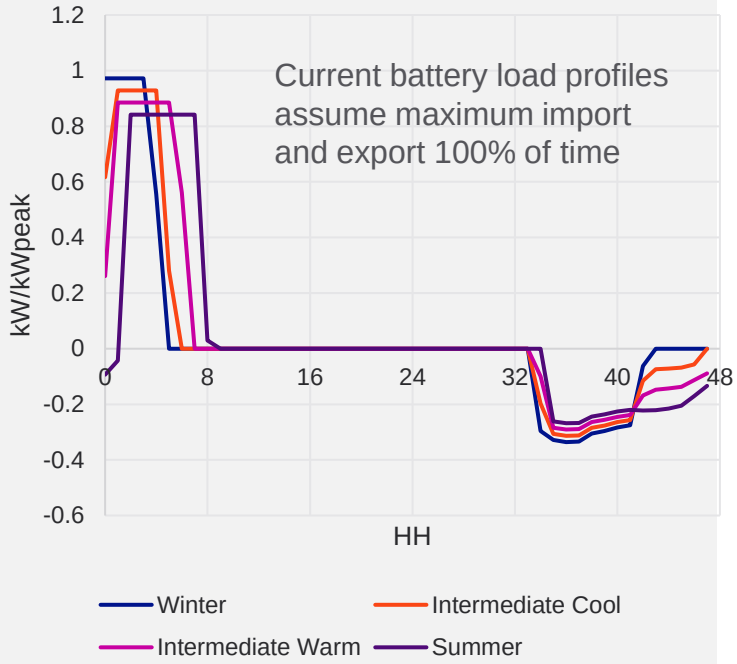
Network Curtailment Forecasts use NGED's SCT and EATL's Transform Tool



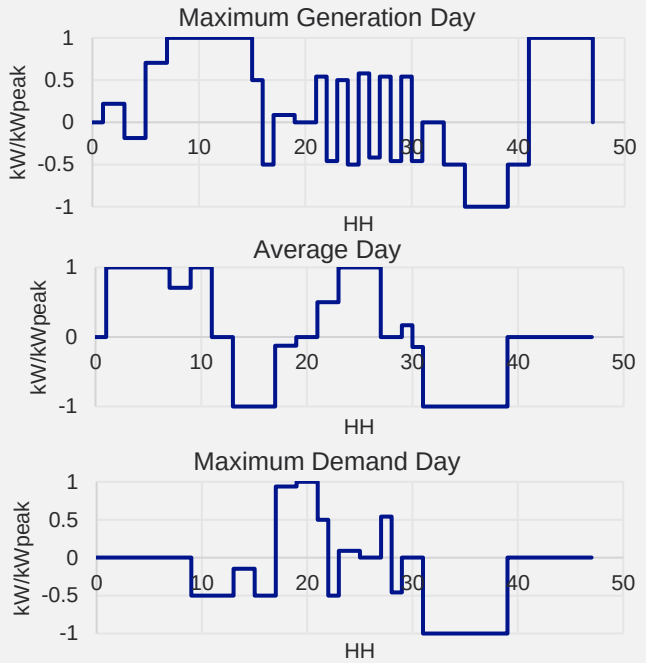
Output: A single 'best view' of distribution curtailment across all voltages

