frontier economics

Targeted Charging Review

Stakeholder workshops

April 2018

Contents

Purpose of the study

Ofgem has asked Frontier to support its wider analysis of the TCR options, in particular…

Distributional impacts

Impact on different types of network users under different residual collection options

Wider system impacts

Assess aggregate market wide impacts on system and consumer costs.

This pack contains an overview of our initial views with respect to certain aspects of this project. Some of the content will change following further consultation with Ofgem and feedback from stakeholders.

At a high-level there are 3 steps to the analysis

1 **Static impacts**

- Agree a range of potential charging options and assess relative to the baseline how they affect network bills of different types of users, holding their physical behaviour constant

2 **Dynamic 'behavioural' impacts**

- Given the potential impact on network bills for different types of users, we will consider the potential for behaviour to be affected in relation to how/when customers use the network, choose to self generate, and adopt new technologies, e.g., EV/Heat pumps

3 **System wide impacts**

- Assess aggregate market wide impacts on system and consumer costs as a result of behaviour change, e.g., increases in demand, changes in balancing costs and investment in networks

This section of the presentation provides an overview of the expected scope of work, though the detail will need to be agreed with Ofgem as the project develops

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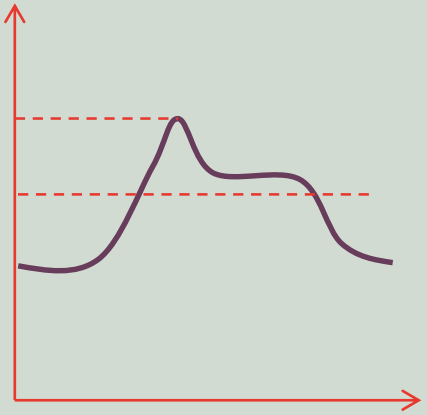
In the first phase of the project we are aiming to understand the direct (static) impact on bills (holding physical behaviour constant)

We will consider the impacts over a 15 year horizon

Definition of baseline charging arrangements

Definition of alternative structure of charges

Definition of user groups and user profiles



Direct impact on bills by user group

There are two important steps in this analysis which are the focus of today's sessions

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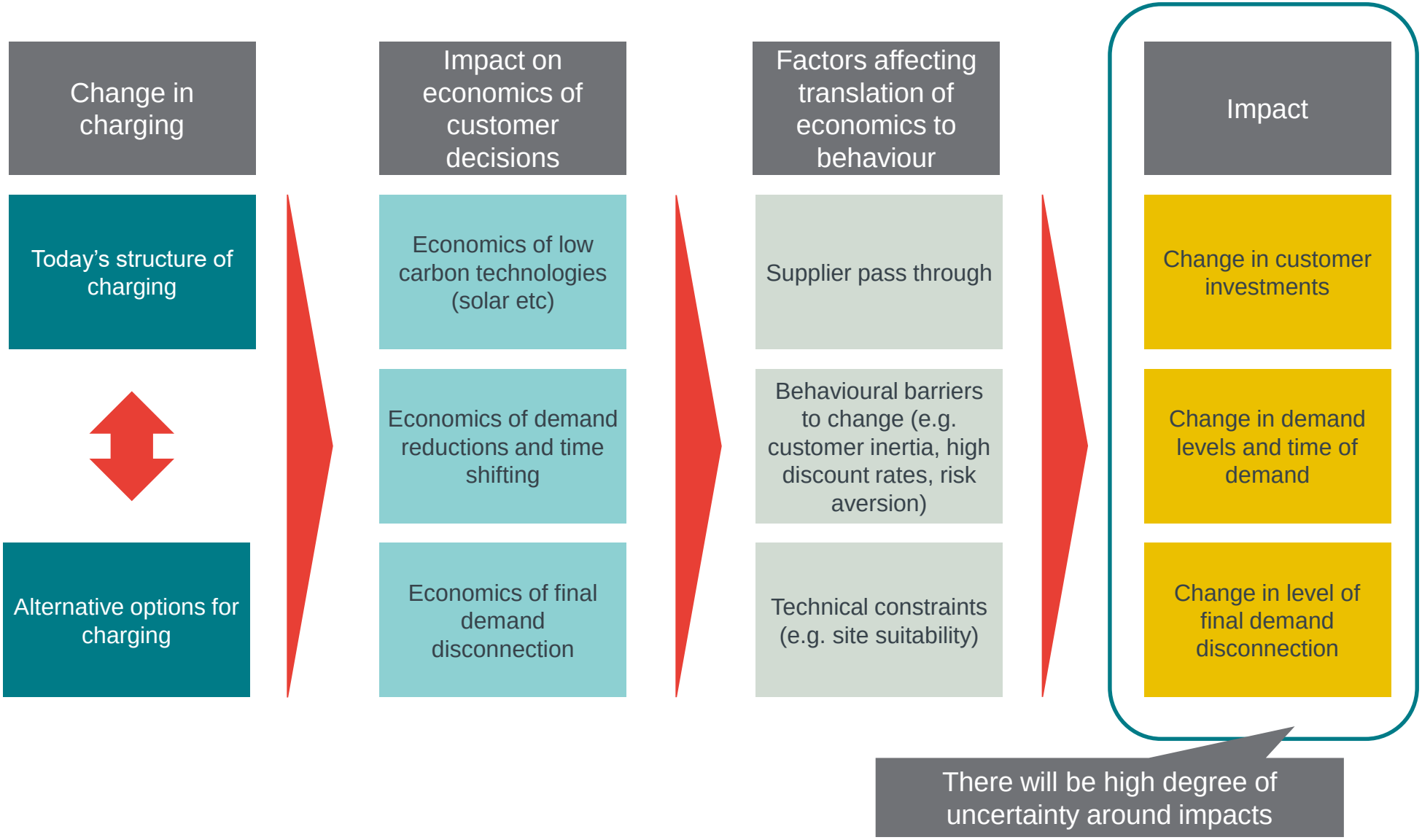
In step 2 we will review the evidence for the broad magnitude of potential impacts on customer behaviour for different user groups



