



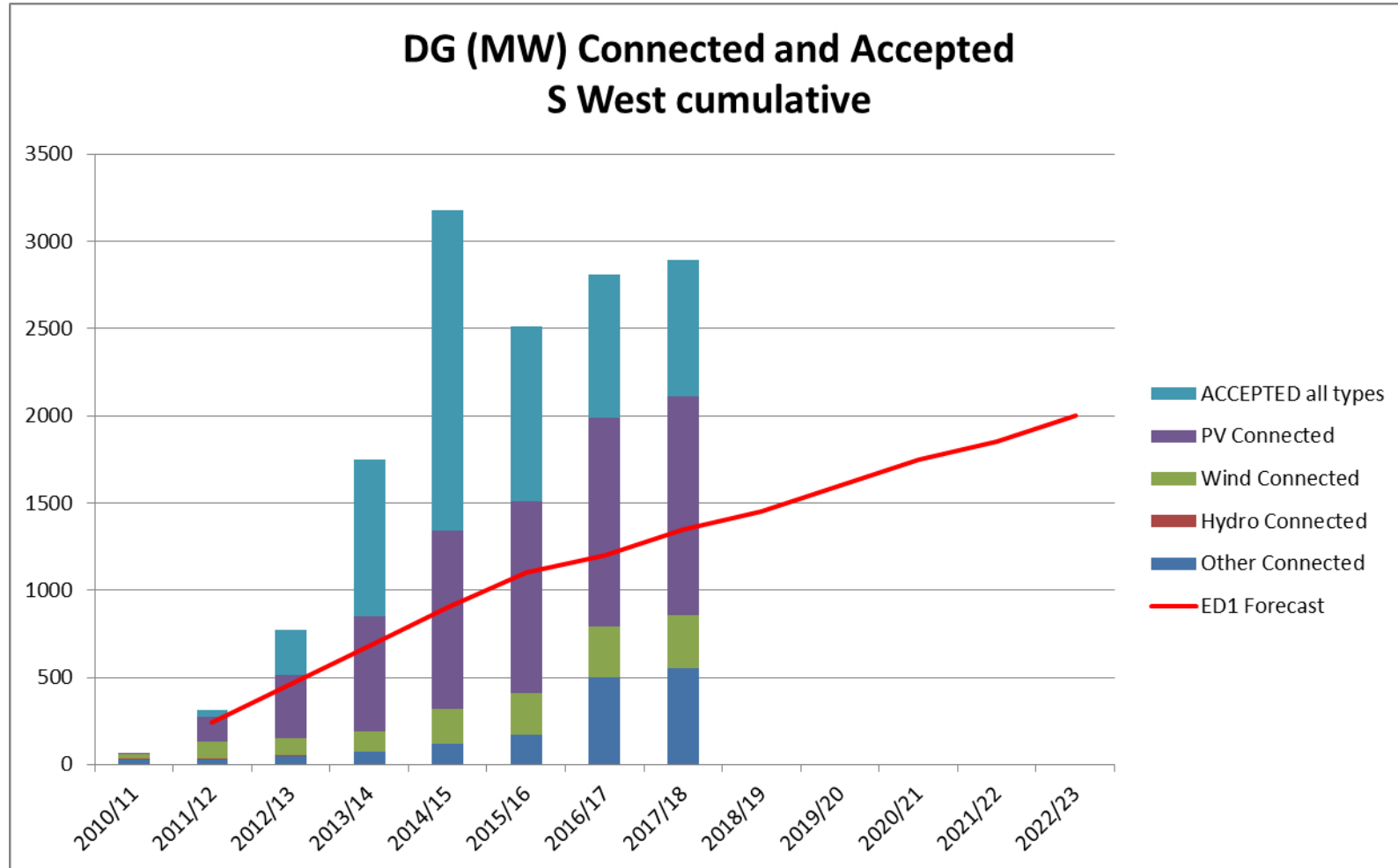
Serving the Midlands, South West and Wales

Are there lessons from dealing with the growth in PV that help with addressing the growth in EVs?

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What happened with growth of PV?



How did we respond?

