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Estimating LRMC to inform the setting of efficient tariffs

Exploration of pricing principles and methodologies

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Insight in Economics™

Overview

- Part 1 – Current tariffs and tariff setting methods
- Part 2 – Optimal tariff design and tariff methodology
- Part 3 – Challenges in implementing tariffs.

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Part 1

Current tariffs and tariff setting methods

LRMC Methodology
NEM DNSPs

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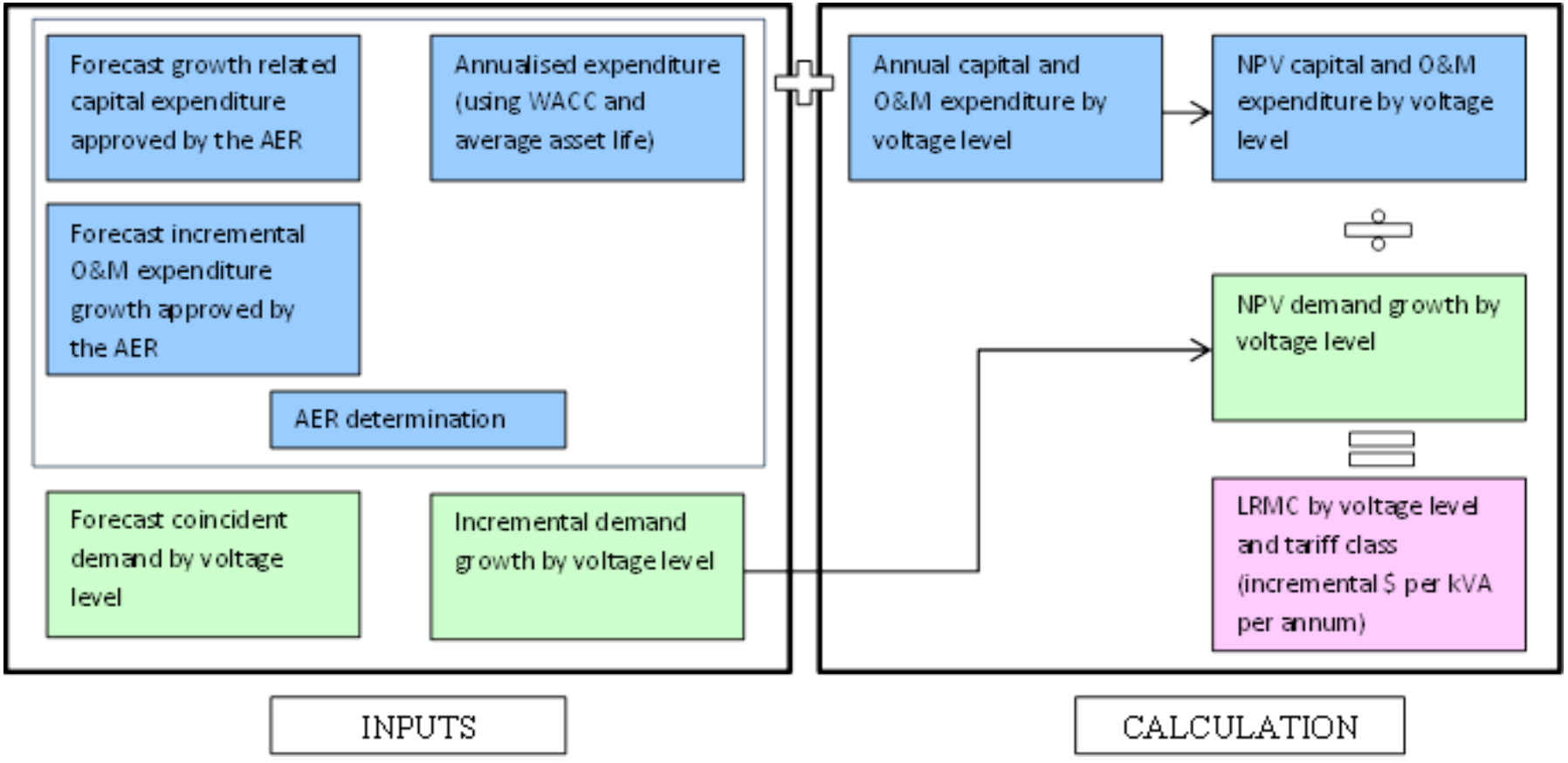
Figure 1: Typically AIC approach used by NEM DNSPs to calculate LRMC by tariff class



Source: ETSA Utilities.

LRMC Methodology
Overseas jurisdictions

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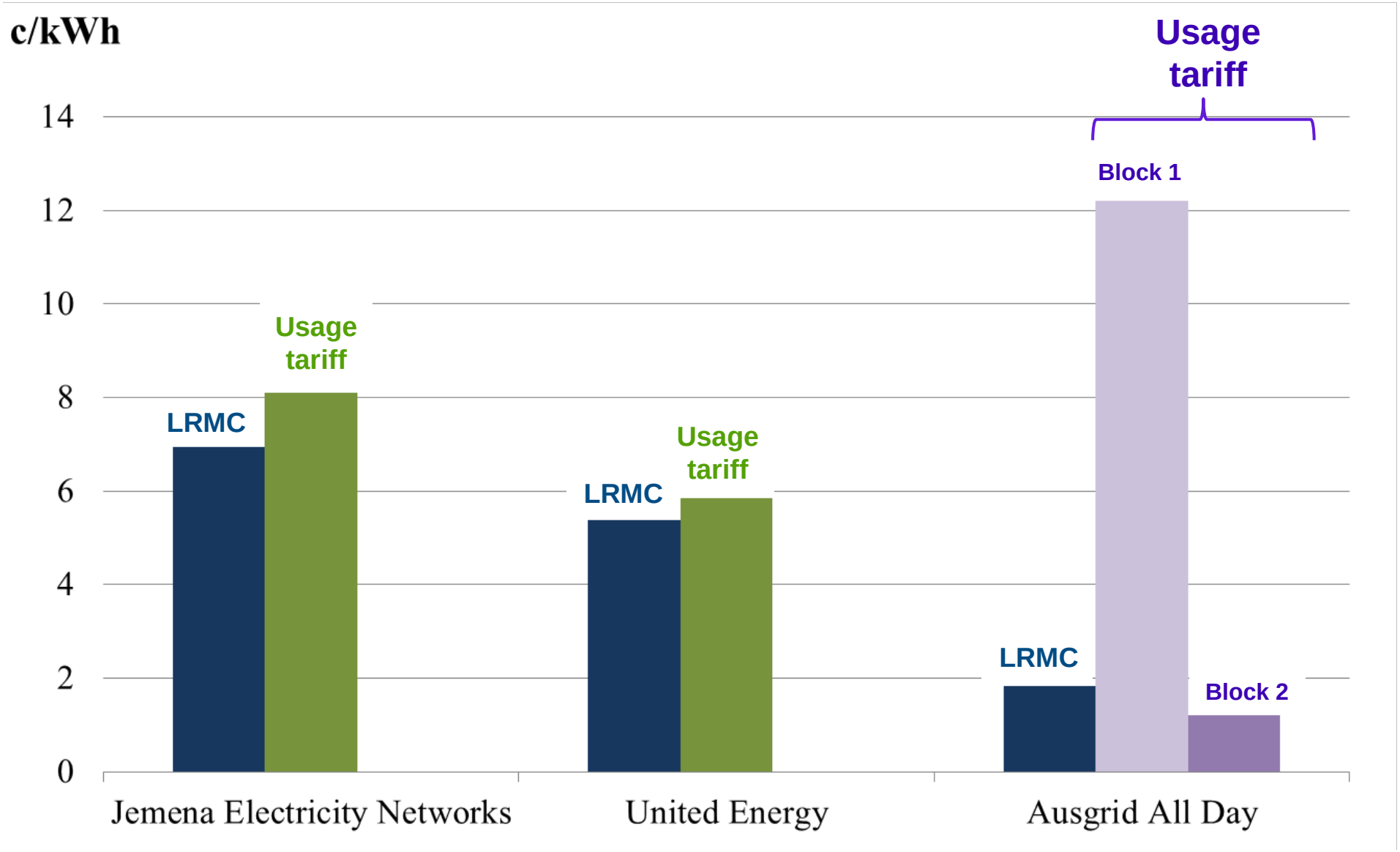
- Electricity Authority (New Zealand)
  - Long run incremental cost more appropriate due to the lumpy nature of network investment.
  - 'Where prices based on *efficient* incremental costs would under-recover allowed revenues, the shortfall should be made up by setting prices in a manner that has regard to customers' demand responsiveness, to the extent practicable.'
- Ofgem (Great Britain)
  - For low voltage customers, the charges are calculated based on meeting a 500MW increment in capacity
  - Costs are allocated to network levels based on maximum load
  - Allocation to customers is based on contribution to maximum load, as well as capacity and fixed charge factors.

LRMC v Usage Tariff



Contains JEN's residential general purpose flat tariff, UE's 'Low Voltage Small One Rate' tariff and Ausgrid's residential block 1 and 2 tariff.

Discussion Points:

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- What methodologies are currently used to calculate LRMC?
- What are some of the practical challenges associated with estimating LRMC?
- How is LRMC used to inform the network pricing strategy?