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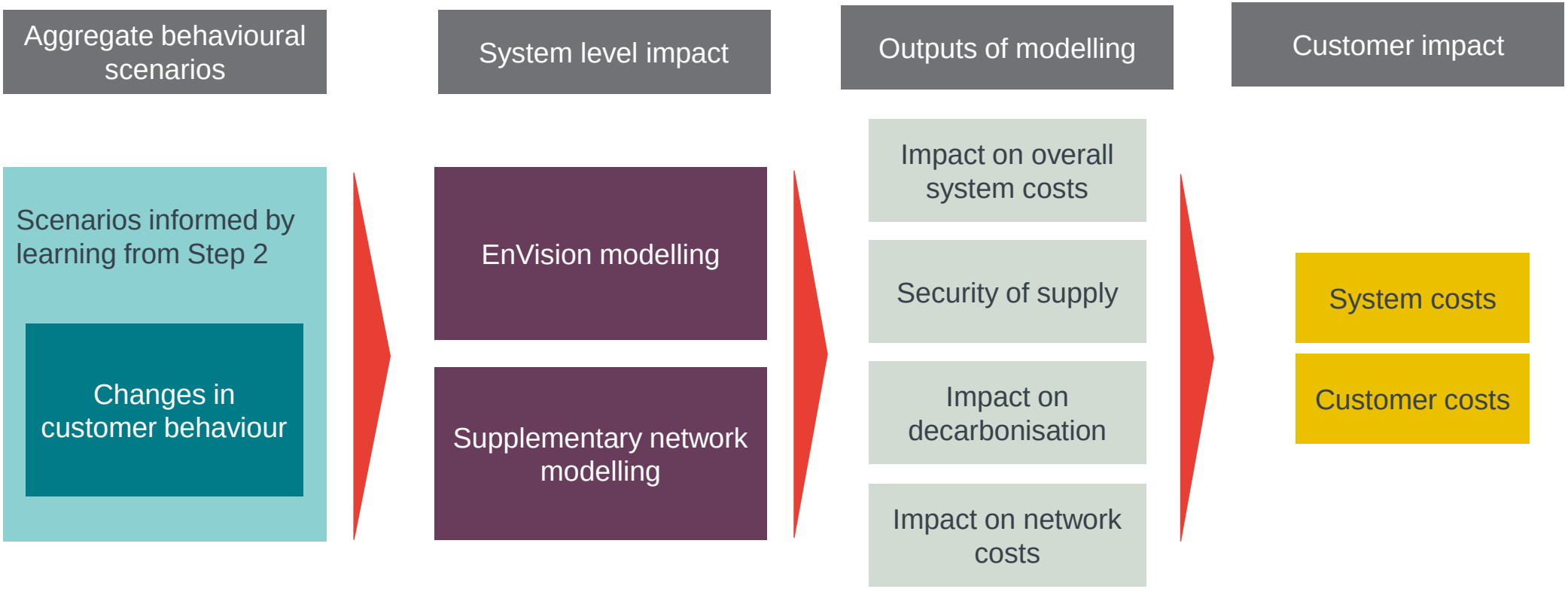
Finally, we will consider the wider system impacts