- Initially we offered ever increasing connection charges and connection times
- These rapidly became unacceptable to customers
- Developed alternative connections
 - Soft intertrip
 - Timed
 - ANM
 - Export limiting
- Revised queue management and ‘acceptable’ change processes
- Published more information about constraints
- Developed scenario planning to look at future options
- Regional Development Program in S West in conjunction with NGET to look at the whole system issues of significant further growth
- Developed our DSO strategy to develop and make use of flexibility
- 3 ▪ Focused innovation activity on elements of DSO

What's similar in the growth of PV to the growth in EVs?

- Forecasting growth difficult and any forecast is likely to be wrong
- Growth partly sustained by subsidies
- Rapid change in technology
- Reduction in cost as technology develops and volumes increase
- Existing network not designed with an assumption that this type of load would develop
- Deployment can be significantly quicker than the time to expand the network

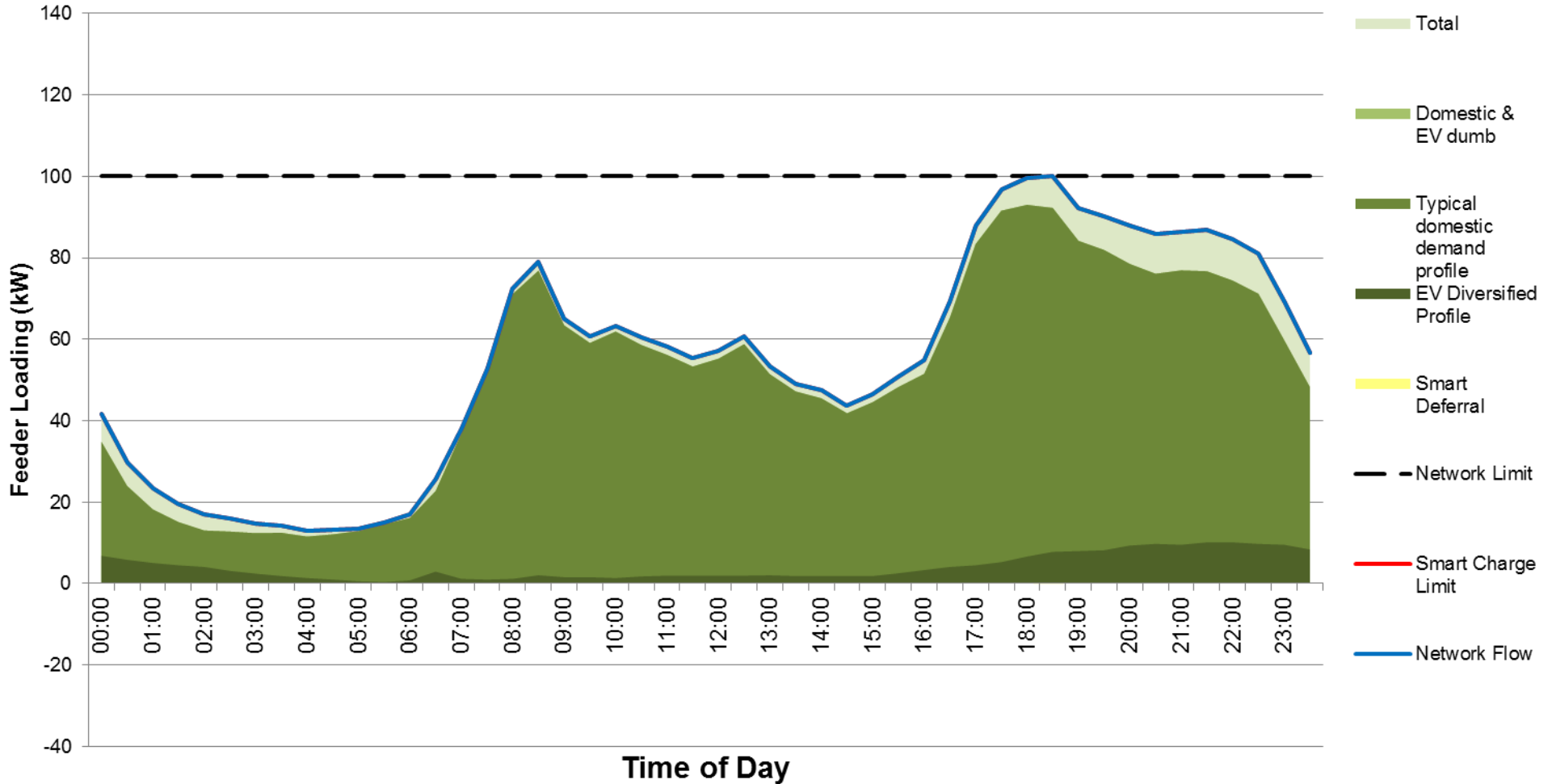
What's different to the growth of PV to the growth in EVs?