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Part 2

Optimal tariff design and tariff methodology

Illustrative Example – Estimation of LRMC

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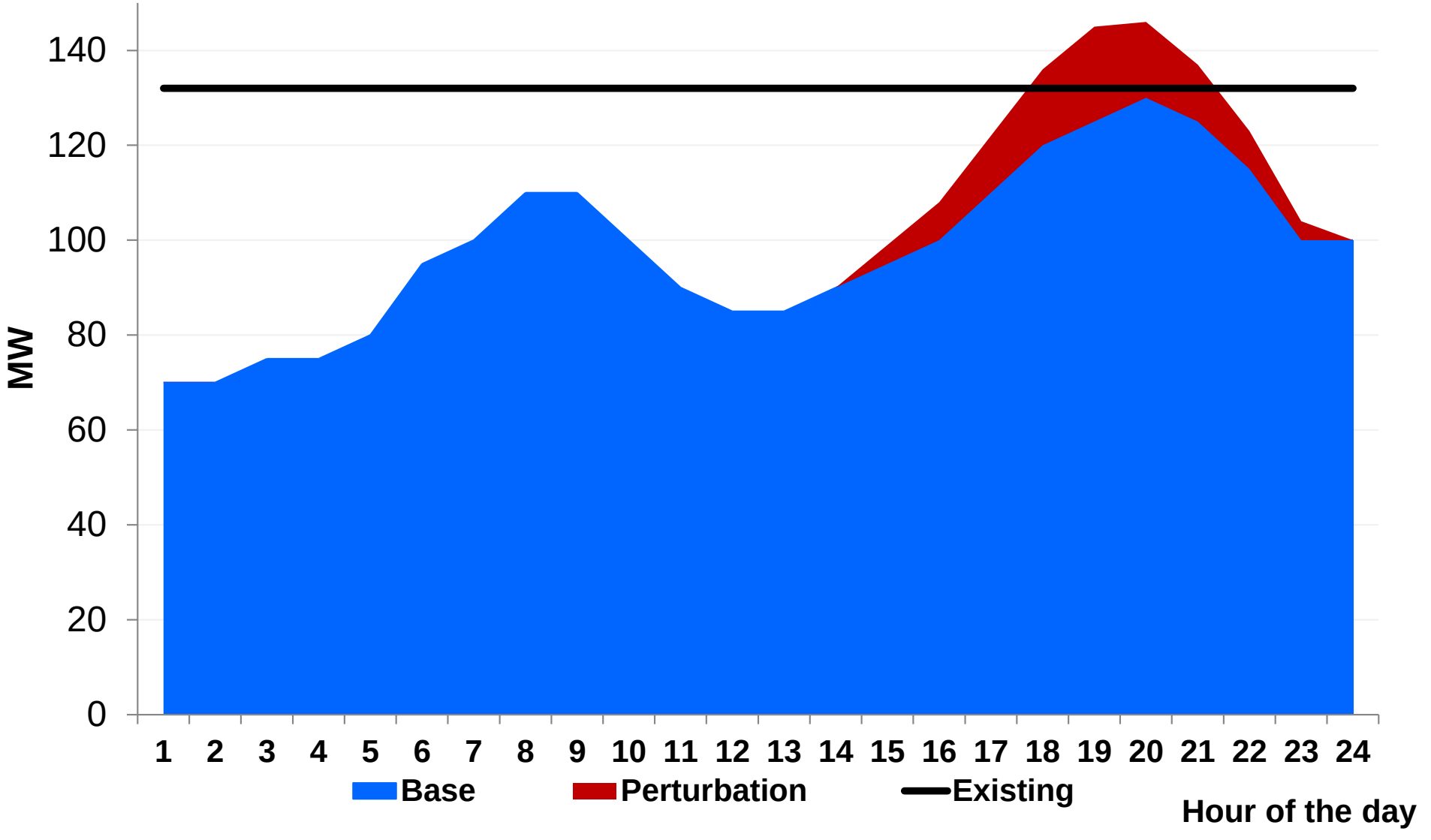
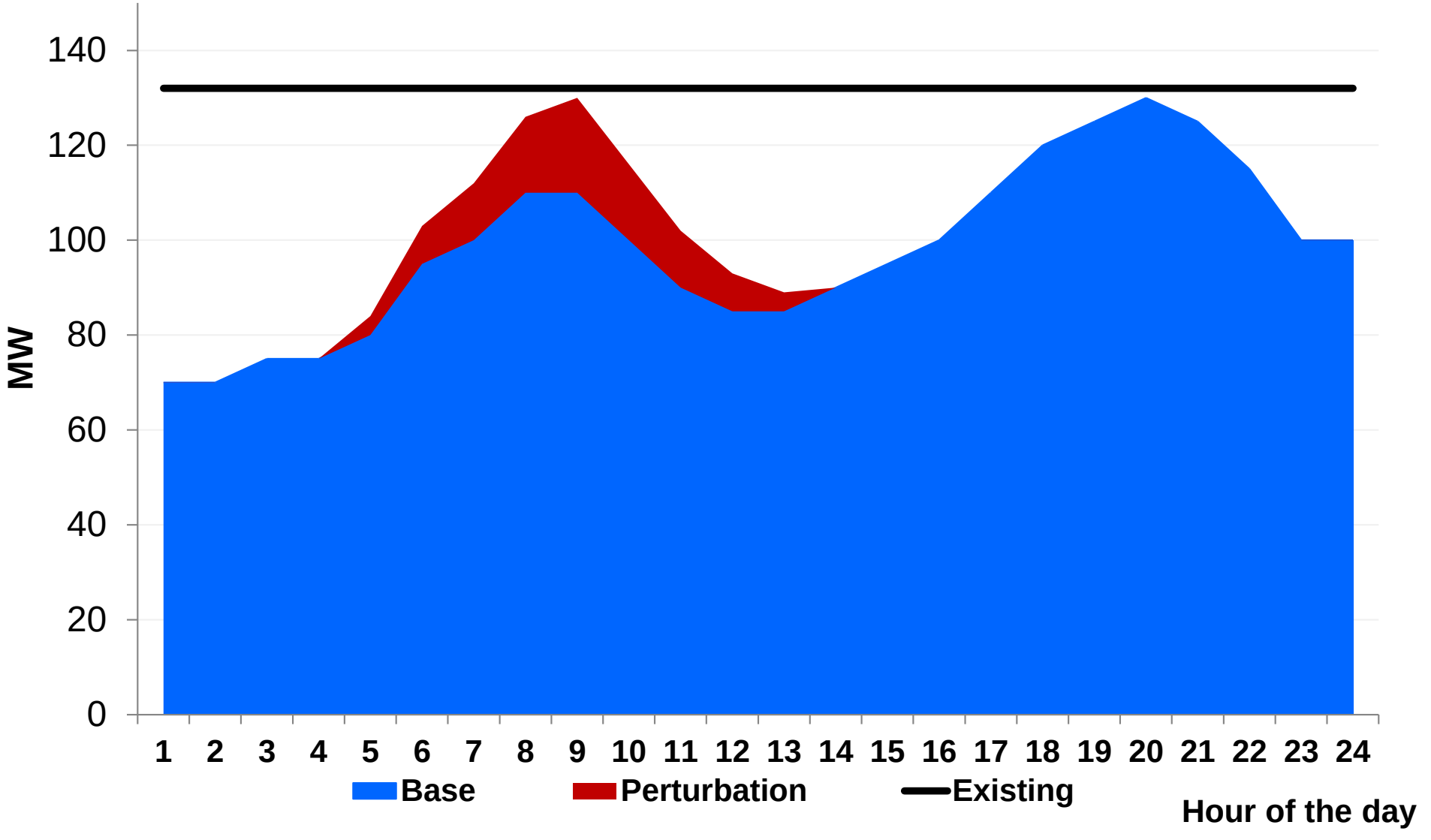
- Motivation:
  - What is the distinction between a perturbation approach and an average incremental cost (AIC) approach?
  - How do the results differ and why?
- Principal input variables:
  - Load profiles
  - Existing capacity
  - Demand trajectories (ie, rising, falling, flat)