In this part of the session we will focus on the definition of the options

We will consider the impacts over a 15 year horizon

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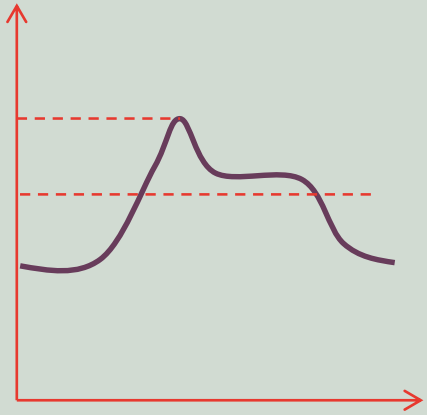


Direct impact on bills by user group

We are further defining the options set out by Ofgem

Options related to customer classification/discounts for certain users

Fixed
(per user fixed charges)

Gross volumetric consumption
(based on all user's consumption incl. from onsite generation)

This was only considered viable for business consumers, but an appropriate scale of business will need to be defined

Options related to whether charges should relate to usage of capacity

Ex ante capacity
(charge related to user's agreed or connected capacity)

Ex post capacity
(based on measure of individual peak system usage)

Options related different measures of historic peak usage e.g. number of peaks

Our approach to developing the options

Step 1

Define a set of 'vanilla' options

- Fixed
- Gross volumetric consumption
- Ex ante capacity
- Ex post capacity

The choice of 'Vanilla' options are subjective in nature and are only intended to aid understanding of potential impacts and inform the development of further options. They are not our view of the best design of the particular option.

Focus of today

Step 2

- Static bill impact analysis
- Qualitative assessment

Step 3

- Identify additional options for assessment, including hybrid options

We have considered different options as to what is ‘vanilla’

Fixed	Gross volumetric consumption	Ex ante capacity	Ex post capacity
Segment customer charges on the basis of customer type (SME, domestic, industrial)	Apply to broader base of non-domestic customers (i.e. industrial final demands and larger commercial sites)	Capacity charge based on individual customer connection capacity	Measure of single individual user peak demand
Segment customer charges on the basis voltage levels.	Only applied to T and EHV connected final demands (i.e. large industrial customers)	Finer granularity in ‘connection capacity’ i.e. bandings based on peak usage fixed ex ante	Measure of multiple individual user peak demand

At this stage the choice of vanilla does not imply anything about what is best or Ofgem’s final decision

To derive charges for each option we need to know the revenue to be recovered and the charging base

