Cost reflective distribution charges

Presentation to Chaire European Electricity Markets conference

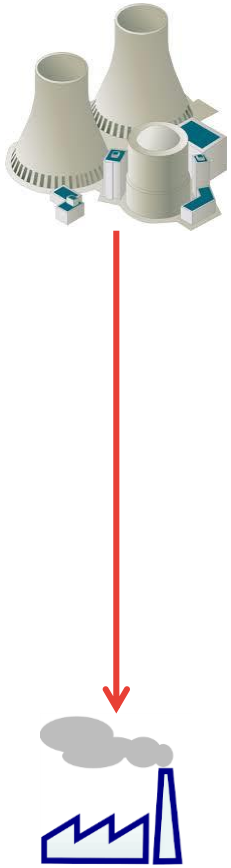
9 July 2015

Overview

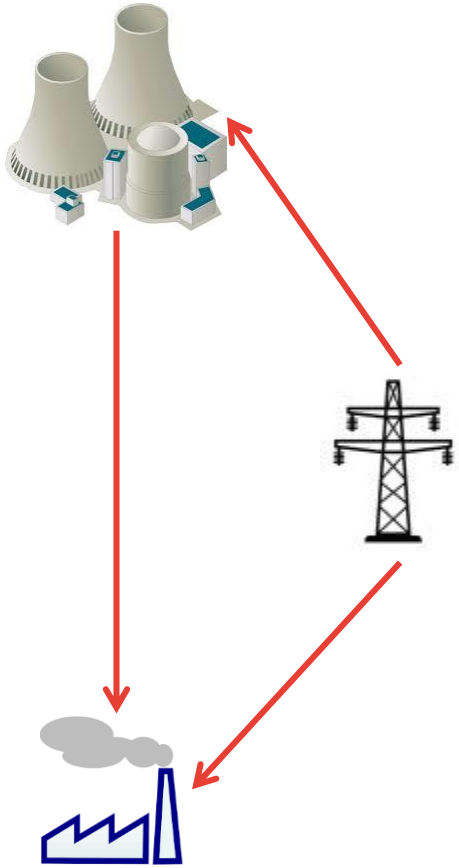
- Why cost reflective distribution charges?

- Practicalities – reflecting which costs and to who?
  - time of use
  - location
  - responsive load
  - generation

The rationale for cost-reflective charges is that network users internalise them and make efficient decisions



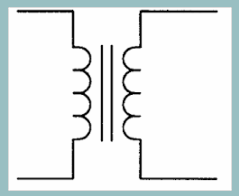
- Economic theory tells us that marginal pricing is a good thing because it means individual decisions to consume or produce more or less are based on the costs the decisions create
- Customers and producers both see the marginal value of electricity
- This influences their decisions over
  - when and how much to consume and produce with existing plant
  - whether to invest
- If all users see flat rate for network, the differential impact of individual uses on network costs are not taken into account
- Cost reflective network charges therefore result in more efficient decisions



The cost which users impose varies according to different factors

- Adding demand to the network at times of system peak will tend to result in network reinforcement being significantly brought forward
- In contrast, using the network when there is lots of spare capacity will have a limited effect

- Adding demand near existing or growing demand will tend to exacerbate existing network flows, and again bring investment forward
- Adding generation near existing demand may reduce network flows and delay the need for investment