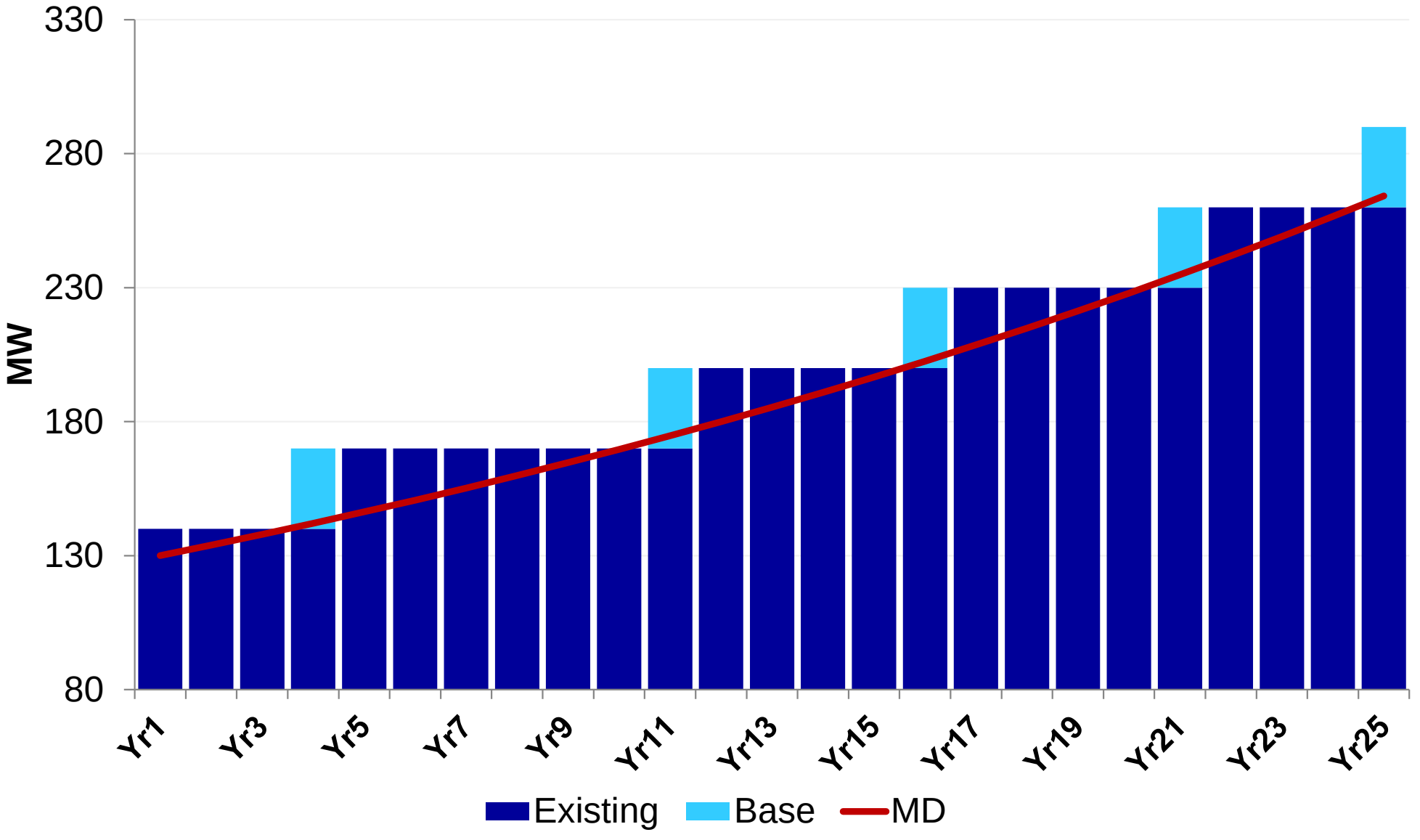
Base Load Profile + Perturbation 1



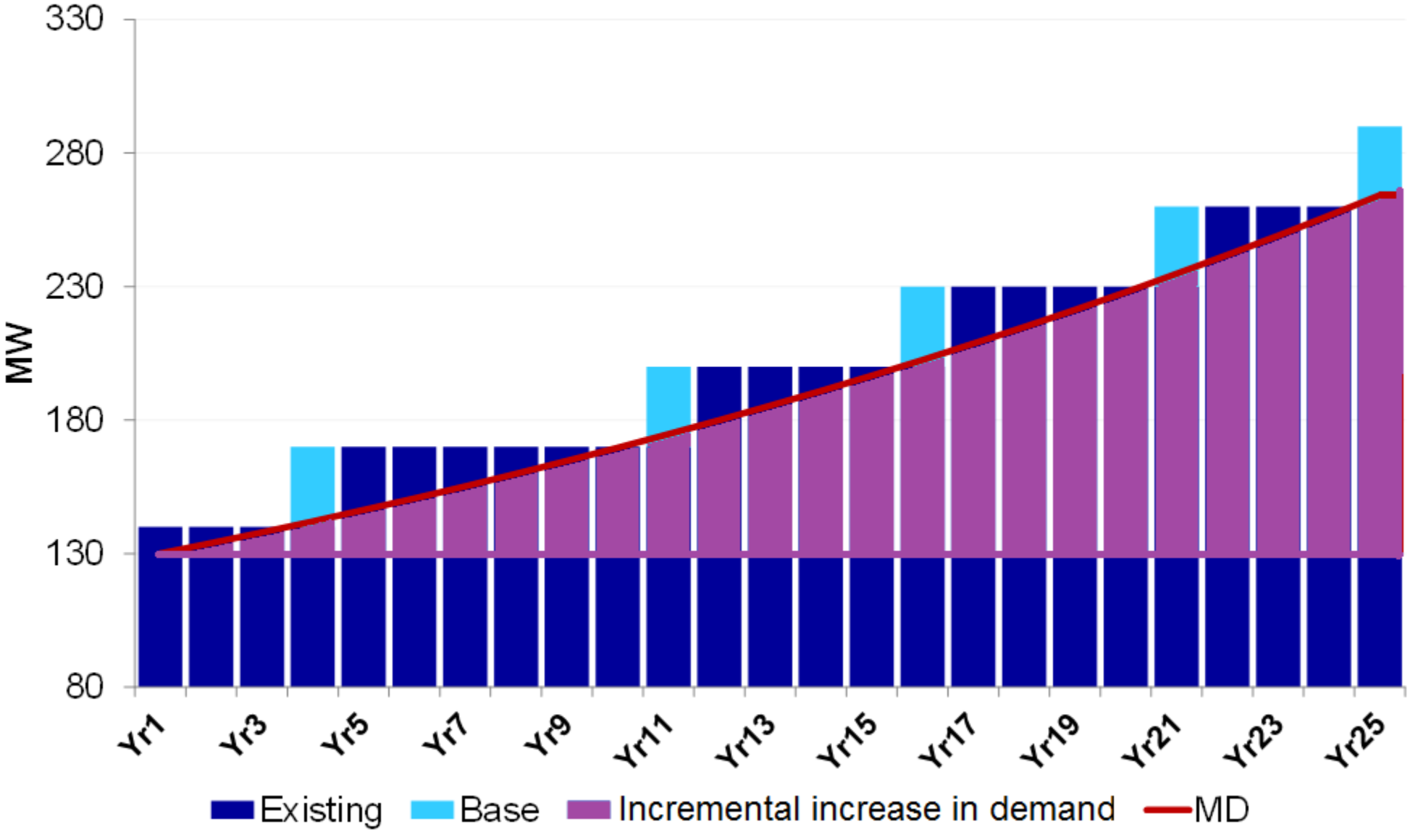
Base Load Profile + Perturbation 2



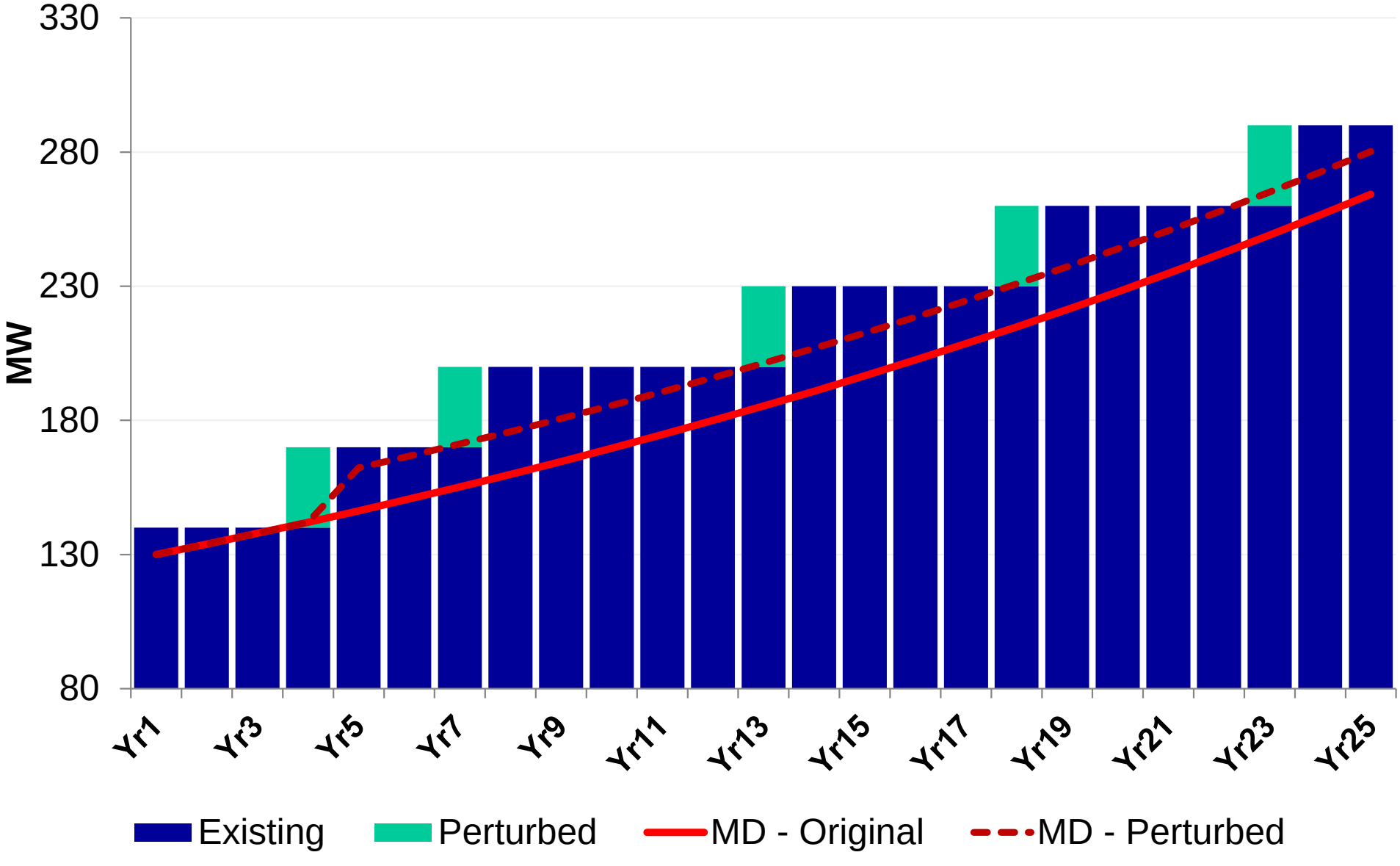
Base Case Augmentation Profile



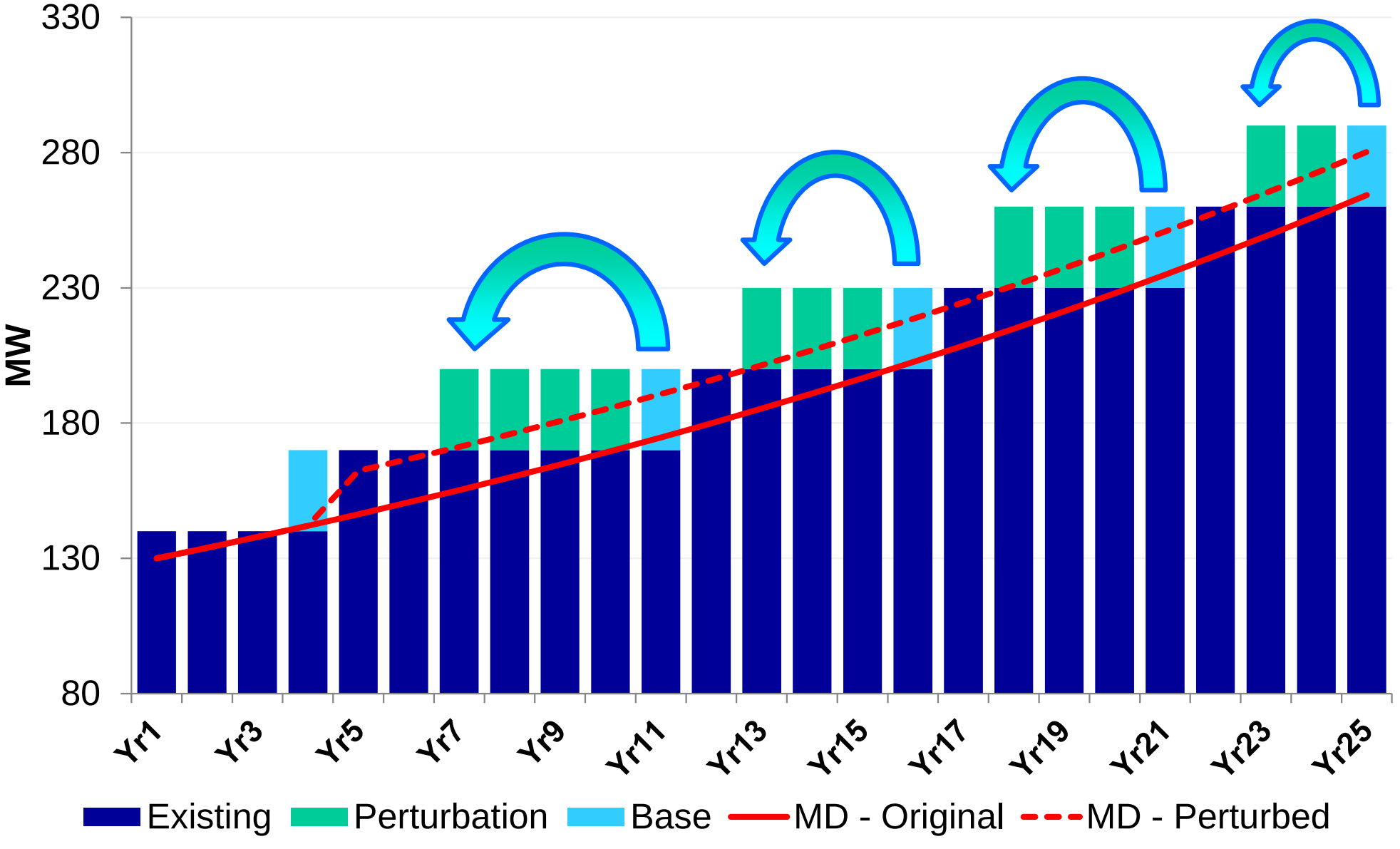
Incremental Increase in Demand



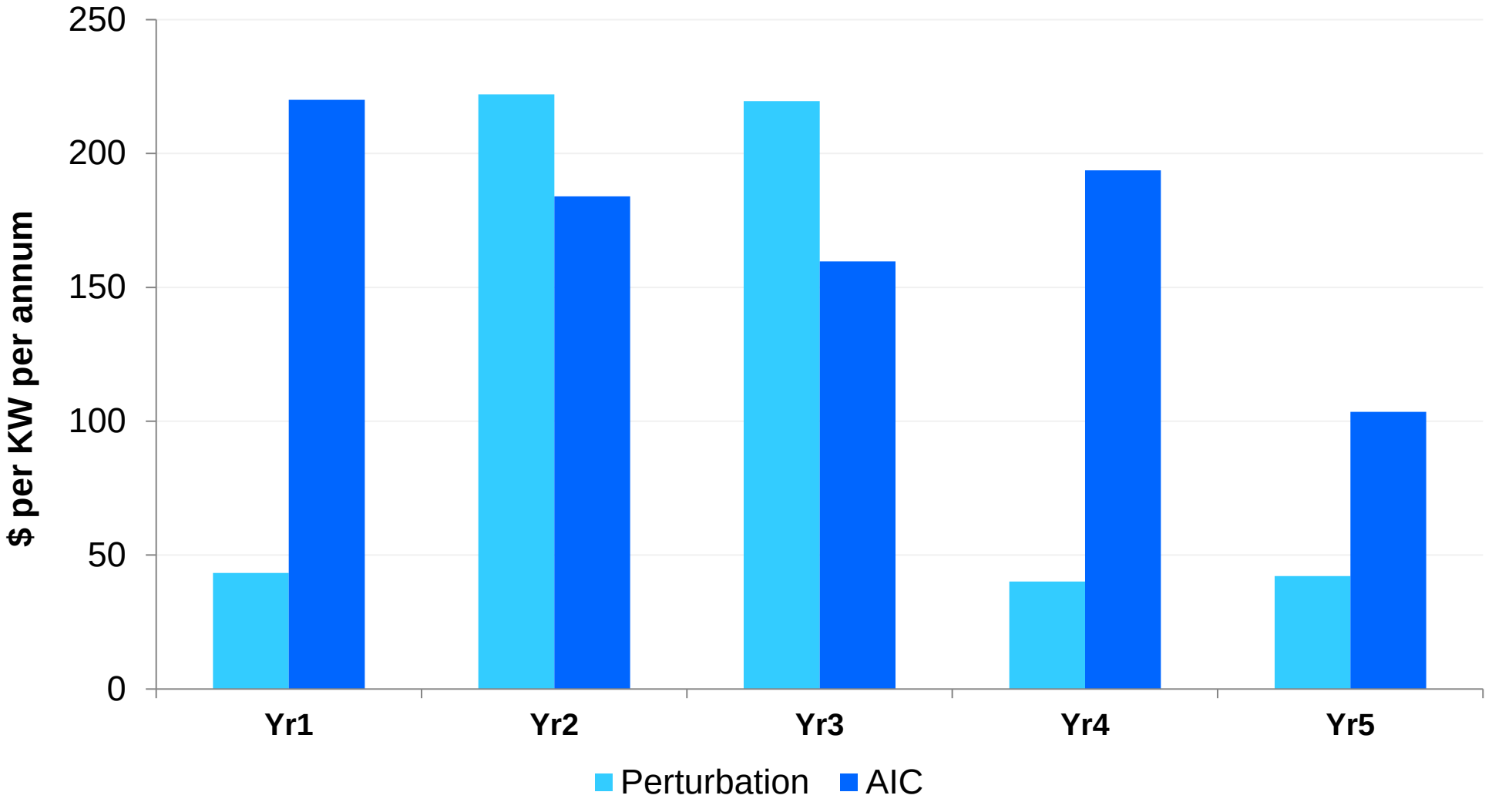
Revised Augmentation Profile – Perturbation in Year 5