We will develop illustrative network charges for each option out to 2035

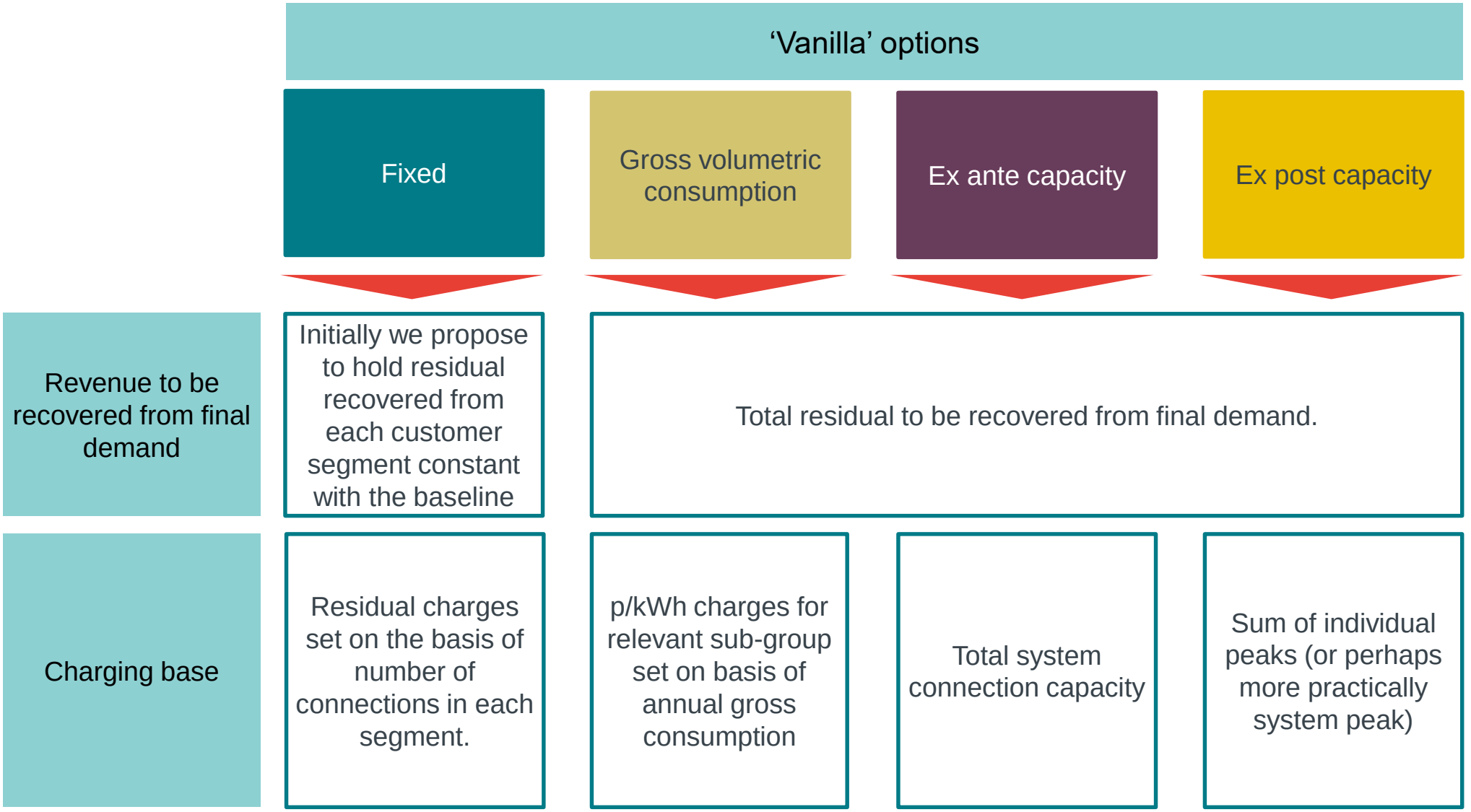
Revenue to be recovered

- Depending on the option this may be total allowed revenue across all final demand, or sub-divided for specific market segments.

Charging base

- The units (e.g. capacity, energy, MPANs) will depend on the particular option
- May be defined across whole market or specific segments

We need to convert projection of TO/DNO allowed revenue in each year to a residual charge for each user group for each of the 'vanilla' options



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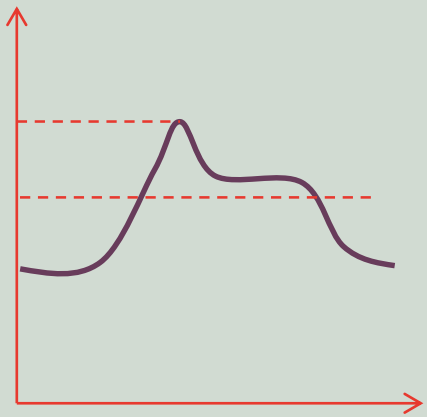

Direct impact on bills by user group

What is the purpose of defining a set of user groups?

