TNUoS Forecasting Seminar

National Grid House, Warwick
23 November 2017
Welcome

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Revenue Manager
Housekeeping
National Grid TNUoS Team

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Oversees the TNUoS and the C USC Development Teams

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Forecasting, setting and billing TNUoS tariffs

Shiv Dhami
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Jo Zhou
Tom Selby
Jessica Neish
Paul Hitchcock
Elena Gershtanskaya

TNUoS Tariff forecasting and setting
Billing
Accounting
<table>
<thead>
<tr>
<th>Agenda</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Welcome &amp; introduction</td>
<td>10:00</td>
</tr>
<tr>
<td>TNUoS overview</td>
<td>10:10</td>
</tr>
<tr>
<td>Coffee Break</td>
<td>11:30</td>
</tr>
<tr>
<td>TNUoS tariff forecasting process</td>
<td>11:40</td>
</tr>
<tr>
<td>Longer term CUSC modification proposals and Targeted Charging Review</td>
<td>12:20</td>
</tr>
<tr>
<td>Q&amp;A</td>
<td>12:45</td>
</tr>
<tr>
<td>Lunch / Team available for drop in Q&amp;A</td>
<td>13:00</td>
</tr>
<tr>
<td>Close</td>
<td>14:00</td>
</tr>
</tbody>
</table>
Feedback

- We welcome your feedback
- There will be a feedback questionnaire at the end of today
- We are always looking at ways to improve these events, and looking at new events and routes to meet your needs

TNUoS Queries
charging.enquiries@nationalgrid.com
01926 654633
TNUoS Overview
What is TNUoS and Who Pays

Paul Wakeley
What is TNUoS?

**TNUoS**
Transmission Network Use of System Charges
£2.6bn TO Revenue

**BSUoS**
Balancing Services Use of System Charges
£1.2bn SO Revenue

**Connection Charges**
£200m TO Revenue
What is TNUoS?

TNUoS
Transmission Network Use of System Charges
£2.6bn TO Revenue

- Recovers Revenue for:
  - National Grid TO,
  - Scottish Power Transmission,
  - Scottish Hydro Electricity Transmission,
  - Offshore TOs
  - Network Innovation Competition Fund
  - Transmission EDR
- Charges calculated *ex ante* and billed by NGSO
- Methodology defined in Section 14 of the CUSC
- Tariffs apply for a whole year from 1 April, and published by 31 Jan.
TNUoS Revenue

- TNUoS Recovers Revenues for all Onshore TOs
- Values determined by Price Control
- **Total: £2.66bn**
- TOs give **final values** to NGSO by **25 January** before charges set on 31 January (STC)
Who pays TNUoS

Total (18/19) £2661m

Generation £430m

Demand £2331m

HH Demand £914m

NHH Demand £1506m

Embedded Export -£190m
Who pays TNUoS?

- **Generators**
  - Directly connected to the transmission network
  - Embedded generators $\geq 100$MW TEC

- **Generation TNUoS** charged on the basis of Transmission Entry Capacity (TEC)

- Generators also liable for Demand TNUoS if they take demand over Triad

---

Total (18/19) £2661m

Generation £430m
Who Pays TNUoS

- **Suppliers**
  - All licenced suppliers are liable for TNUoS, for their *gross demand* from the transmission network.
  - Three categories of charge:
    - **Half Hourly** metered demand on the basis of Triads
    - **Embedded Export** credited for export over Triads
    - **Non-Half-Hourly** demand, total 4pm-7pm annual consumption
  - The changes to HH charges were introduced by CMP264/265 from 2018/19 Charging Year
  - All demand is in one of these categories

Total

- **£2661m**
  - Demand
    - **£2331m**
      - HH Demand
        - **£914m**
      - NHH Demand
        - **£1506m**
    - Emb. Export
      - **-£190m**
Who Pays TNUoS

- **Directly Connected Demand**, pay HH demand charges
- **Embedded Generation** (<100MW) which contracts directly with National Grid can gain Embedded Export payments