- PV growth was largely driven by commercial returns available
- Transport is an essential service and we have a 2040 end date for the internal combustion engine (emission level issues could result in an earlier date – particularly in cities)
- PV has a predictable output
- EV charging behaviour currently uncertain – driver behind our Electric Nation project
- Significant quantity of the PV is in multi MW sites
- EV charging may be highly distributed and may moved location during the day or season

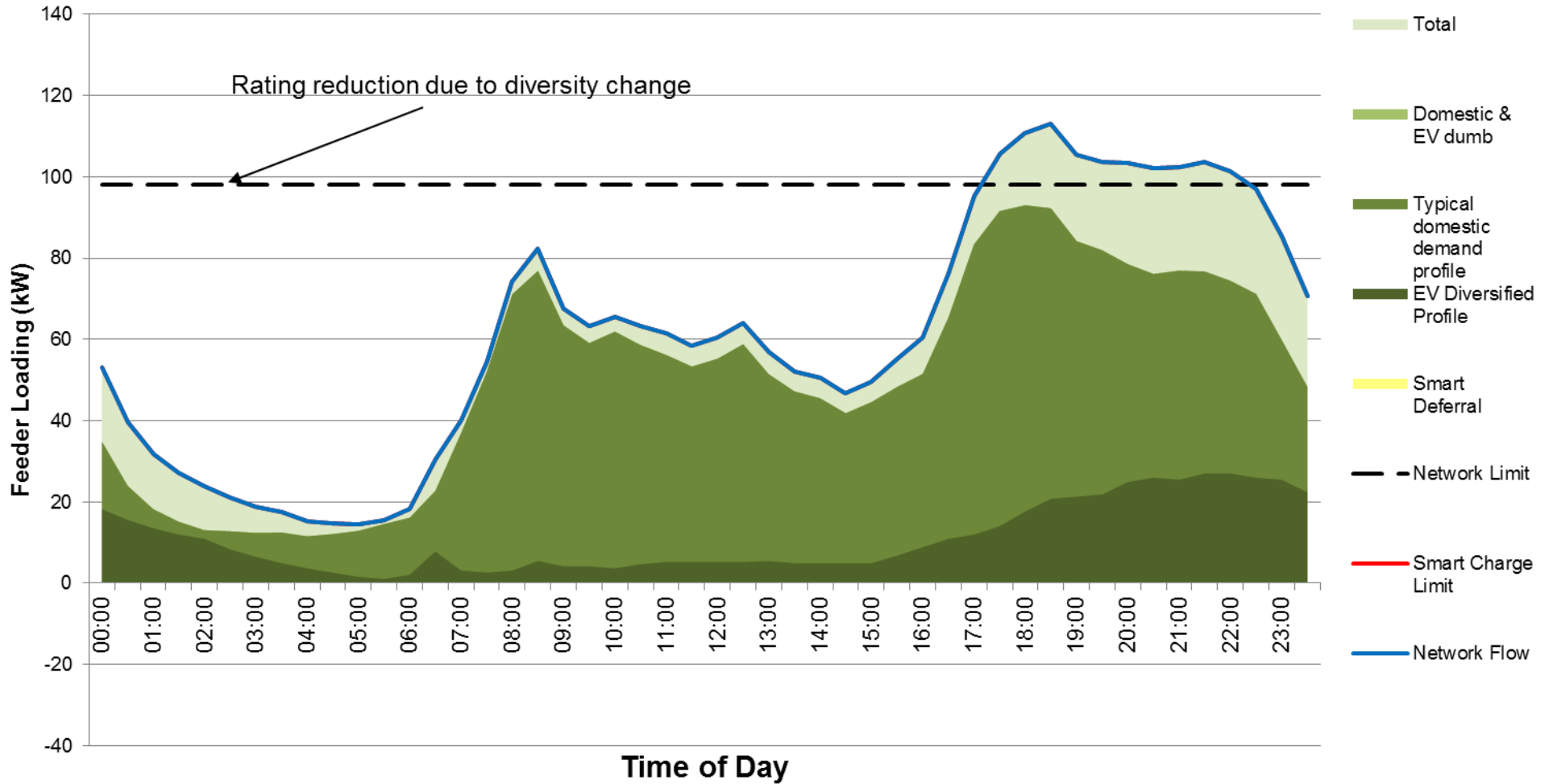
Transferrable lessons from the growth in PV

- Our forecasts will be wrong – we need to plan for a range of scenarios
- We need the solutions ahead of the problem if we are not to be seen as the barrier to growth
- Additional technology on the distribution network has an important role to play
- But – it's not the whole solution ...