We are looking to identify up to 15 different groups spread across domestic, SME and industrial final demand and generation

User groups should help us understand how the bills of different customer groups could be affected by the options. They are intended to…

- …be **representative of particular consumer archetypes**
- …represent a **reasonable spread of different levels and shapes** of consumption
- …but they are **not meant to be representative of all consumers**

They will provide an understanding of **how the options affect consumers depending on their level of and shape of consumption.** This should provide an ability:

- To understand the extent to which the evidence suggests particular groups (e.g. vulnerable groups) are unduly affected.
- For consumers to infer individual impact by assessing how different levels and shape of consumption are affected by the options.

At a high level we propose to define our user groups using a range of different sources

Final demand

- **Domestic** - typically located at LV level
- Profiles derived from TDCV data and Customer-Led Network Revolution (CLNR) Data also reflecting different types of appliances/onsite generation.

- **SME** - typically located at LV/HV level
- Profiles based on CLNR data

- **Industrial -** consumers typically located at EHV and TG.
- Archetypes to reflect users with and without ability to reduce peak demand.

Generation

- We will consider impacts at different connection voltage levels

Based on the options the degree to which consumers are affected will depend on:

- Peak consumption
- Annual consumption
- Connection size

…in the following slides we provide an illustration of how we are deriving user groups

CLNR data is one of a number of inputs to our domestic and SME profiles, specifically related to profile shape

The Customer-Led Network Revolution (CLNR) trials were funded under regulator Ofgem's Low Carbon Network (LCN) Fund

The trial data includes…

- More than 13,000 domestic, SME, industrial and commercial and distributed generation customers
- **Almost 9,000 domestic trial participants** from a wide range of socio-demographic backgrounds participated over 2010-2014
- **Almost 1800 SMEs** divided into 28 groups varying by tariff type, size (no. of employees) and sector (e.g., agriculture, fishing)

…and can provide useful inputs to this study

- Important information about the **level and shape of consumption on a HH basis** for:
  - A wide range of domestic households on standard tariffs
  - Domestic households with a range of Low Carbon Technologies such as heat pumps, solar PV, EVs.
  - SMEs of varying sizes and types

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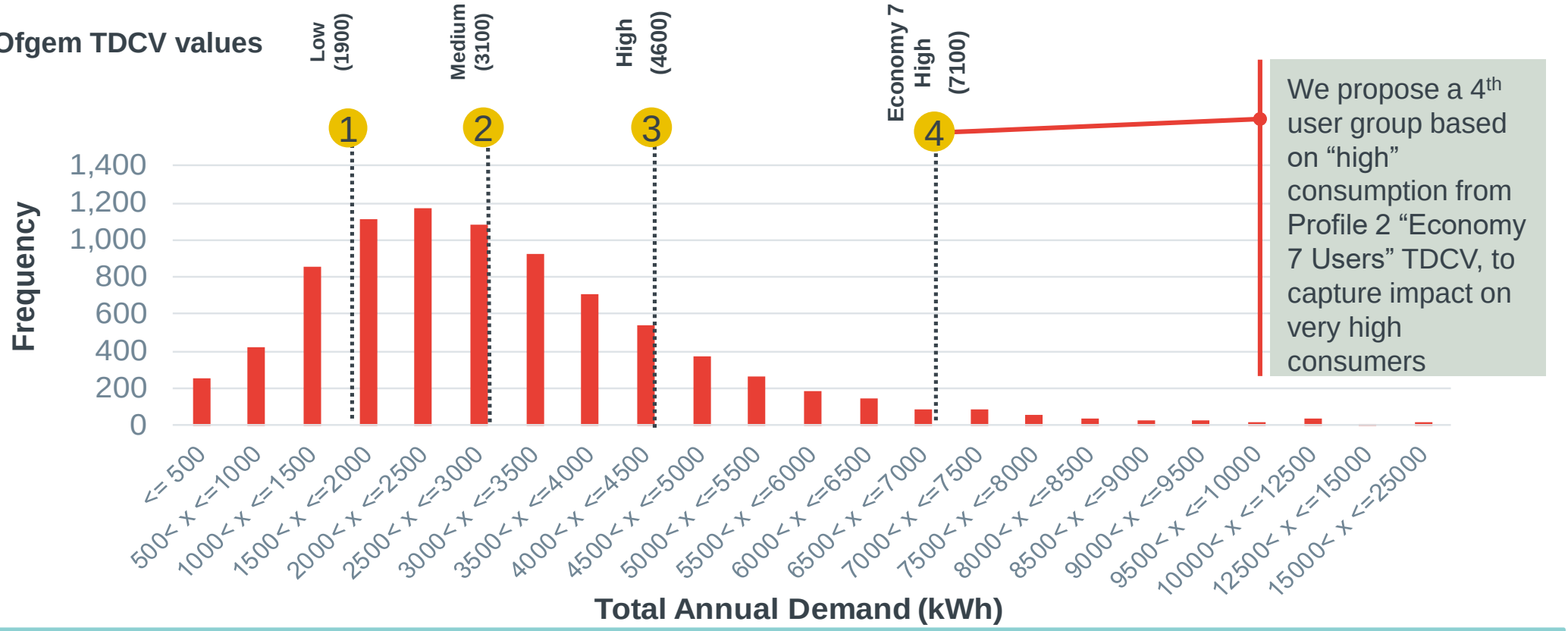
Four basic domestic user groups: “Low”, “Medium”, “High” and “Economy 7 High” guided by Typical Domestic Consumption Values (TDCV)