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
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</thead>
<tbody>
<tr>
<td>Demand</td>
<td>£2331m</td>
</tr>
<tr>
<td>HH Demand</td>
<td>£914m</td>
</tr>
<tr>
<td>NHH Demand</td>
<td>£1506m</td>
</tr>
<tr>
<td>Emb. Export</td>
<td>-£190m</td>
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<tr>
<td><strong>Total</strong></td>
<td>£2661m</td>
</tr>
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</table>
Changes to TNUoS Methodology for 2018/19 tariffs

Paul Wakeley
Methodology

- The TNUoS Charging Methodology is in Section 14 of the CUSC
- National Grid applies the methodology to set each year’s charges
- Changes to the methodology can be proposed by industry parties
- Ofgem ultimately decides on changes
- Therefore, the methodology is in a constant state of flux
Changes to 2018/19 TNUoS Methodology

Approved Modifications

- **Implemented in October Forecast**
  - CMP264/265 – Gross Charging for Demand / Embedded Benefits
  - CMP268 – Conventional Carbon Generation Tariffs

- **Will be implemented in December Draft Tariffs**
  - CMP283 – Interconnector Revenues
Changes to 2018/19 TNUs Methodology

Awaiting Ofgem decision

- **Will be implemented in tariffs if approved**
  - CMP282 – Demand Locational  
    [Indicative tariffs in Oct Forecast]
  - CMP251 – enduring changes to Euro Cap

Decided: Modification rejected

- CMP261 - €2.50/MWh for 2015/16 tariffs
  - The existing methodology for the split of charges between generation and demand continues
  - Any changes will be need to be taken forward as a modification to the CUSC. National Grid is not proposing any changes for 2018/19.
Methodology and data in this presentation

- This presentation uses the methodology, including the approved modifications, for 2018/19.
- All data in this presentation is from the October 2017 forecast of 2018/19 TNUoS tariffs.
Demand TNUoS

Shiv Dhami
Demand TNUoS Tariffs

- Demand TNUoS recovers £2.2bn of Revenue
- There are three demand tariffs for each of the 14 demand zones

Gross HH Demand

Charged a £/kW tariff for average demand over the Triads

Embedded Export

Credited a £/kW tariff for average export over the Triads

NHH Demand

Charged a p/kWh for consumption between 4pm and 7pm each day
## Demand TNUoS Tariffs

<table>
<thead>
<tr>
<th>Zone</th>
<th>Zone Name</th>
<th>Gross HH Demand (£/kW)</th>
<th>NHH Demand (p/kWh)</th>
<th>Embedded Export (£/kWh)</th>
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<tr>
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<td>Northern Scotland</td>
<td>42.625828</td>
<td>5.685964</td>
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<td>4.850815</td>
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<td>North West</td>
<td>43.772060</td>
<td>5.877395</td>
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<td>Yorkshire</td>
<td>43.584369</td>
<td>5.721052</td>
<td>28.916651</td>
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<tr>
<td>6</td>
<td>N Wales &amp; Mersey</td>
<td>45.186145</td>
<td>5.886433</td>
<td>30.518427</td>
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<tr>
<td>7</td>
<td>East Midlands</td>
<td>47.142520</td>
<td>6.297143</td>
<td>32.474802</td>
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<tr>
<td>8</td>
<td>Midlands</td>
<td>48.600885</td>
<td>6.705442</td>
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<tr>
<td>9</td>
<td>Eastern</td>
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<td>South Wales</td>
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<td>South Western</td>
<td>53.611446</td>
<td>7.814511</td>
<td>38.943729</td>
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</table>

Tariffs include small gen tariff of: 0.591801 0.079965
Based on the forecast of **Embedded Generation output**, this will cost **£190m in 2018/19**

This is added to the revenue to be recovered from the demand residual, to ensure overall revenue recovery is correct
Embedded Export Tariff Revenues

- Forecast to cost £190m in 18/19
- Cost is added to the Demand Gross Residual
- Overall, same value is recovered from Demand

<table>
<thead>
<tr>
<th>Zone</th>
<th>Final Tariff (£/kW)</th>
<th>EET Revenue (£m)</th>
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<td>6</td>
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<td>33.933167</td>
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<td>34.451952</td>
<td>21.51</td>
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<td>10</td>
<td>31.865312</td>
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<td>16.98</td>
</tr>
<tr>
<td>14</td>
<td>38.943729</td>
<td>7.80</td>
</tr>
</tbody>
</table>

![Graph showing revenue distribution]
Demand TNUoS: HH & NHH Tariffs

Gross HH Tariff (£/kW) = Demand Locational + Residual

- Calculated per zone
- From Transport Model per zone
- To ensure overall revenue recovery is correct. One value.