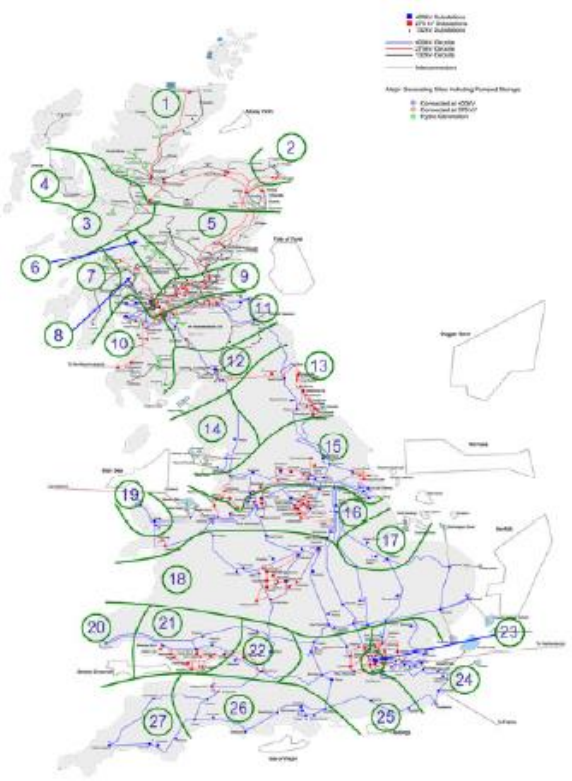


- Adding demand at lower voltage levels will tend to result in the need to reinforce higher voltages (if there is not spare capacity on those network components)

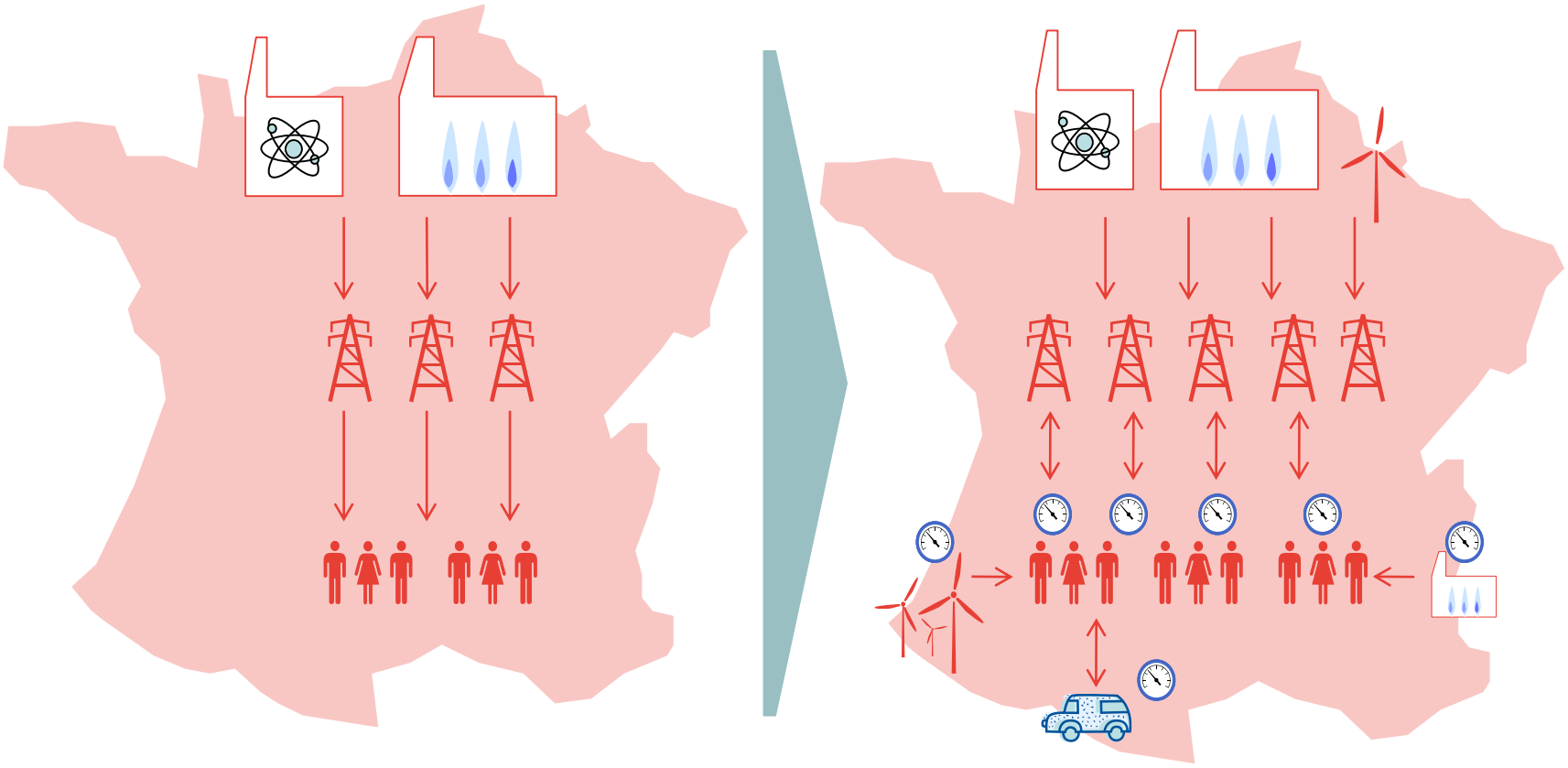
At the transmission level, cost reflective signals in relation to location feature in a number of systems