- 3 of our user groups are based on the low, medium and high levels of annual domestic consumption for Profile 1 “unrestricted Domestic Users” TDCV.
- These levels of consumption are relatively well aligned with observed distribution of annual demand in the CLNR domestic dataset, from which we propose to develop an understanding of the profile shape.

Distribution of annual demand for domestic customers in CLNR data



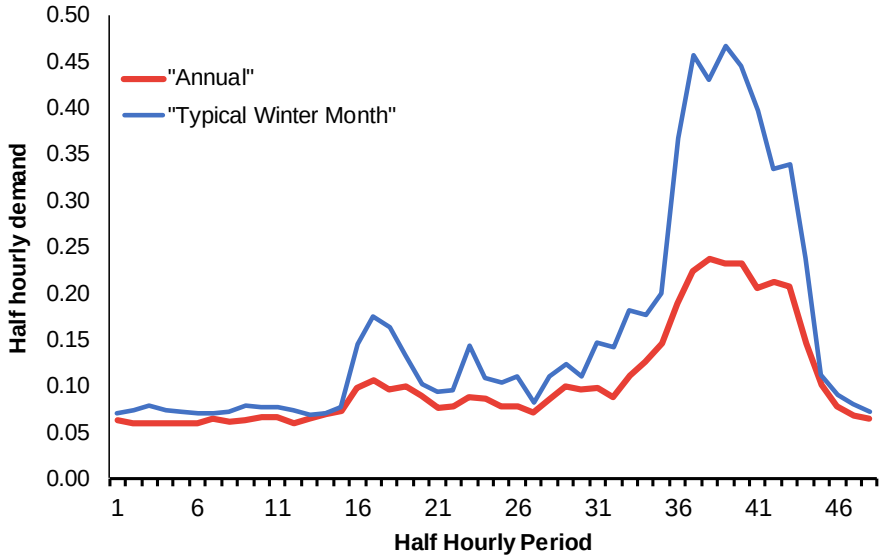
We propose a 4th user group based on “high” consumption from Profile 2 “Economy 7 Users” TDCV, to capture impact on very high consumers

- We will also use CLNR data to produce profiles for domestic households with EVs, solar PV and heat pumps. 5 6 7

CLNR data provide an understanding of the "peakiness" of consumption for each domestic user group

- Generally, we find peak demand increases with annual consumption.
- However, there is a high degree of variability in peak demand at each level of consumption.
- The CLNR data can be used to provide the level of peak demand for different user groups, though we will also test the sensitivity of the results to changes in peak demand.

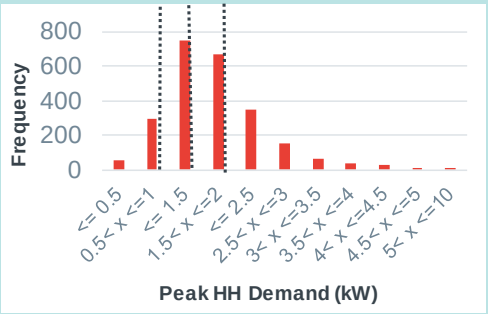
Half hourly demand profile for a sample "Low" user



Distribution of HH peak demand (kW) for all domestic customers within each user group