NHH Tariff (p/kWh) = Revenue Required per zone - Revenue recovered from Gross HH

- Calculated per zone
- From Tariff Model
- NHH Volume (kWh)
Triads

- Three half hour settlement periods of highest GB net demand
  - 1st November to end of February
  - Separated from each other by a minimum of 10 clear days
- Determined after the event using settlement metering data in March (mixture of SF, R1 & R2).
- Exclude interconnector demand but include pumping and station demand
Triads for Winter 2016/17

Winter Triads 2016/17

MW Chargeable

01/11/2016 08/11/2016 15/11/2016 22/11/2016 29/11/2016 06/12/2016 07/12/2016 14/12/2016 21/12/2016 28/12/2016 04/01/2017 07/01/2017 14/01/2017 21/01/2017 28/01/2017 04/02/2017 11/02/2017 18/02/2017 25/02/2017

Triads 10 Clear Days Daily Peak
HH Tariff Charges & Embedded Export Payment

Half-Hourly gross Metered Demand → [Average Metered Demand over the Triad (kW)] × [Zonal Demand Tariff (£/kW)]

[Graph showing demand over time with half-hourly and non-half-hourly periods marked]

Of the 52GW gross peak, 38% is Half Hourly charged

Embedded Export Metered Volume → [Average Metered Embedded Export over the Triad (kW)] × [Zonal EET (£/kW)]

HH Demand £914m
Emb. Export -£190m
Half-Hour Demand & Embedded Export Tariffs

- **Supplier Demand Charge (£)**
  \[ = \text{Gross HH Demand Tariff (£/kW) } \times \text{Average Gross Demand at Triad (kW)} - \text{Embedded Export Tariff (£/kW) } \times \text{Average Export at Triad (kW)} \]

- Suppliers billed based on forecast Gross HH and Export volumes:
  - Liability is floored at zero, as today, so can not accumulate credit.
NHH Tariff Charges

Non-Half-Hourly Metered Demand \[\times\] Energy Consumption between 4pm-7pm each day (kWh) \[\times\] Zonal Energy Tariff (p/kWh) \[\div\] 1000

NHH Demand £1506m
Non Half-Hour Demand Tariffs

- Suppliers are charged based on their average demand usage between 16:00 – 19:00 on every day of the year.

- Liability = NHH Zonal demand x p/kWh Tariff per zone

- Demand TNUoS bills throughout the year are based on Supplier forecasts: submitted in March, and can be resubmitted as required
Supplier Reconciliation

- Demand TNUoS bills throughout the year are based on Supplier forecasts: submitted in March, and can be resubmitted as required

- Suppliers are billed (1/12)th of the annual liability every month

- Supplier forecasts are reconciled to settlement data from Elexon:
  - June Y+1 Initial Reconciliation
  - Autumn Y+2 Final Reconciliation (when RF settlement data available)
Generation TNUoS

Tom Selby
Generation TNUoS

- Generation TNUoS recovers charges from Transmission connected generation and large embedded generation

- Maximum revenue from generation set by EU Regulation

- Tariffs are composed of wider and local elements
- Final tariffs are generator specific
Generation Wider Tariffs

- Wider tariffs are calculated per zone – 27 generation zones
- Components apply based on connection and generation type

Wider Tariff components:

- Peak
- Security
- Year Round
- Shared
- Year Round
- Not Shared
- Generator
- Residual
Wider Generation Charging Categories (CMP268)

- **Intermittent**
  - Wider Tariff
  - Annual Load Factor (ALF) \( \times \) Year Round Shared
  - Year Round Not Shared
  - Generator Residual