Perturbation brings forward augmentation expenditure



Perturbation and AIC approaches can produce vastly different results



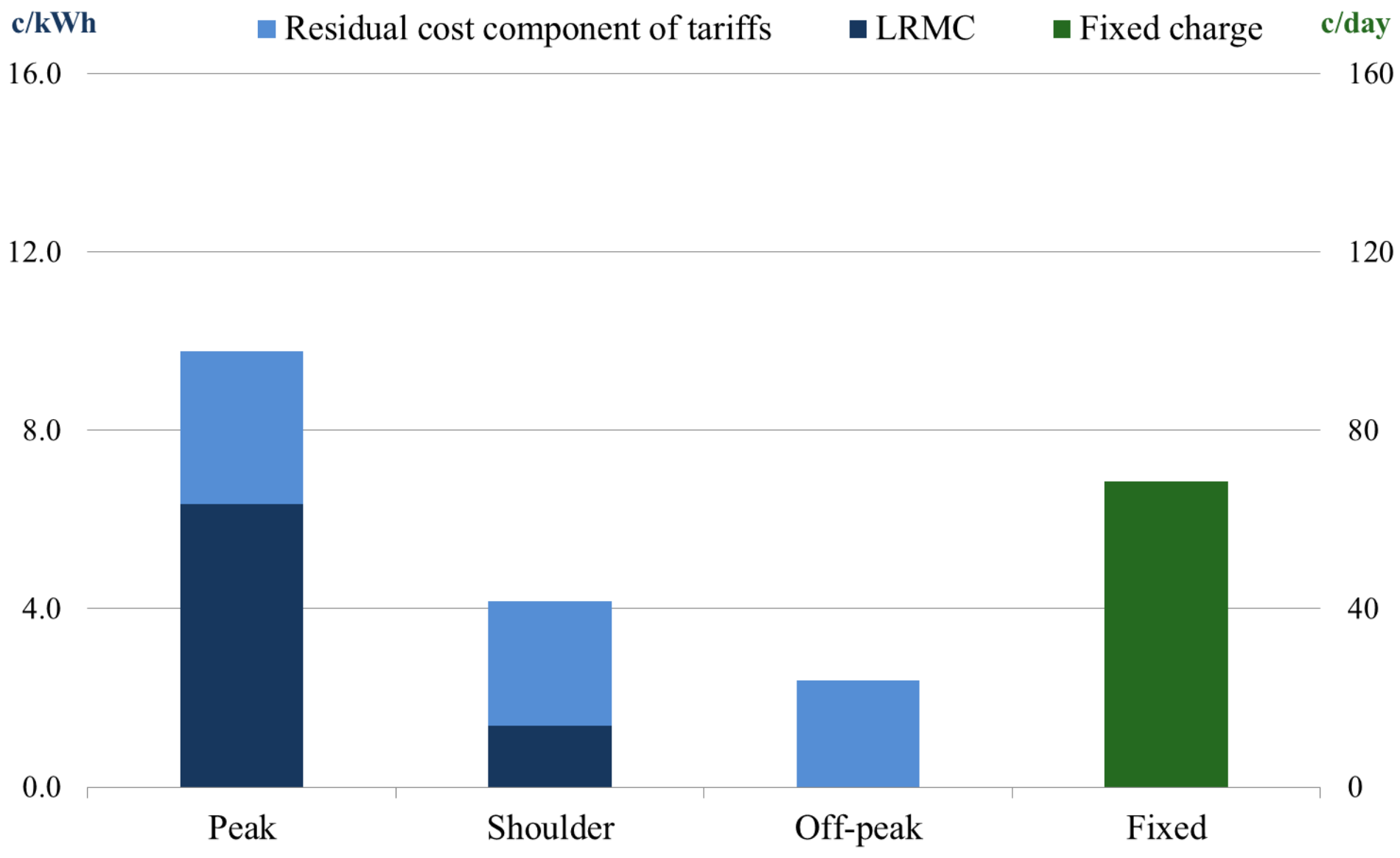
Allocation of Residual Costs

- Postage stamp pricing – the tariff is the same regardless of the customers':
  - energy usage; and
  - location
- Ramsey pricing – the price is inversely proportional to price elasticity of demand
- How are DNSPs currently recovering residual costs?