Nordic market – split into price zones

GB – locational grid fees

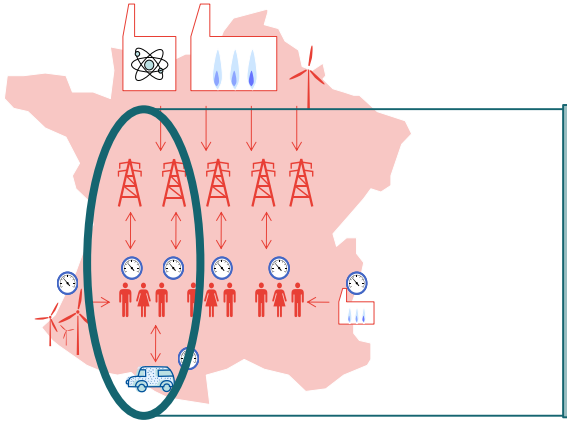


Looking forward, in theory cost reflective charges at the distribution level should become more important…



… DNOs will see high investment need, more injections, more flexibility of load, and more complex flows

In relation to DSR, things can get complex quickly – the key is to decide what is best done through incentives



- Price signals
  - time / location / situation varying distribution charges
  - bilateral contracts
- Automation / direct control – requires direct contract

There are a number of complications to sending signals through D charges

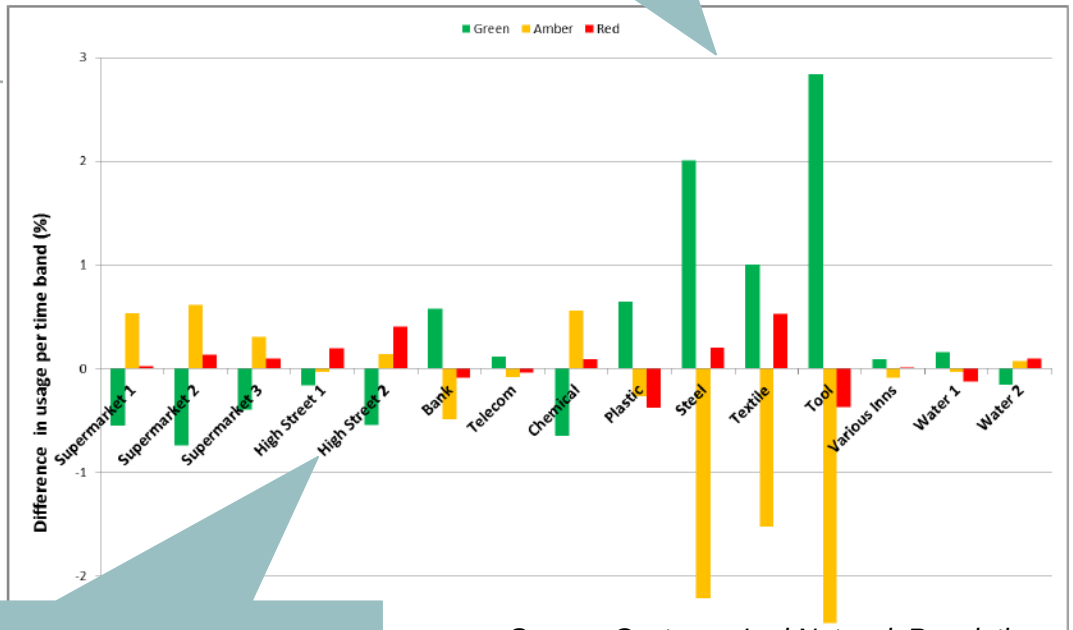
- Retailers pay distribution charges – will they be able / willing to pass the signals through?
- It may be difficult to get customers to engage through distribution charge price signals – not very visible to most customers
- Will more complicated distribution charges have negative side effects – e.g. increasing complexity creating a barrier to retail entry?
- Are distribution charges more visible to generators?