Battery profiles improved to be more reflective of real life

1. Domestic Batteries

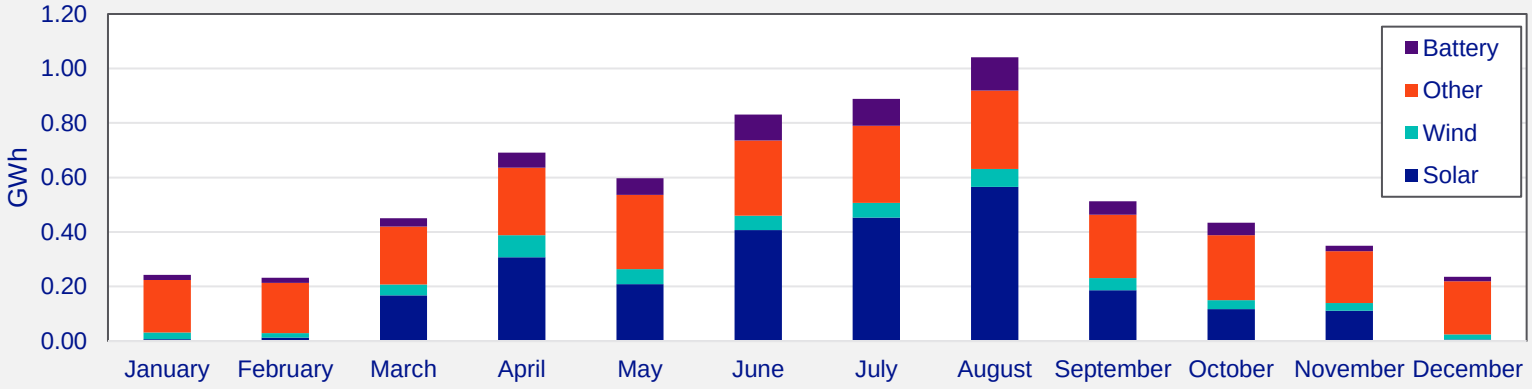


2. Commercial Batteries

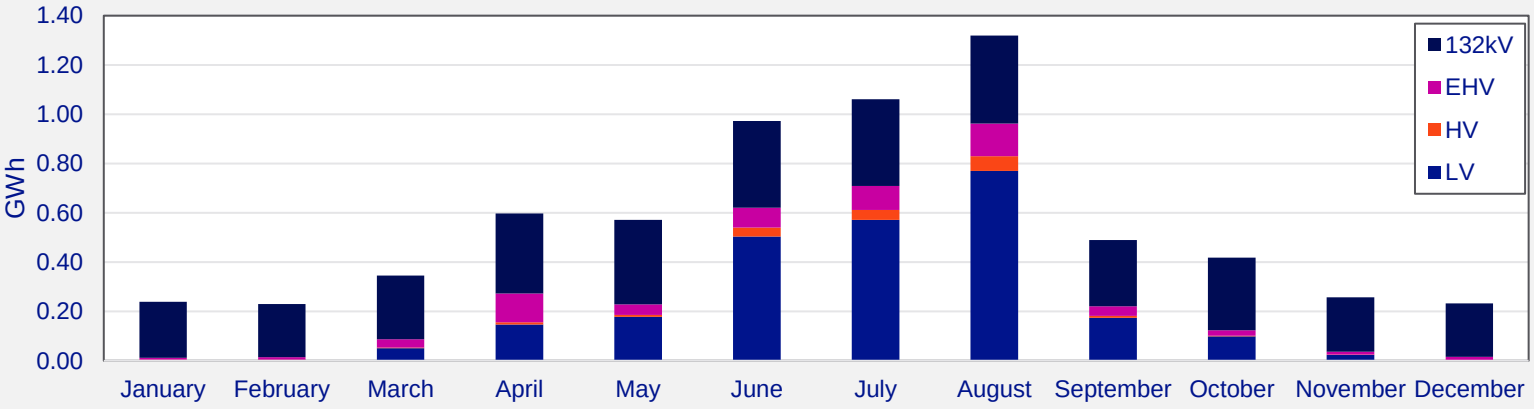


Overview of curtailment profiles

Technology Type



Voltage Level



Learning from this project will direct our future innovation

Future Project Activities

- Market modelling in PLEXOS to understand benefit case
- Cost curve to explore range of curtailment value cases
- Identify main market drivers of benefit to aid future work
- Voltage level sensitivity to direct investment

Post-Project Implementation

- Target future innovation to increase network headroom
- Improvements in battery forecasting
- Areas of interest for Active Network Management enhancements
- Benchmark capital schemes to increase headroom against the value they create

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