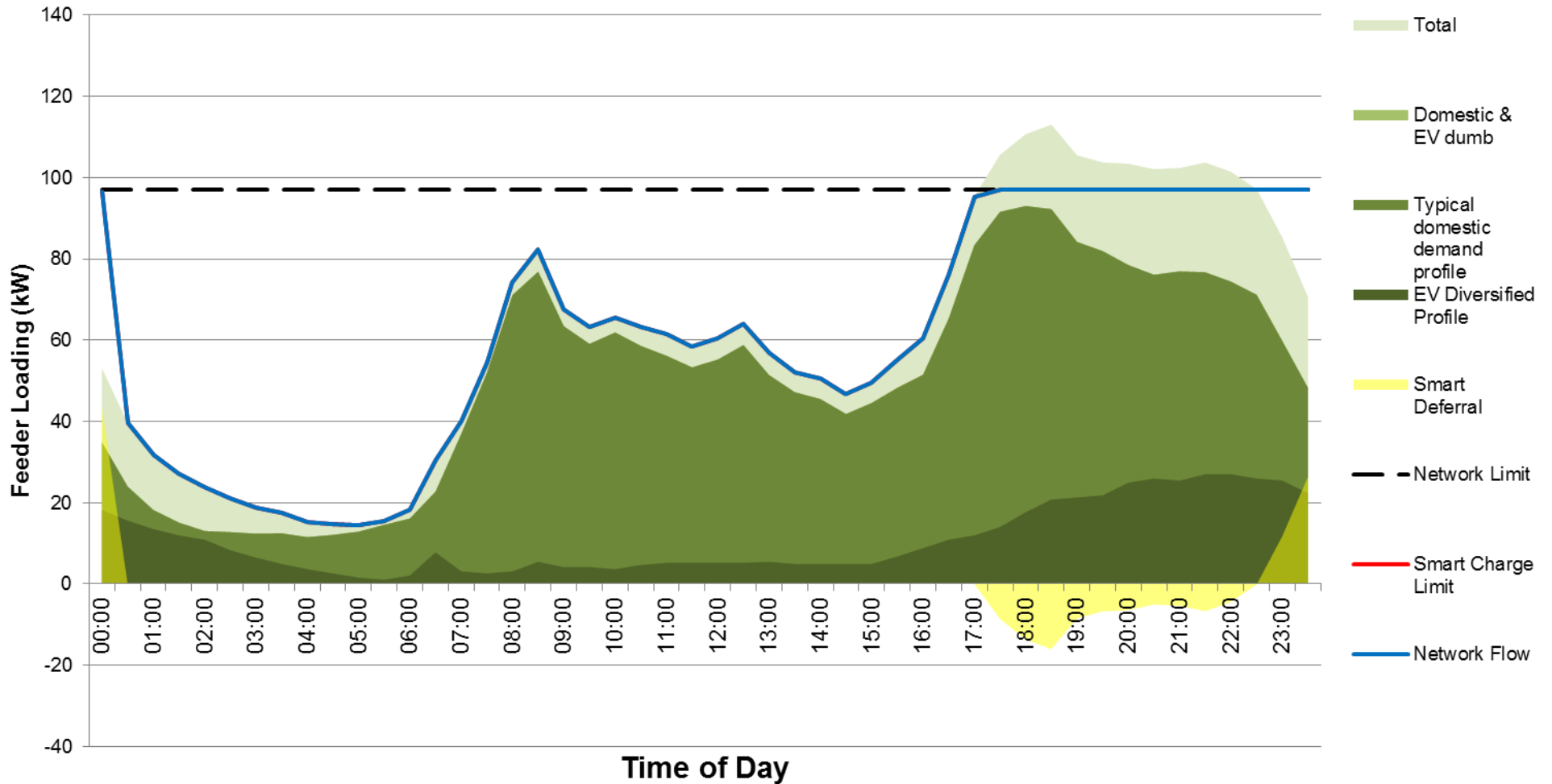
15% EV Uptake will saturate some networks