Pilots indicate time of use based network charges may have little impact, even for larger I&Cs…

Time band	Mon-Fri	Sat-Sun	p/kWh (HV, half hourly metered)
Red	1600-1930		5.855
Amber	0800-1600 1930-2200		0.519
Green	0000-0800 2200-2400	0000-2400	0.056

- Tariffs introduced April 2010
- Trial data March 2009 to April 2011
- Broadly consistent results across distribution network area

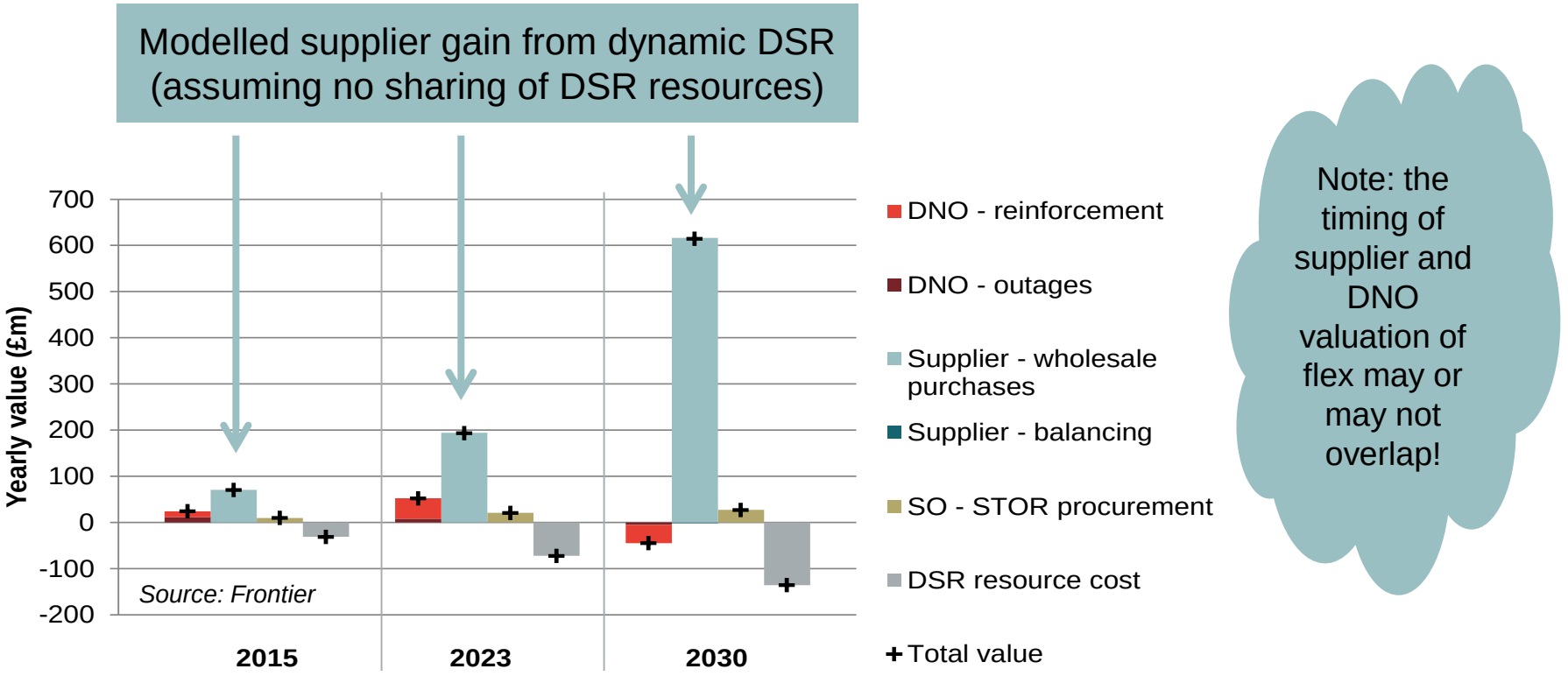
Some positive response to green band – but far from uniform, and <3% by volume (could simply be year on year variation)



Source: Customer Led Network Revolution, Tariff Reform analysis

Some customers reduced consumption

… and peak-shaving demand side flexibility may just not be valuable enough to the DSO