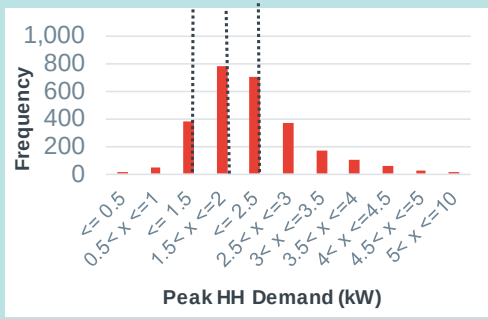
1 Low

Low (25th percentile)	1.20
Medium (50th percentile)	1.58
High (75th percentile)	2.04



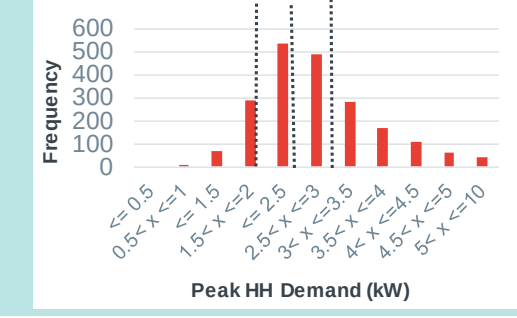
2 Medium

Low (25th percentile)	1.66
Medium (50th percentile)	2.08
High (75th percentile)	2.59



3 High

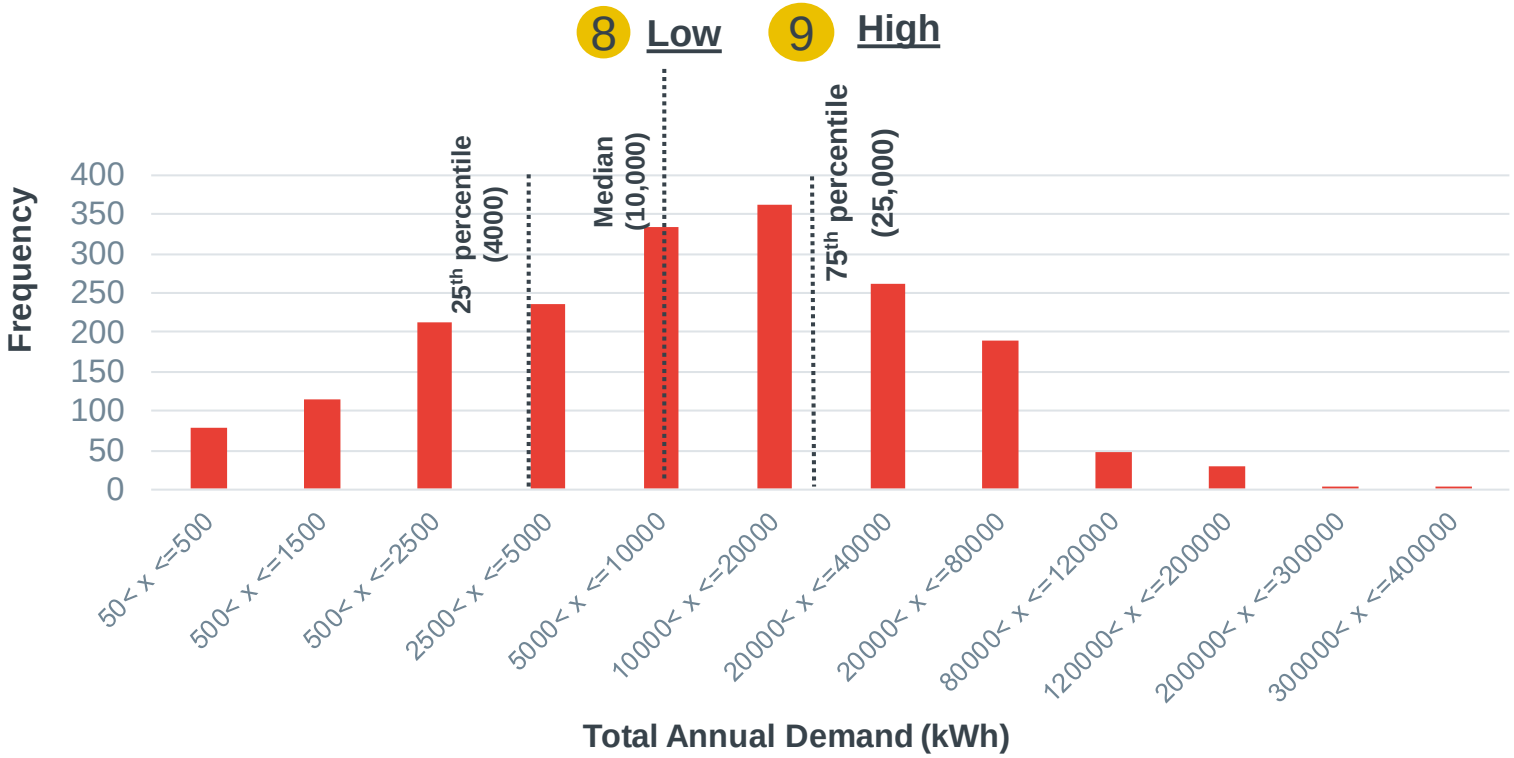
Low (25th percentile)	2.15
Medium (50th percentile)	2.60
High (75th percentile)	3.20