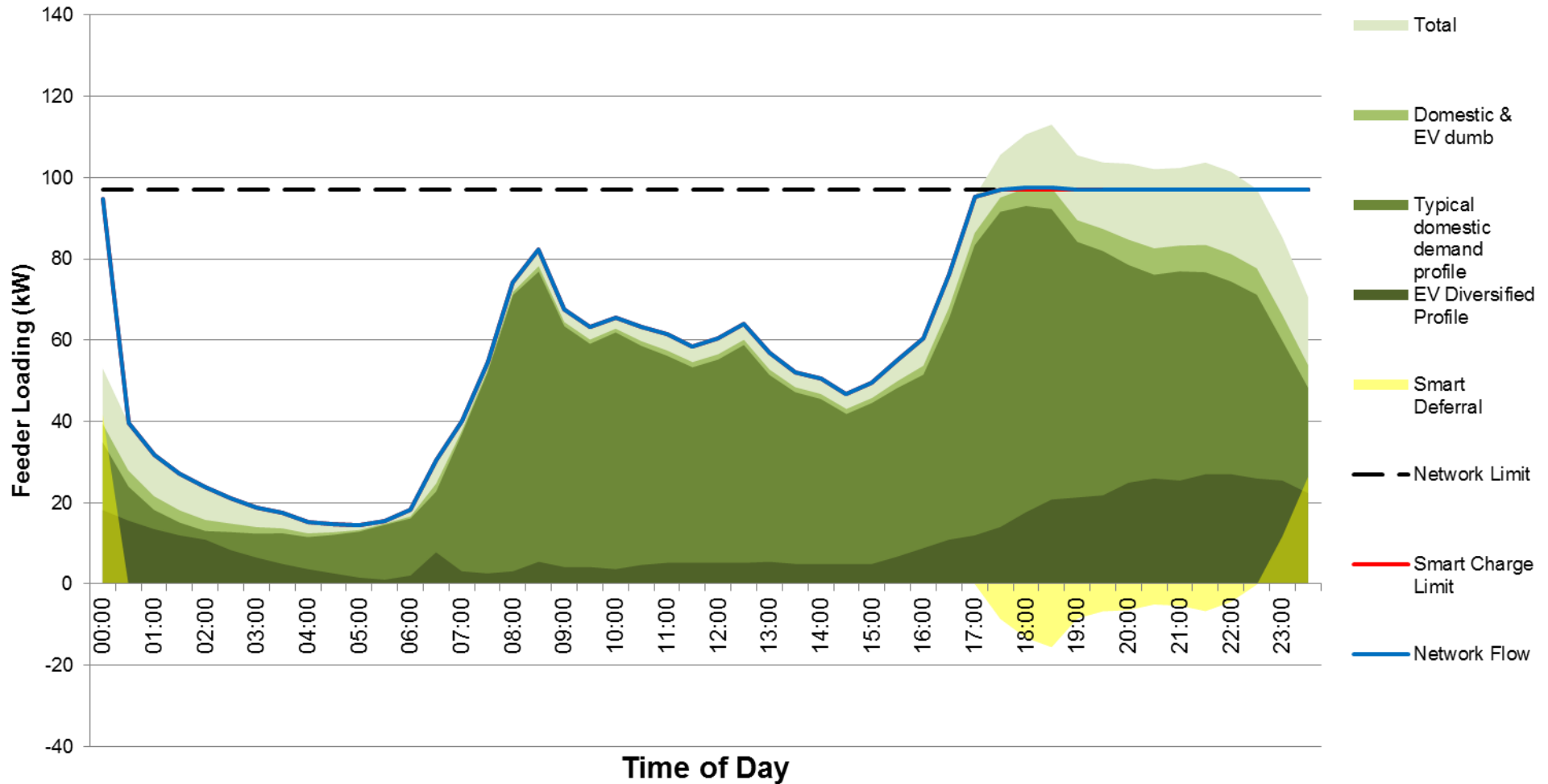
40% EV Uptake will over stress networks