Allocation of residual costs

TOU

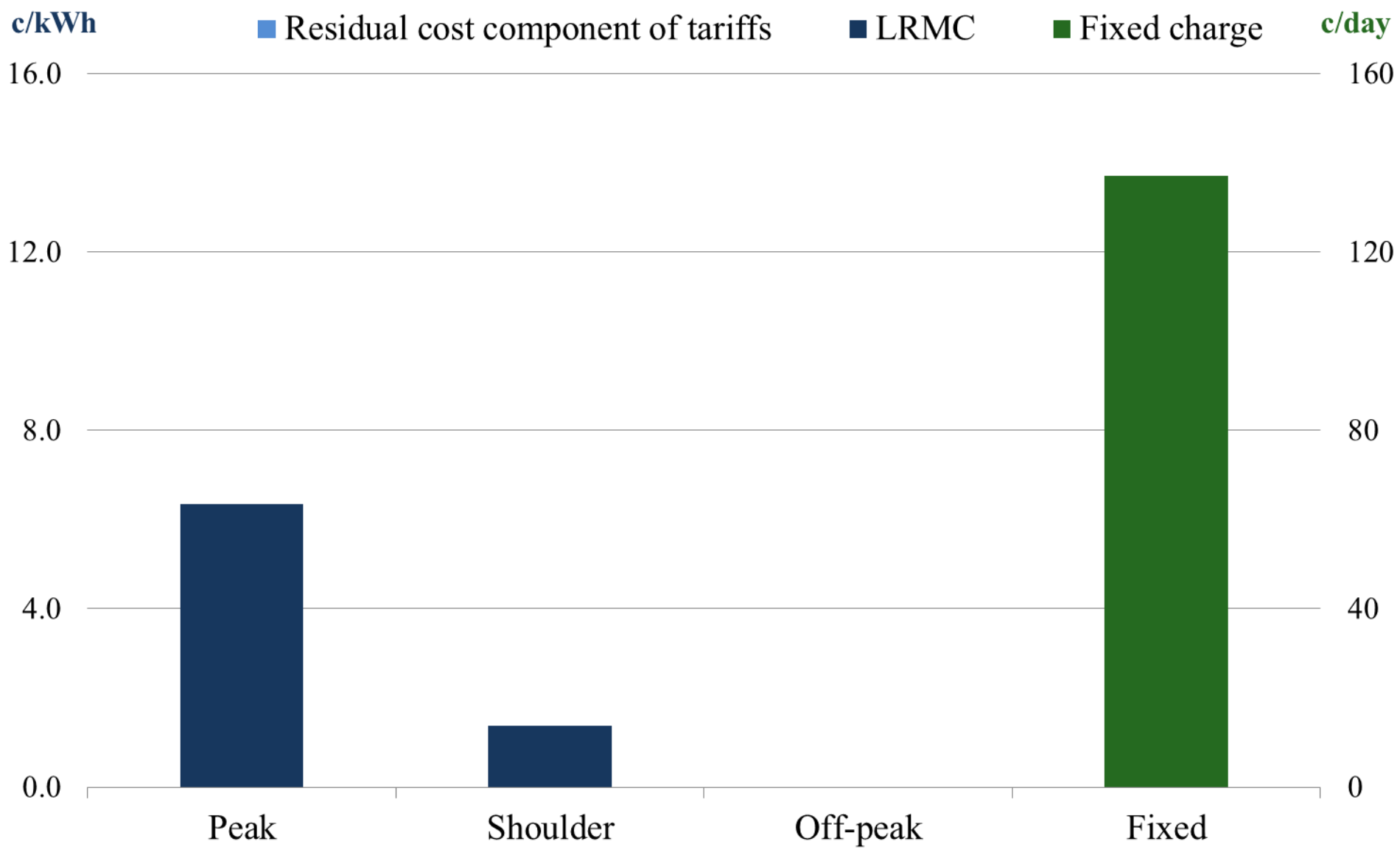
Fixed: 50%, Usage: 50%



Allocation of residual costs

TOU

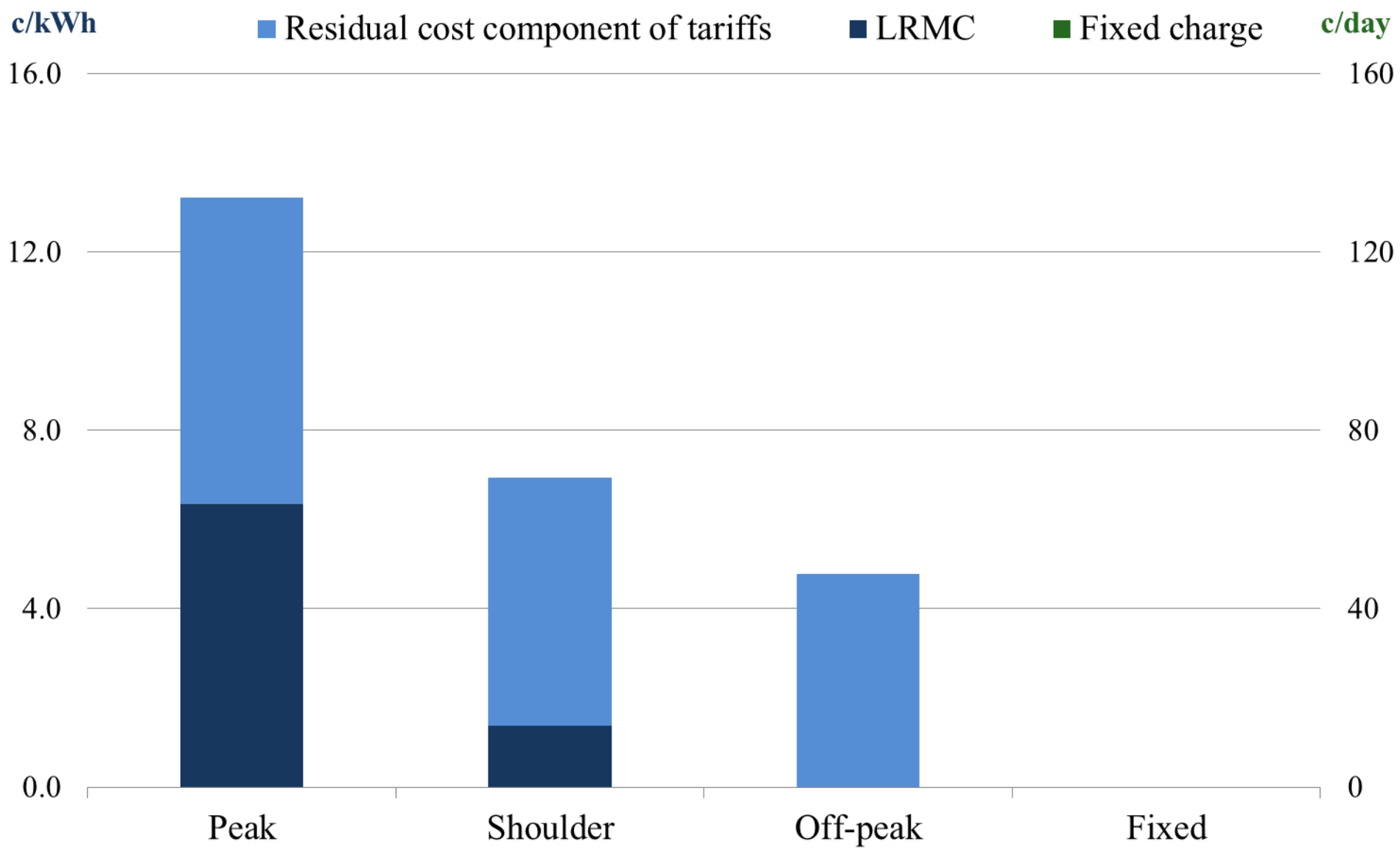
Fixed: 100%, Usage: 0%



Allocation of residual costs

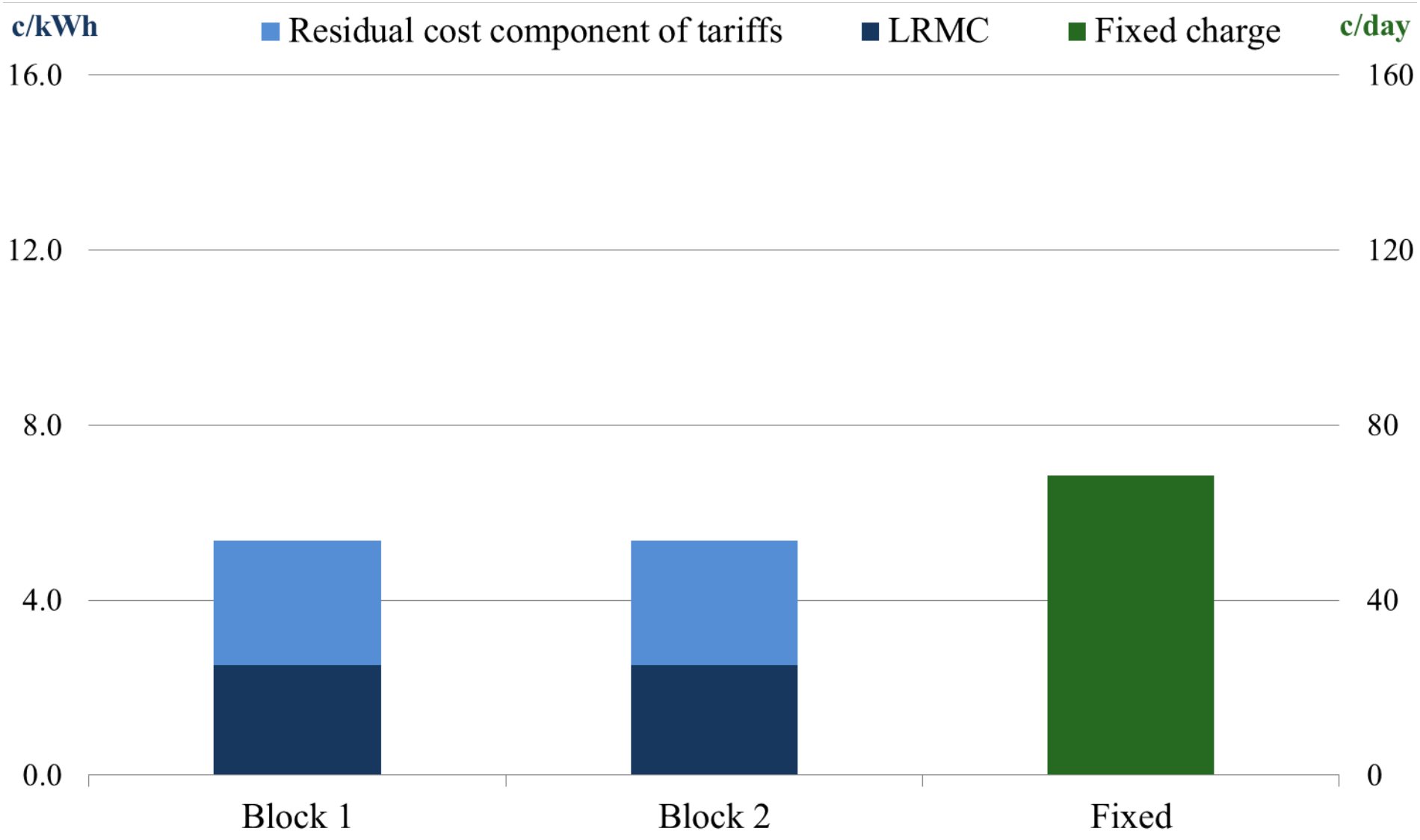
TOU

Fixed: 0%, Usage: 100%



Allocation of residual costs

Incremental Block Tariff
Fixed: 50%, Usage: 50%

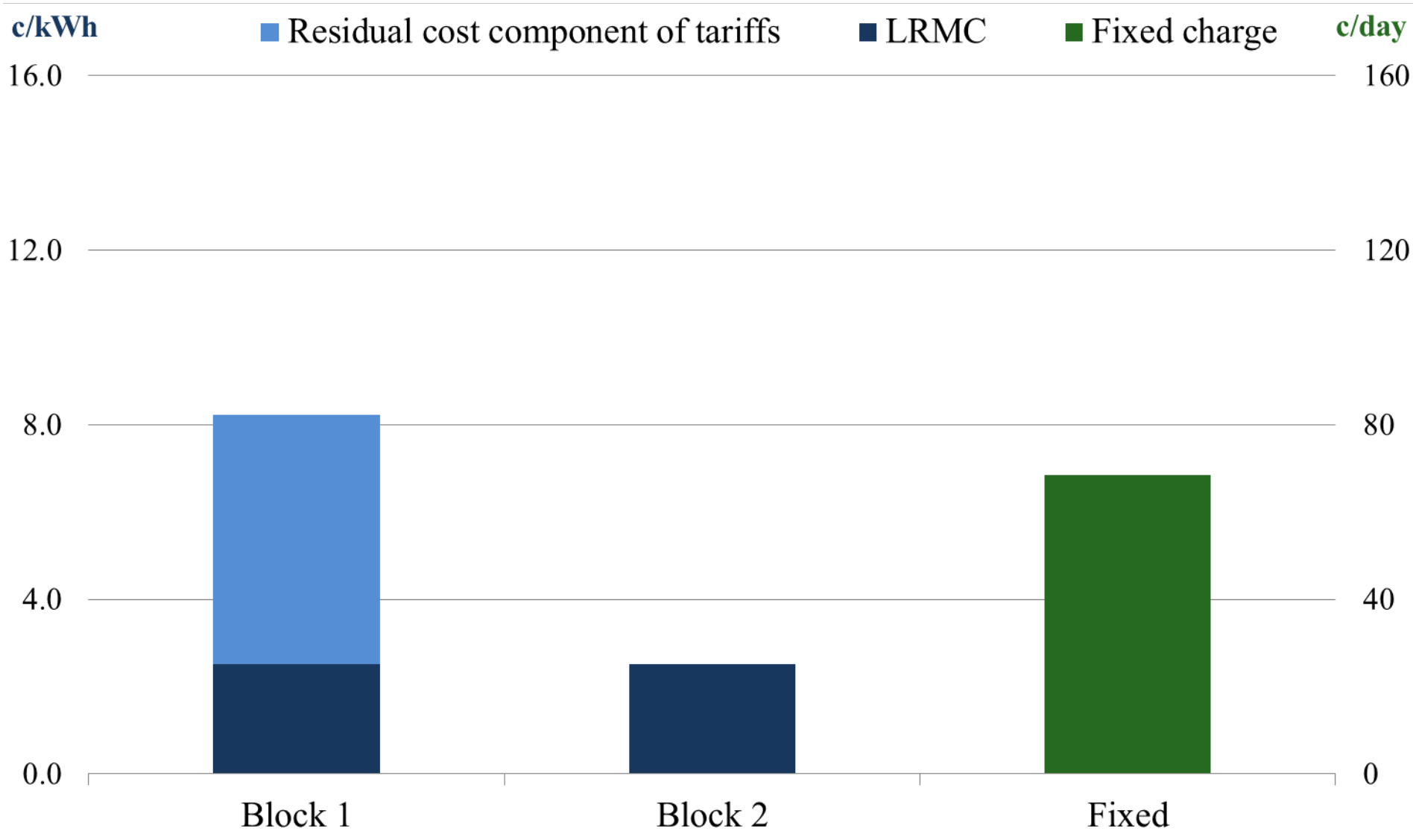


Note: Assuming equal consumption in Block 1 and Block 2

Allocation of residual costs

Incremental Block Tariff

Fixed: 50%, Usage: 50%

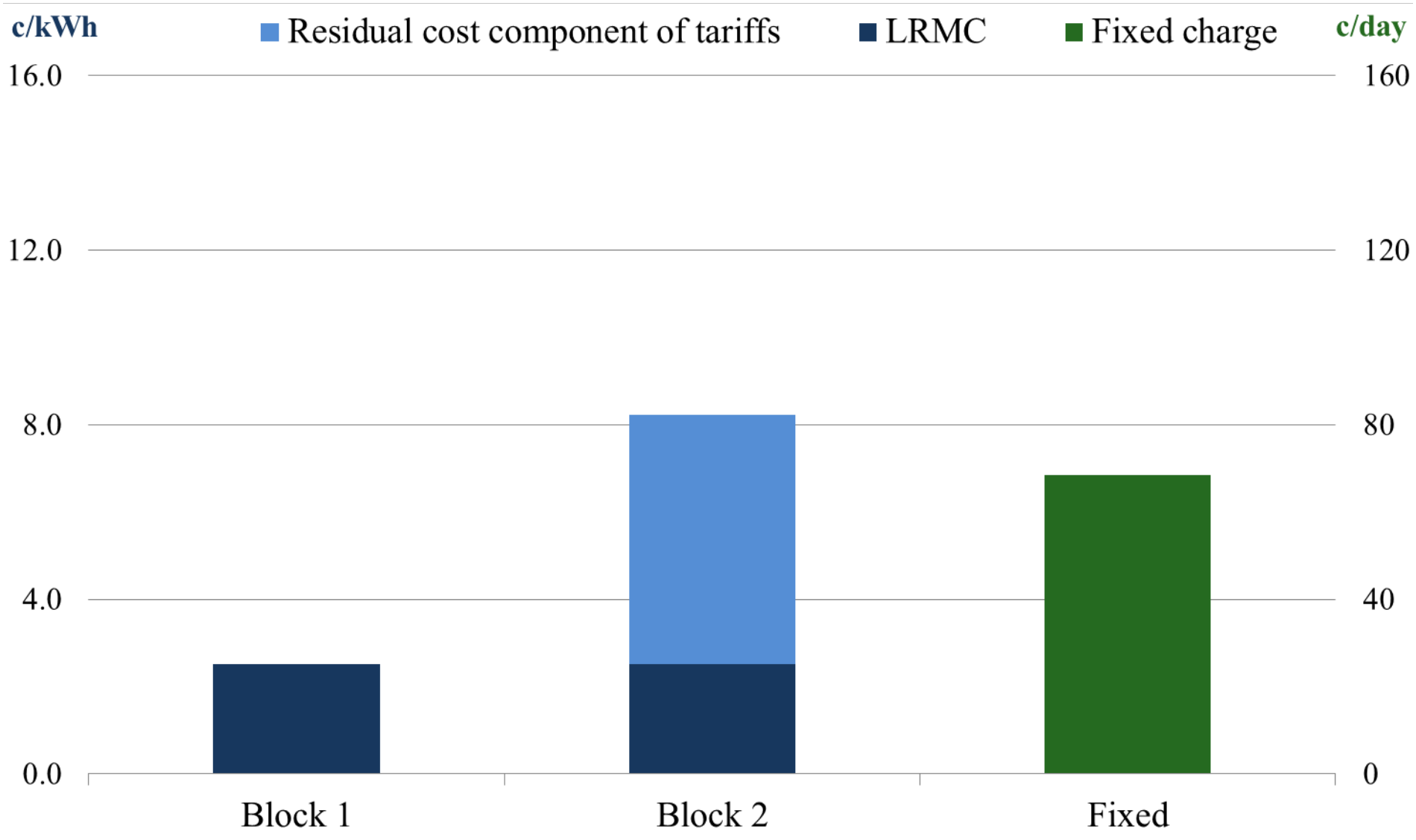


Note: Assuming equal consumption in Block 1 and Block 2