CLNR data provides a distribution of annual consumption from which to pick SME user groups

We can identify different levels of SME consumption with corresponding peaks in the CLNR dataset from which we derive two user groups, “low” and “high”

Distribution of annual demand for SME customers in CLNR dataset



- Within each of these three sub-group of SME customers, the dataset will allow us to make observations regarding, number of employees, sector (agriculture, fishing, public sector, etc.) for the two profiles.

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We have taken an initial view on illustrative industrial user profiles but will explore the value of using more detailed HH data for individual sites

Our proposed approach is based around four industrial user groups reflecting different connection voltage levels and ability to generate onsite and/or manage final demand

EHV connected (Large: consuming 20,000 – 69,999 MWh per annum)	With onsite generation and/or ability to manage final demand	10
	Without onsite generation and/or ability to manage final demand	11
Transmission connected (Extra large: consuming 70,000 - 150,000 MWh per annum)	With onsite generation and/or ability to manage final demand	12
	Without onsite generation and/or ability to manage final demand	13

- We have relied on BEIS categories which identify thresholds for "large" and "extra large" industrial users.
- We have assumed that
  - **"large" users connect to EHV**
  - **"extra large" users connect to transmission**.

- We will consider different approaches to determining the shape – i.e. a flat demand profile or peakier profiles based on examination of HH data for example sites. This could result in changes to our proposed user groups.

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Generation user groups are focused on users affected by Ofgem's minded to position for residuals to be recovered only from final demand

TNUoS Residuals

- It is Ofgem's initial view that final demand faces the residuals, in broad terms we would not expect an impact from the shift of residuals to final demand.

DUoS Residuals

- DUoS residuals are currently only paid by EHV connected plant under EDCM.
- Generators do not pay CDCM residuals.

- We therefore propose to focus the generation user groups on EHV connected plant
- We propose to consider at least two different types of generation profiles.

14 15

In total we have identified 13 final demand user groups and 2 generation user groups

Final demand

A – Domestic

Size and meter type

- Low consumption 1
- Medium consumption 2
- High consumption 3
- High Economy 7 4

Appliances/onsite generation

- - Solar PV/storage 5
- - Electric Vehicles 6
- - Heat pumps 7

B – SME

- Low consumption 8
- High consumption 9

C – Industrial

- EHV-connected with onsite generation/demand management 10
- EHV-connected without onsite generation/demand management 11
- T-Connected with onsite generation/demand management 12
- T-Connected without onsite generation/demand management 13

Generation

D – EHV connected generation paying distribution residual

At least two different types of generation profiles. 14 15

In reality the boundaries between users overlap. As set out earlier, small SMEs profiles will also be captured by our analysis of the larger domestic profiles, and small industrial demand could be captured by the high consumption SME profile.

Next steps in developing static impacts modelling

- Finalise the definition of the user groups with Ofgem (including examine industrial profile data provided by industry)
- Finalise the definition of ‘vanilla’ policy options with Ofgem
- Carry out data collection for estimate of residual network charges under the baseline and the different options
- Build static impacts model to understand direct impact on network bills from options