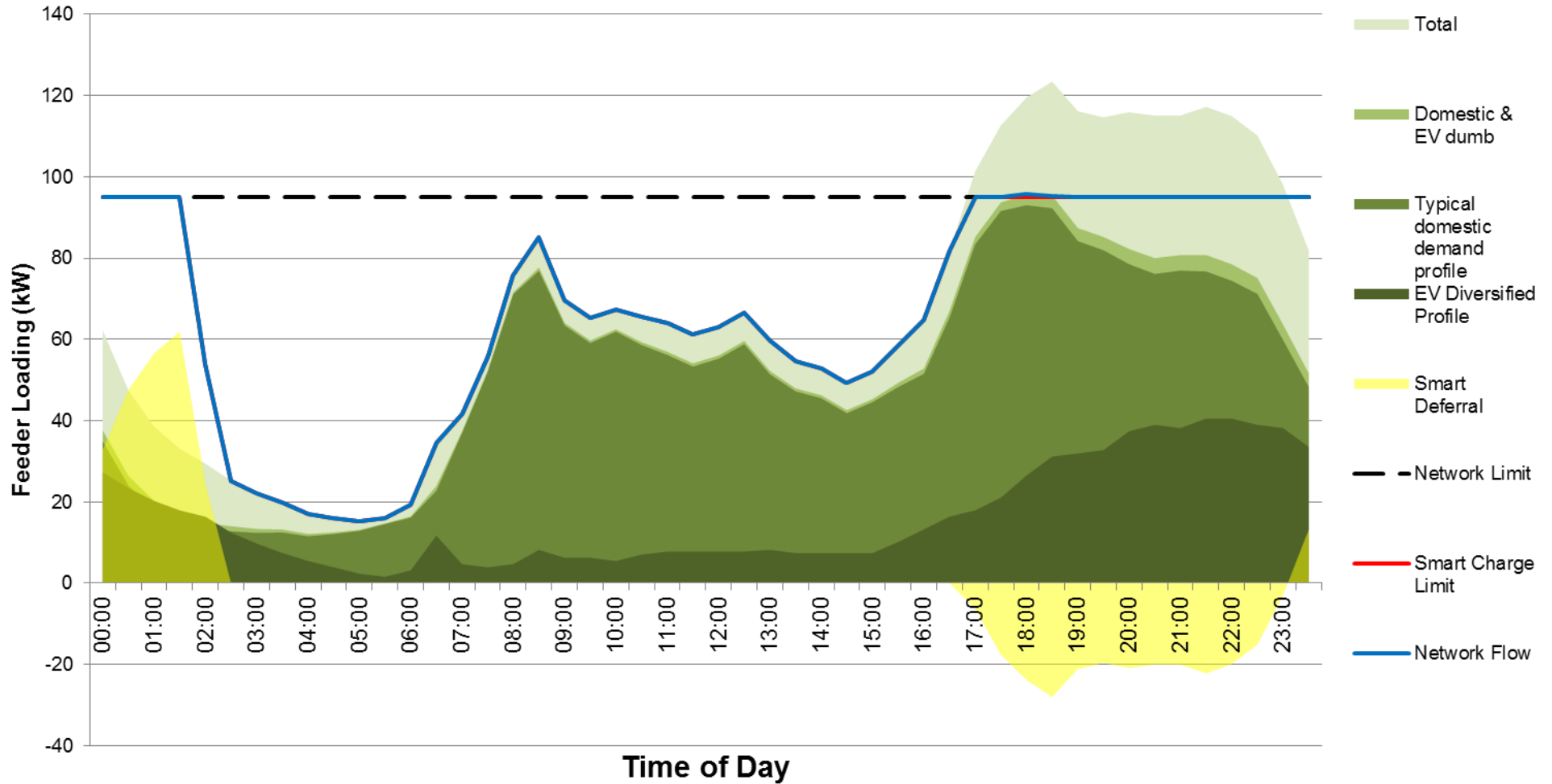
40% EV Uptake could be managed by smart charging