Allocation of residual costs

Incremental Block Tariff

Fixed: 50%, Usage: 50%

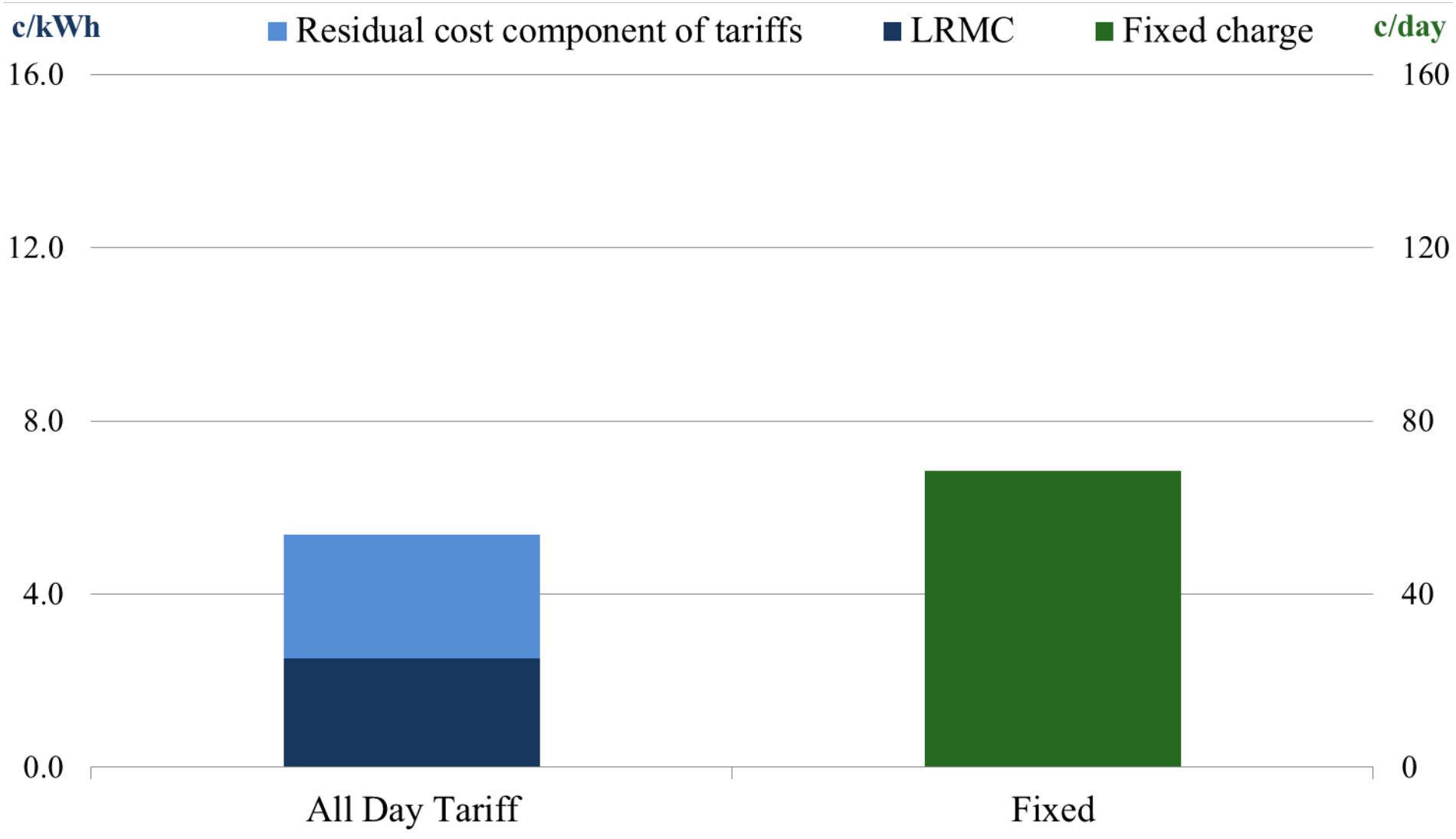


Note: Assuming equal consumption in Block 1 and Block 2

Allocation of residual costs

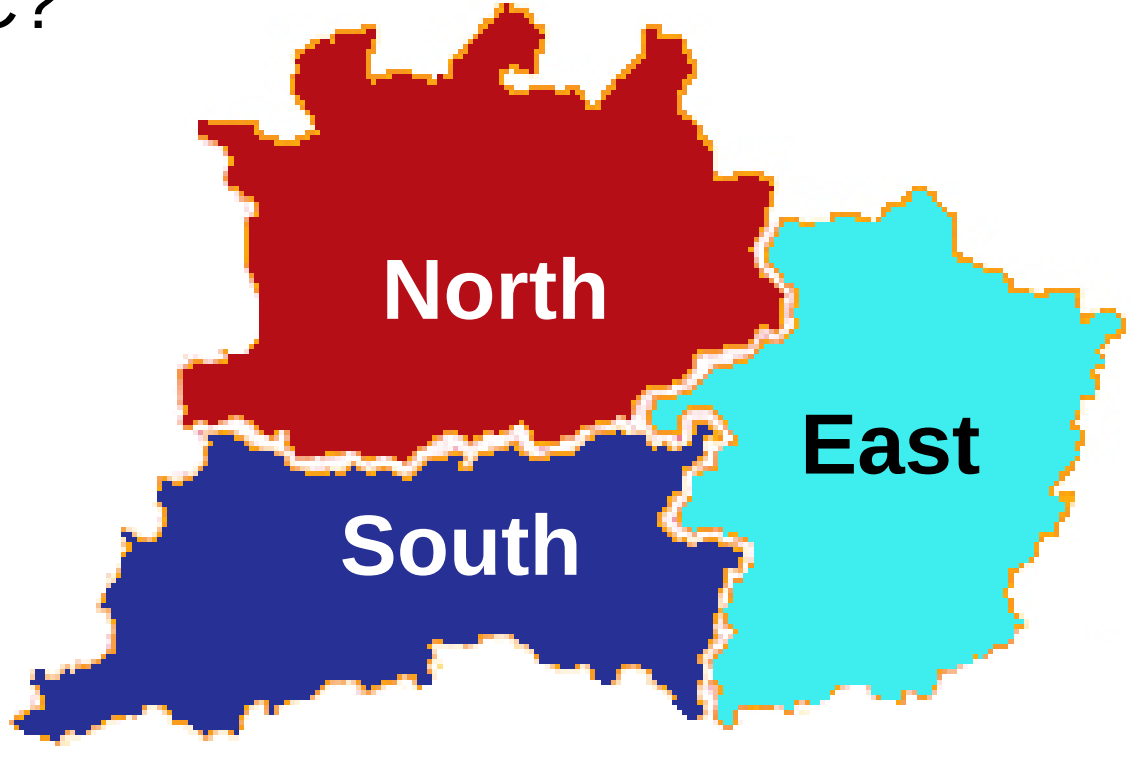
All Day Tariff

Fixed: 50%, Usage: 50%

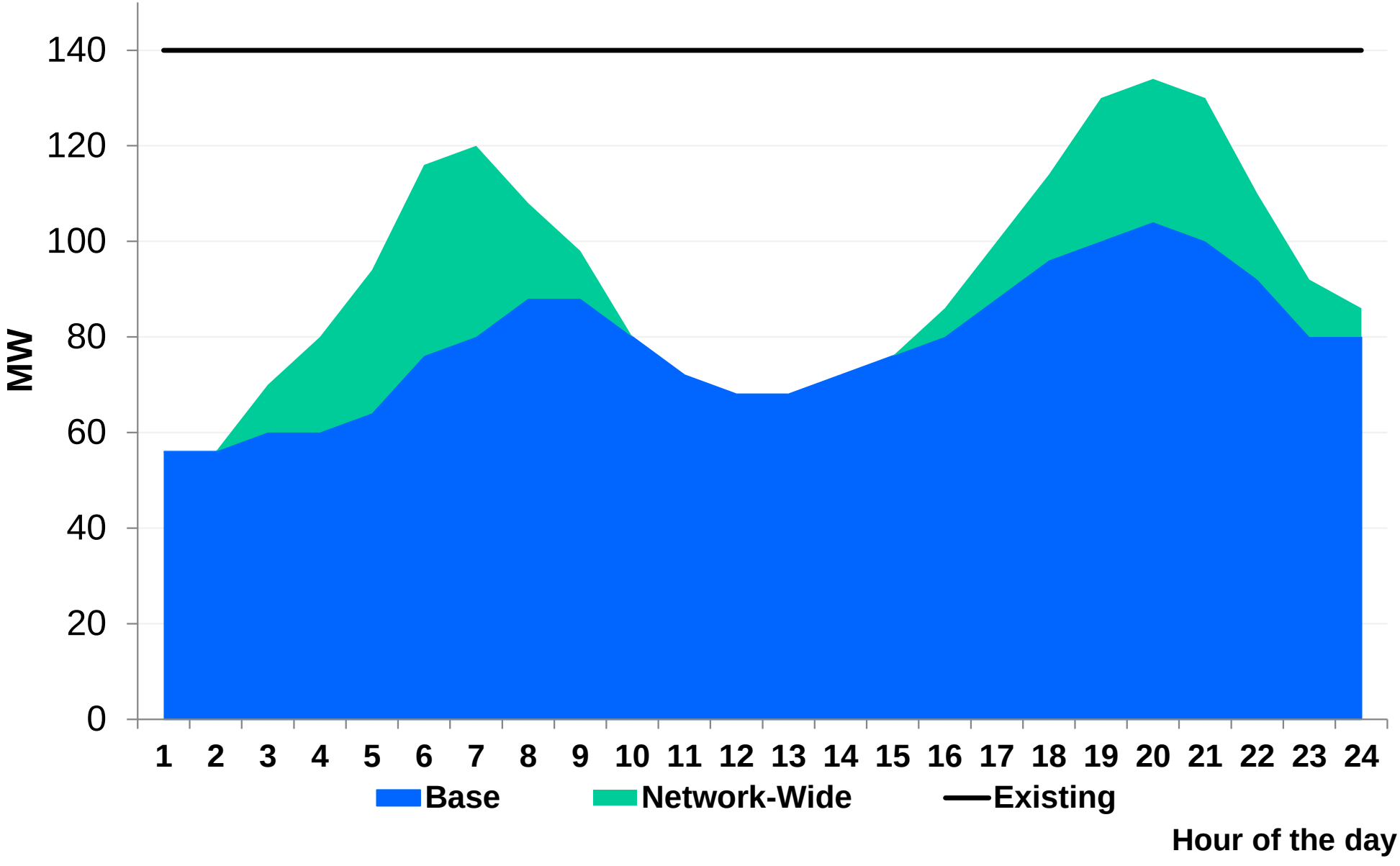


Allocation and aggregation

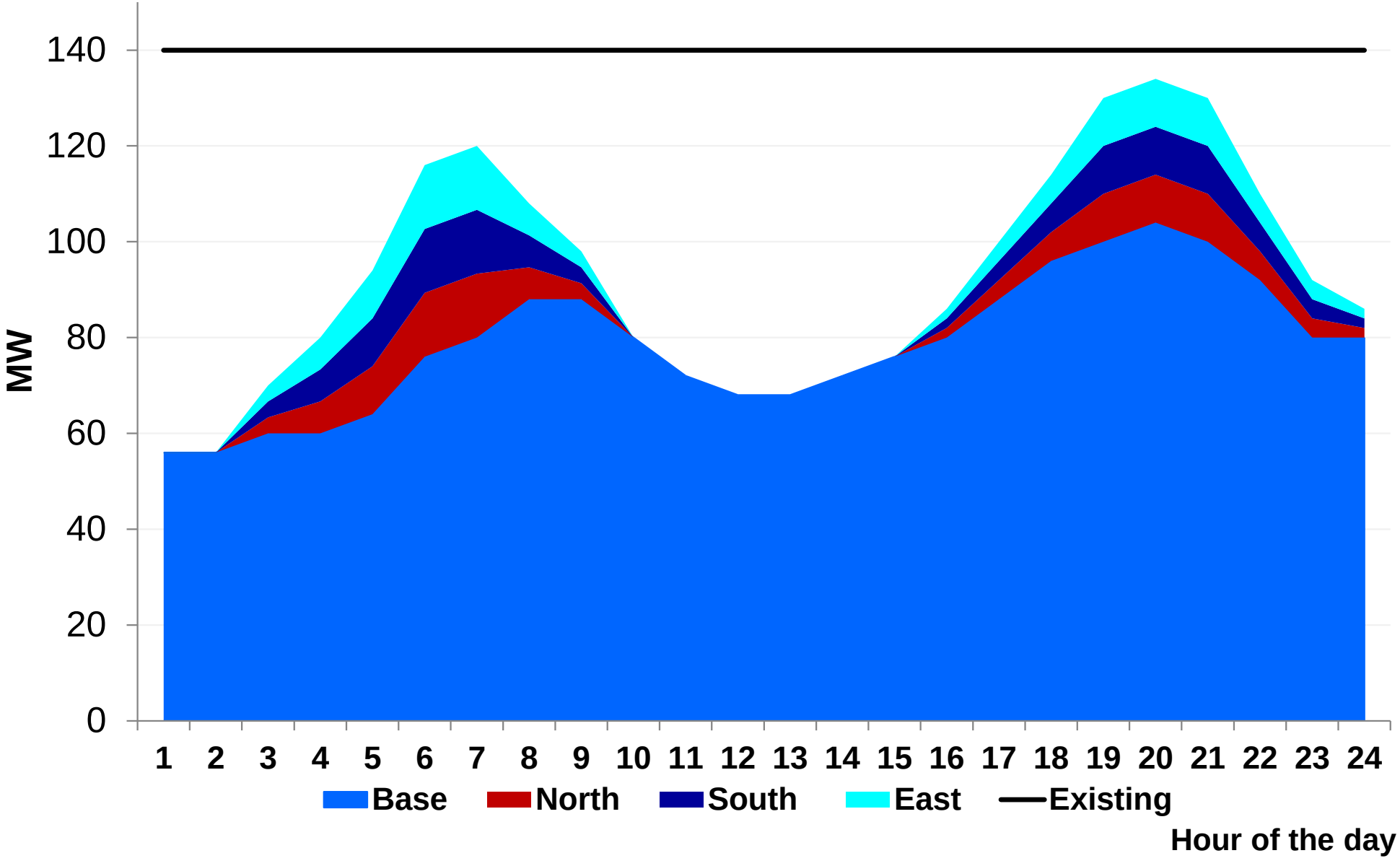
- How do we *allocate* the network-wide LRMC across different subsets of the system?
- Alternatively, how do we *aggregate* LRMCs from different locations to obtain a network-wide LRMC?



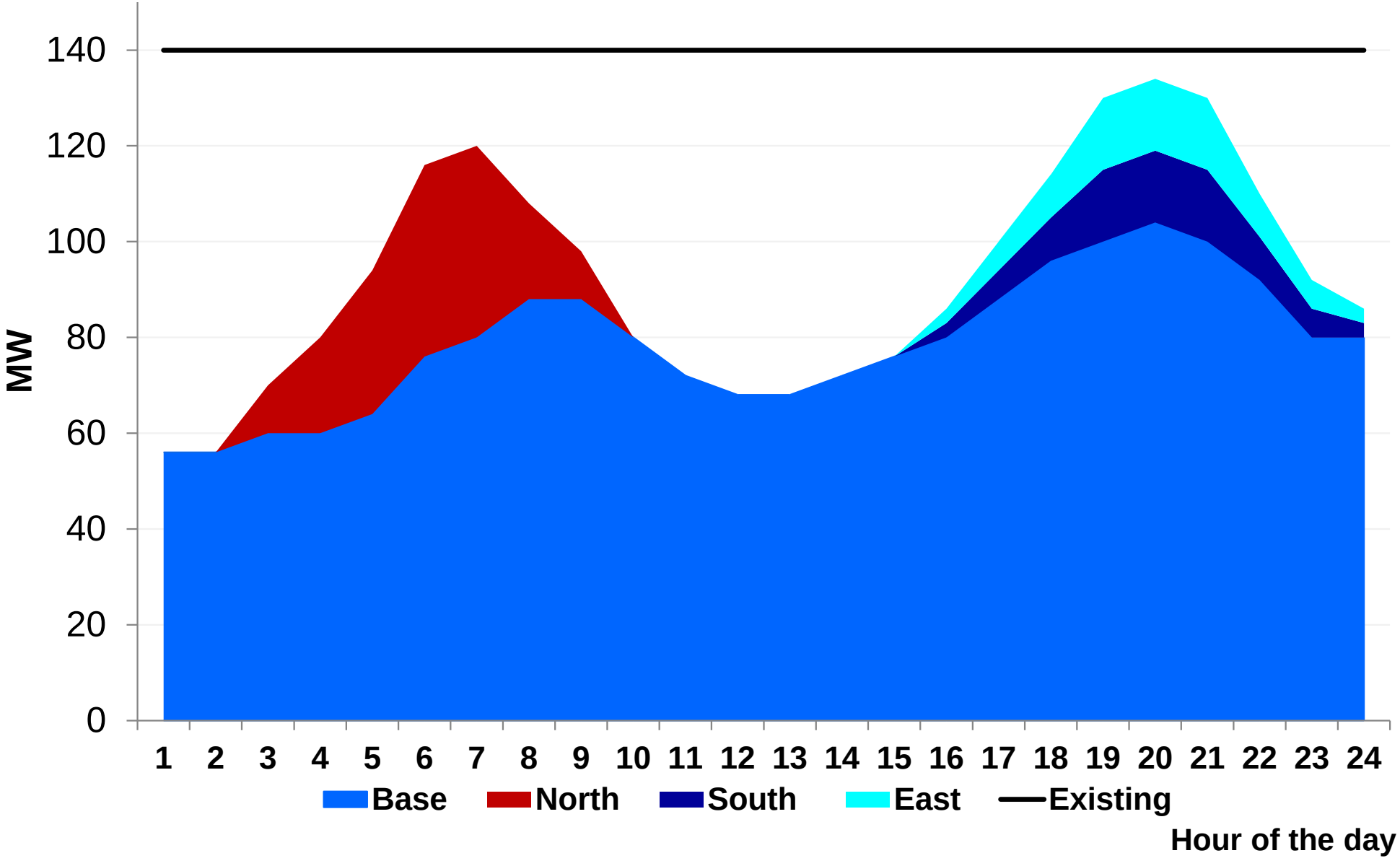