- Further modelling in GB indicates that the value of demand side flexibility is much greater for retailers than either the TSO or DSOs today
- This asymmetry of value is likely to increase over time
- Mechanisms to allow efficient sharing of flexibility between DNO and retailer important

So location and "direction" of use (injection / withdrawal) may be higher priority areas for action

Generator dominated area — *"a primary substation where thermal reinforcement is more likely to be caused by generation than demand, within a ten year time period"*

DNOs costed — A primary substation where LV and HV generation capacity steadily grows to the extent that, at times, the reverse flows exceed the rating of the substation

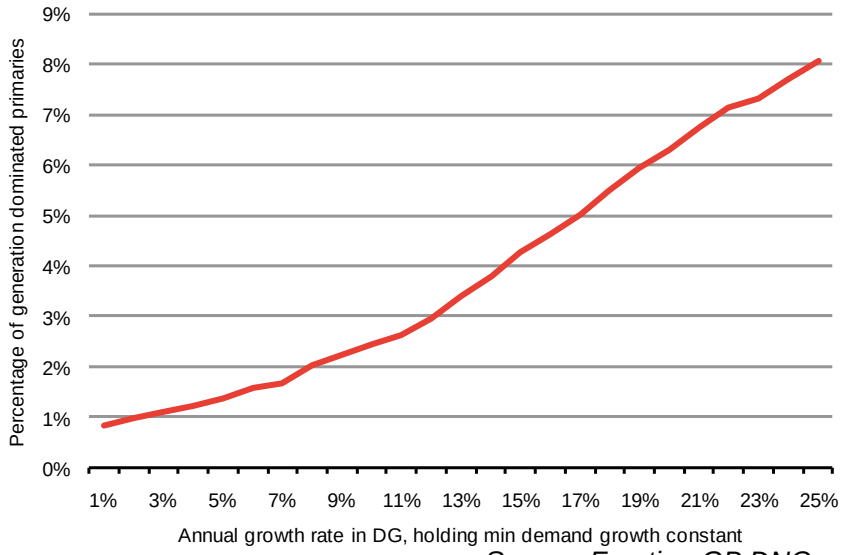
	Transformers	Switchgear	Circuits (km)	Circuit terminations
Average asset reinforcement requirement	2	6	7	1
Average asset reinforcement unit cost (£)	£523,250	£210,520	£339,280	£7,500
Implied total reinforcement costs	£1,046,500	£1,263,120	£2,374,960	£7,500

Source: Frontier, GB DNOs

Implies total 'typical' reinforcement cost of **£4.7m**

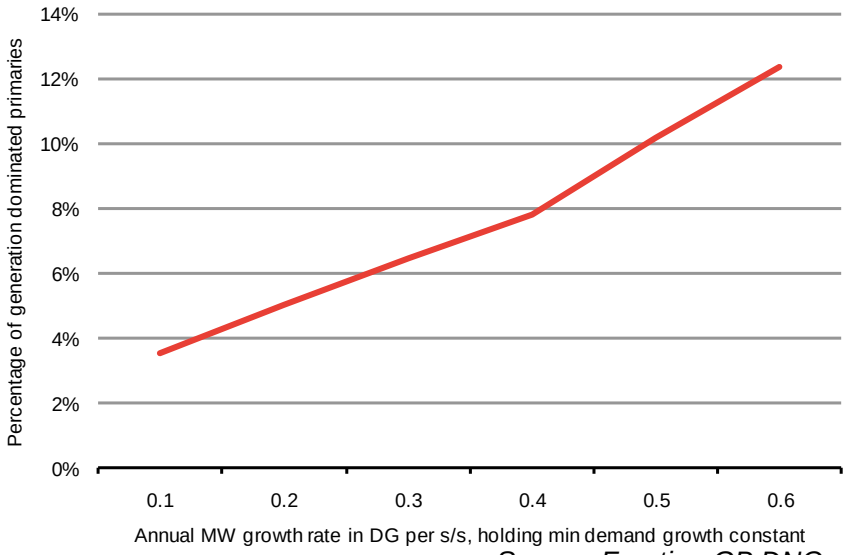
Significant growth in “generation dominated areas” is foreseen (certainly in GB)