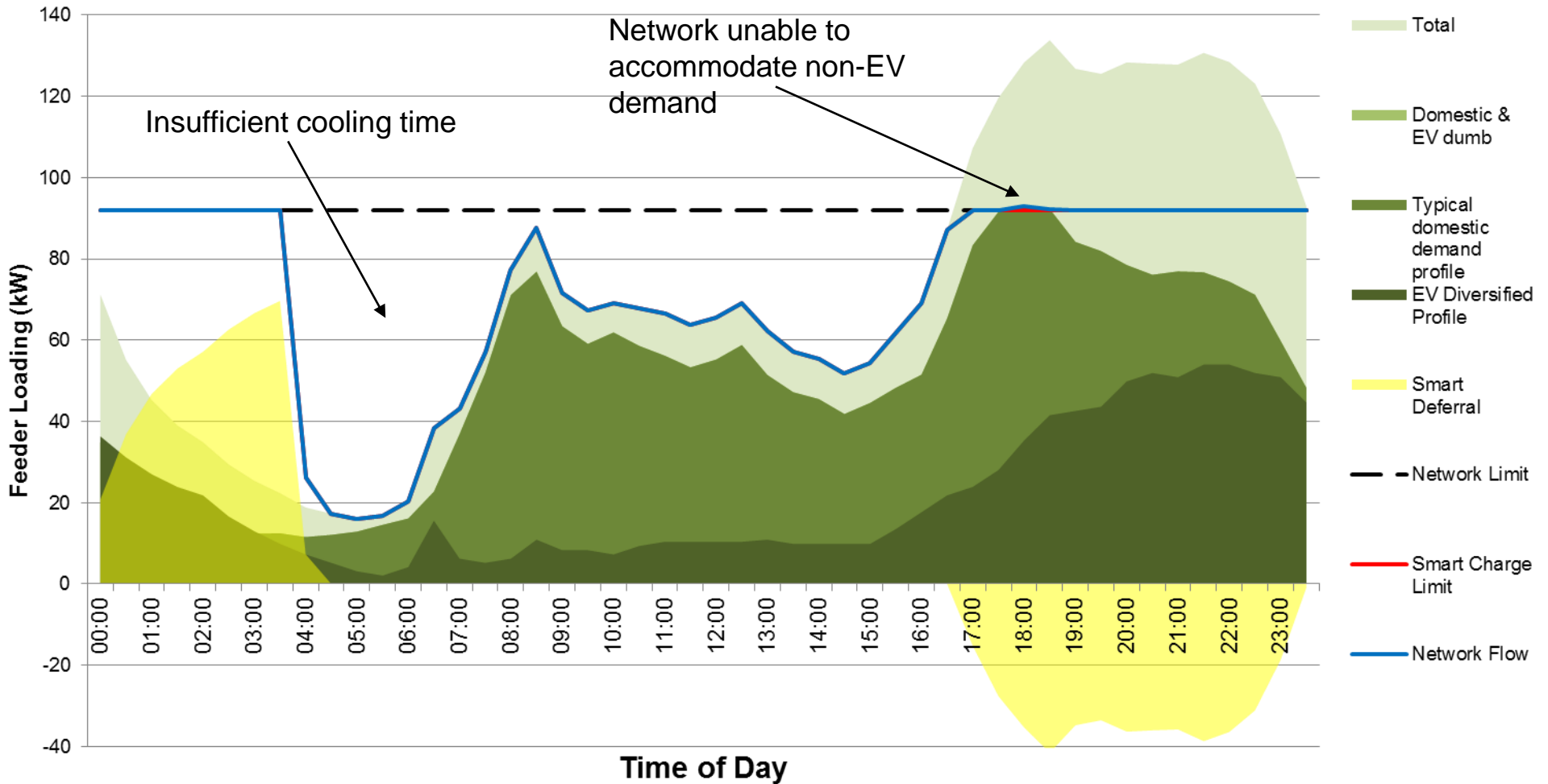
But if 25% of EV customers do not accept smart charging, networks will still be overloaded



60% EV Uptake will require over 90% of customers to accept smart charging



As EV charging and EV batteries get bigger, we will experience more congestion



12

Even 40% EV uptake with smart charging on a high EV demand day (Thursday before bank holiday) would over stress the network

Low Regret Investment in LV networks

- By supplementing Smart Charging with low regret investment on LV networks, benefits would directly accrue to customers:
 - Reduction in standing losses for the network
 - Maintaining existing load utilisation of LV networks to reduce accelerated aging of assets
 - Continue providing capacity ahead of the acceptability of energy curtailment for customers being assessed
 - Ensure capacity is available for competing low carbon technologies – e.g. Heat Pumps & Energy Storage
 - Maintenance of operational headroom on the LV to ensure security of supply is continued at same levels
 - Mitigation of extreme demand days – high impact, low probability