Network wide perturbation



Contribution of different regions may be similar



However in general LRMCs are not additive



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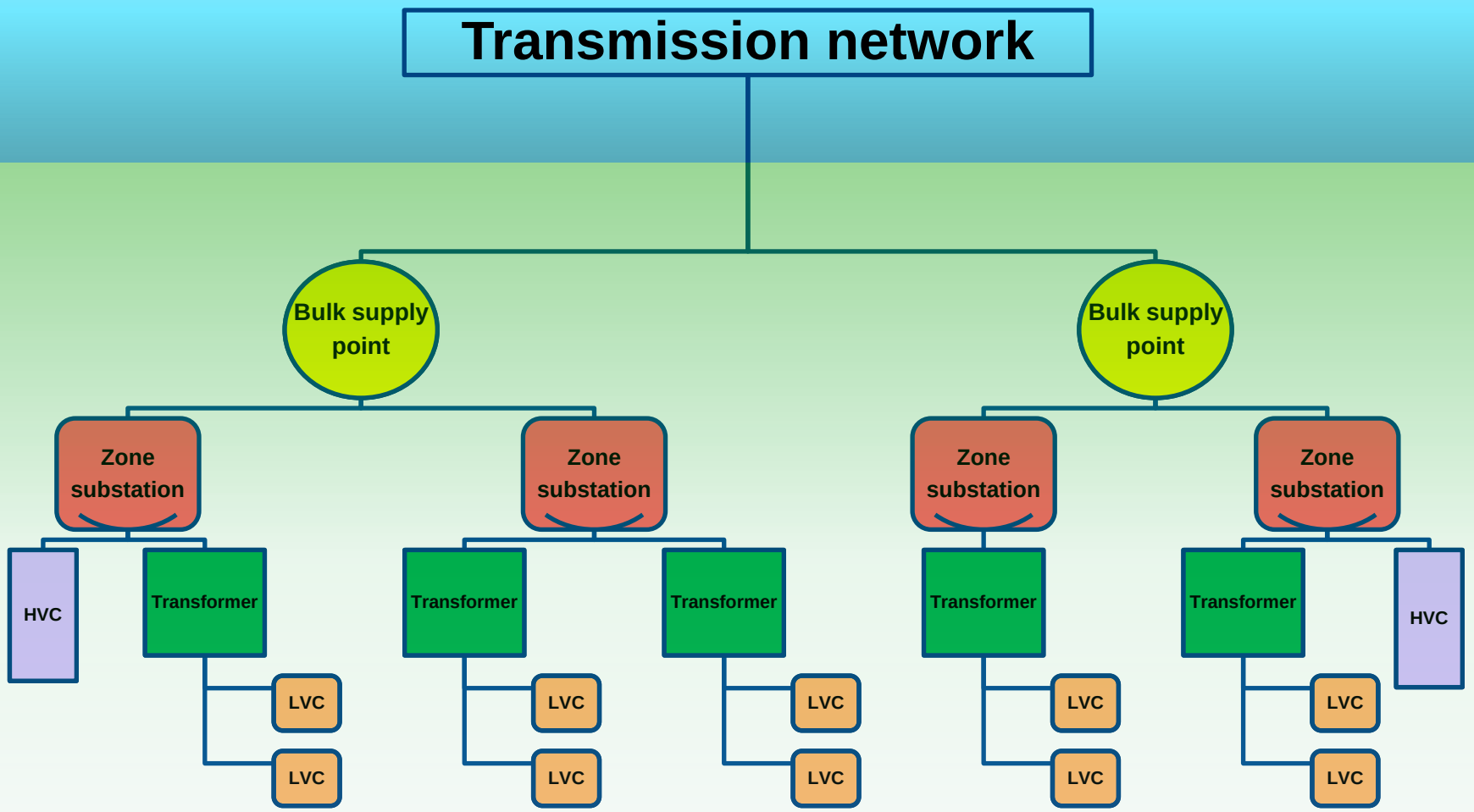
Part 3

Challenges in implementing tariffs

What are the challenges?

- More data to manage in the downstream parts of the network
- What principles should you use to determine the level at which you should calculate LRMC?

Information collection



Asset numbers

	Count
Bulk Supply Points	41
Zone Substations	238
Distribution Transformers	47,436
Street Lights	345,807
Poles	658,886

Note: as at 30 June 2013.