“Hot spot” growth scenario



Source: Frontier, GB DNOs

“Even” growth scenario



Source: Frontier, GB DNOs

We looked at the business plans submitted by DNOs to Ofgem, and from these created a central case for the number of GDAs which might be seen in the future

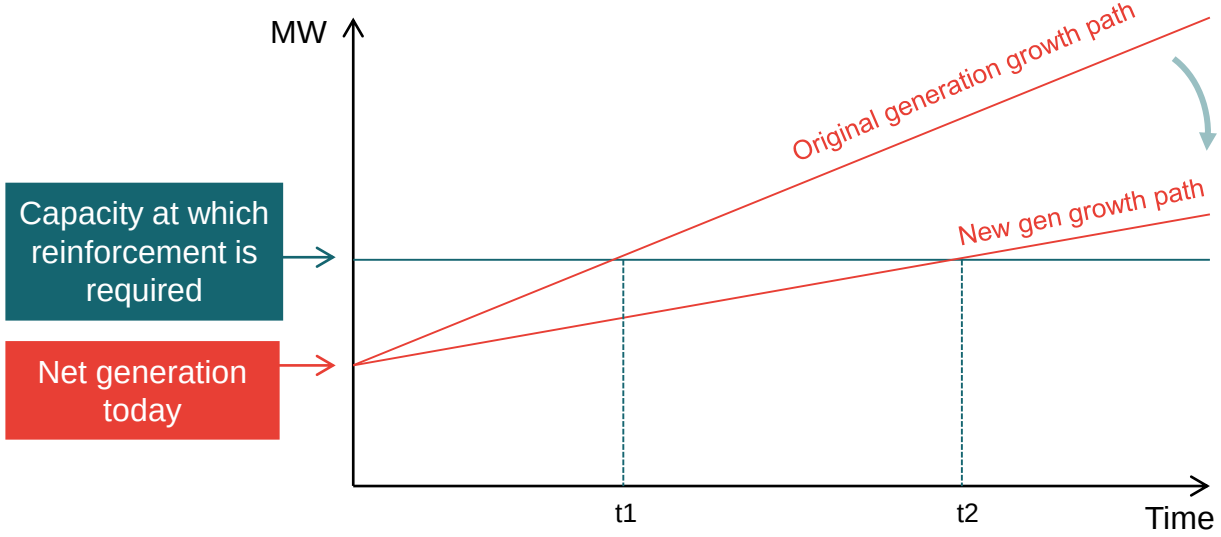
- Hot spot growth: 157 (3.4%)
- Even growth: 146 (3.2%)

We estimated the cost of implementing various distribution charging regimes in GB

	Complex	Intermediate	Simple
Voltage	HV & LV	HV and LV	HV only
Granularity	“Postcode” level	Groups of primary substations	Groups of primary substations
Consider upstream assets	Yes	No	No
DNO costs (NPV over ten years)	£20.6m	£13.1m	£4.1m
Supplier costs (NPV over ten years)	£15.1m	£10.2m	£2.5m
DNO and supplier costs (NPV over ten years)	**£35.7m**	**£23.3m**	**£6.6m**

Source: Frontier, GB DNOs, GB retailer

A simple locational scheme would require very little user reaction to show a positive cost benefit ratio



‘Complex’ option	‘Intermediate’ option	‘Simple’ option
68% ↓	**12%** ↓	**3%** ↓
i.e. reduction in FBPQ generation growth rate forecast from **12%** to **4%**	i.e. reduction in FBPQ generation growth rate forecast from **12%** to **11%**	i.e. reduction in FBPQ generation growth rate forecast from **12%** to **11.6%**

Some conclusions

- The distribution network is likely to become more active over the next years
- There is a theoretical logic to sending signals to more active demand / distributed generation using distribution charges – analogy to transmission
- However, there are arguably more practicalities to consider
- In relation to changing time of use of network
  - Complexity in getting the signal to the customer
  - Difficulty in getting customers to engage
  - Value might not be big enough for network: DNO-supplier interaction may be more important, and distribution charges may be one way to achieve this (though there may be others)
- In relation to geographical signals in areas where there is significant generation
  - Complex charging regimes can be administratively complex
  - But simpler schemes can have a big payoff in terms of network reinforcement saving…
  - … particularly important as DNO networks build out to meet new users of power

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