Factors to consider when determining the resolution of LRMC estimates

- Variation in the trajectory of demand over time
- Different levels of existing demand relative to capacity
- Differing costs across different parts & levels of the network

Doboy Bulk Supply Point

Maximum demand is flat or falling at most Bulk Supply Points in Energex's Network

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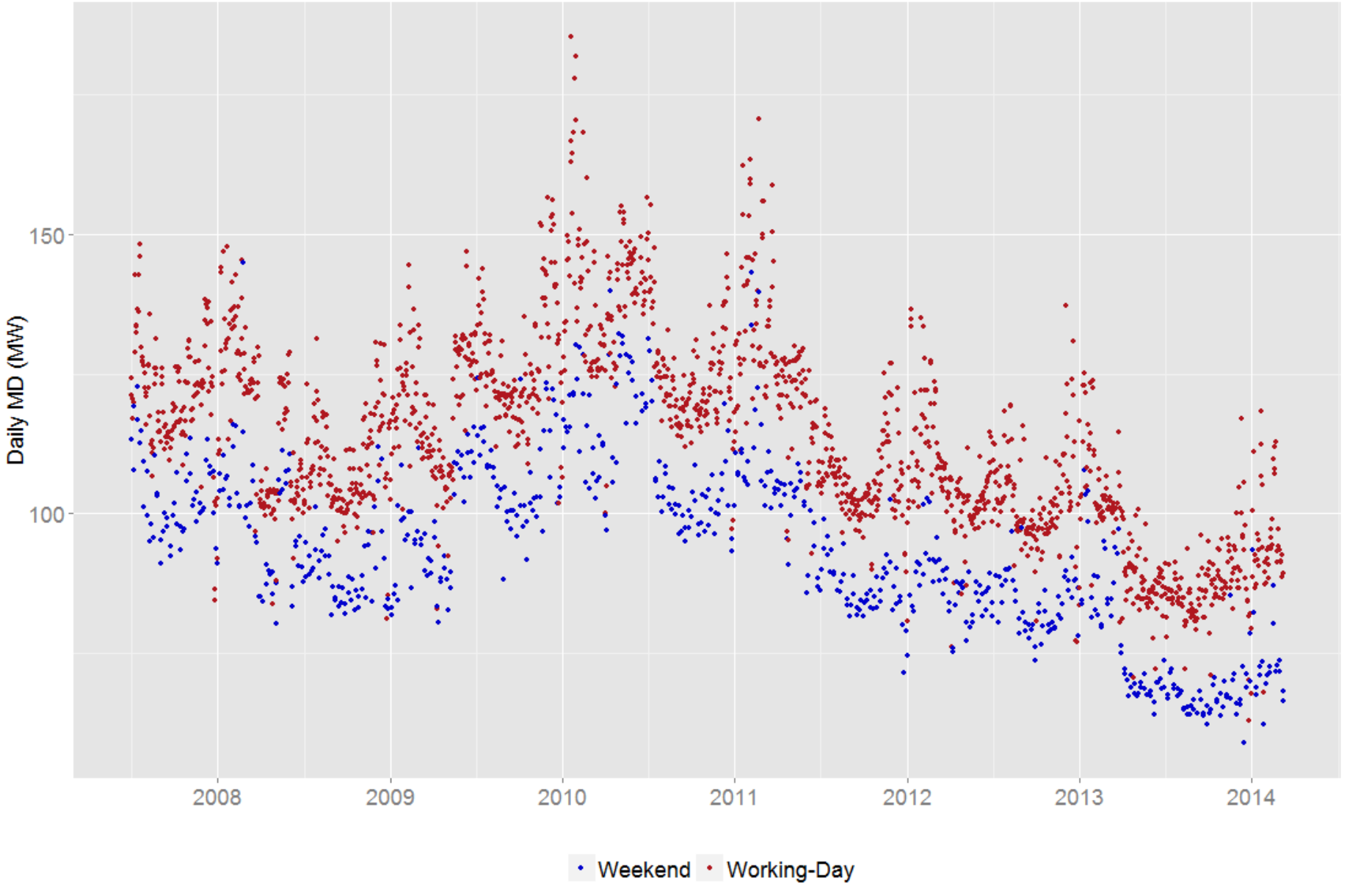

Victoria Park Bulk Supply Point

Maximum demand is flat or falling at most Bulk Supply Points in Energex's Network

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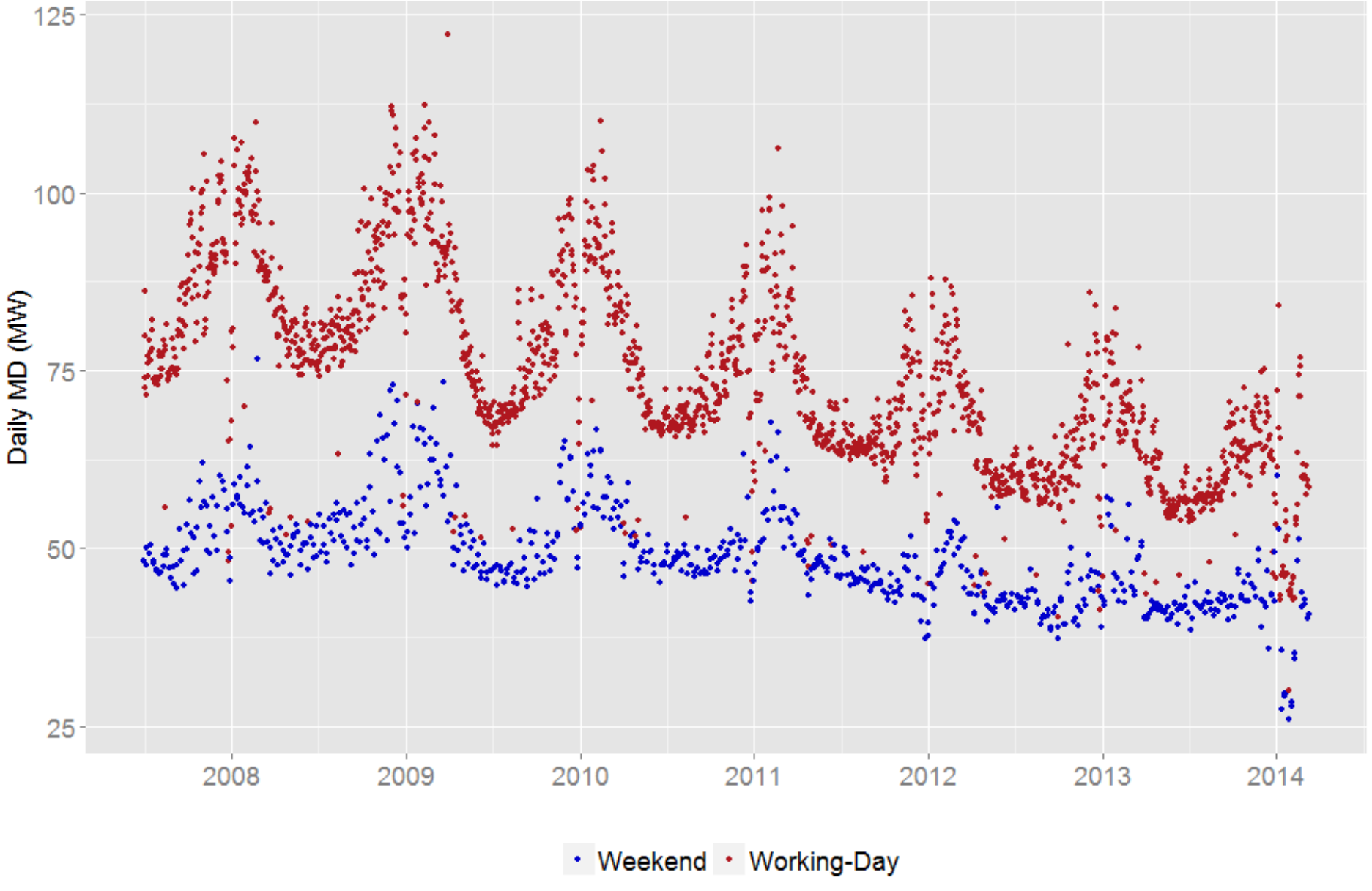
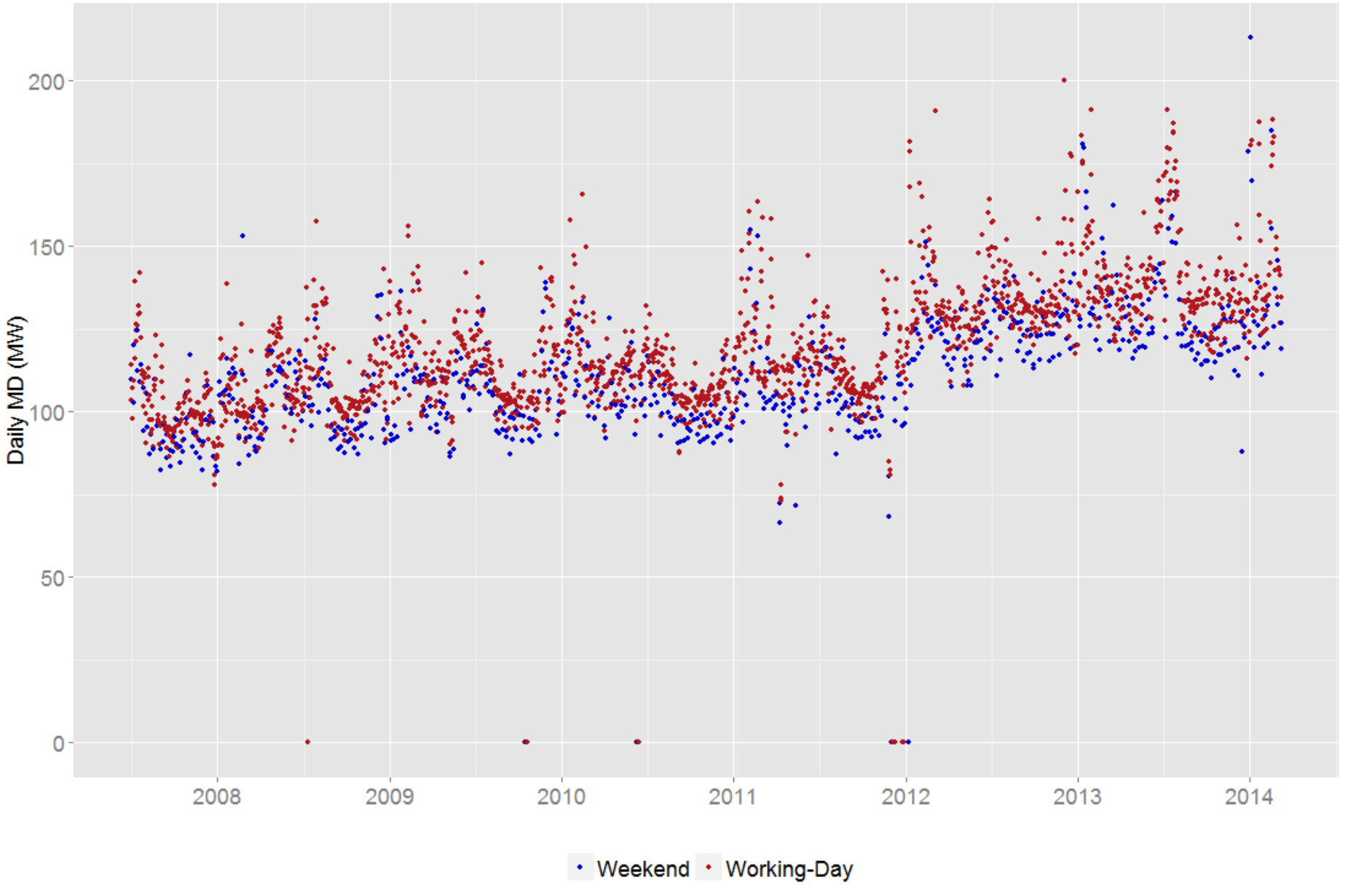


Hays Inlet Bulk Supply Point

Downward trend in maximum demand is not universal



Discussion Points:

- What data limitations exist – is it practical to estimate LRMC at a substation or transformer level?
- Do other DNSPs (ie, other than Energex) see similar variation in maximum demand across their network?
- What other practical challenges exist to estimating LRMC?
- How might LRMC estimates better inform DNSPs pricing strategies?

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