- **Conventional Low Carbon, e.g. Nuclear, Hydro**
  - Wider Tariff
  - Peak + ALF \( \times \) Year Round Shared
  - Year Round Not Shared
  - Generator Residual

- **Conventional Carbon, e.g. Coal, Oil, Gas, Pumped Storage**
  - Wider Tariff
  - Peak + ALF \( \times \) Year Round Shared
  - ALF \( \times \) Year Round Not Shared
  - Generator Residual
# Generation TNUoS Tariffs

We publish wider tariff components by zone.

We publish example wider tariffs for 3 types of generator.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Zone Name</th>
<th>System Peak Tariff (£/kW)</th>
<th>Shared Year Round Tariff (£/kW)</th>
<th>Not Shared Year Round Tariff (£/kW)</th>
<th>Residual Tariff (£/kW)</th>
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<tr>
<td>1</td>
<td>North Scotland</td>
<td>2.241534</td>
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<td>10.280668</td>
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<td>Western Highlands</td>
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<td>13.951755</td>
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<td>Eastern Grampian and Tayside</td>
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<td>The Trossachs</td>
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<td>11.744597</td>
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<td>Stirlingshire and Fifie</td>
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<td>8.812135</td>
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<td>10</td>
<td>South West Scotland</td>
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<td>Lothian and Borders</td>
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</table>

**Example Tariffs:**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Conventional Carbon 80% Tariff (£/kW)</th>
<th>Conventional Low Carbon 80% Tariff (£/kW)</th>
<th>Intermittent 40% Tariff (£/kW)</th>
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<tr>
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<td>24.983777</td>
<td>27.974756</td>
<td>18.929460</td>
</tr>
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</table>
Local Generation Tariffs: Directly Connected

- **Pays MITS local substation tariff only**
- **Pays local circuit, local substation tariffs**
- **Pays: offshore local circuit, offshore local substation tariffs**
Local Generation Tariffs: Embedded generators

- Pays no local tariff

- Pays: offshore local circuit, offshore local substation, ETUoS tariffs

OFTO connected to MITS through distribution network

MITS

Offshore Local Circuit

Offshore Substation

Onshore OFTO Substation

Wider
Final Generation Tariff

- **Onshore**
  - Onshore Generation Tariff
  - Wider Tariff
  - Local Circuits (onshore)
  - Local Onshore Substation
  - Based on voltage, capacity and redundancy

- **Offshore**
  - Offshore Generation Tariff
  - Wider Tariff
  - Local Circuits (onshore)
  - Local Offshore Circuit & Substation
  - ETUoS
  - OFTO Specific
  - If connected via DNO
If the tariff is positive multiply tariff by max TEC:

- TNUoS Wider Charge (£)
  \[= \text{Wider Tariff (}£/\text{kW}) \times \text{TEC(MW)} \times 1000\]

- TNUoS Local Substation Charge (£)
  \[= \text{Local Substation Tariff (}£/\text{kW}) \times \text{TEC(MW)} \times 1000\]

- TNUoS Local Circuit Charge (£)
  \[= \text{Local Circuit Tariff (}£/\text{kW}) \times \text{TEC(MW)} \times 1000\]
Generator Charges where tariffs are negative

- **TNUoS Wider Charge (£)**
  \[= \text{TNUoS Wider Tariff (£/kW)} \times \text{(average of 3 highest metered volumes kW, 10 days apart between Nov-Feb)}\]

- **TNUoS Circuit Charge (£)**
  \[= \text{TNUoS Local Circuit Tariff (£/kW)} \times \text{(average of 3 highest metered volumes kW, 10 days apart between Nov-Feb)}\]

- These “3 highest metered volumes” are specific to the generator, and are not the same as the Demand Triads.
Annual Load Factors (ALFs)

- ALFs give a measure, over five years, of a generator’s output compared to TEC, using:
  - Transmission Entry Capacity (TEC),
  - Metered Flows (MF) and
  - Final Position Notifications (FPN)

- **ALFs for 2018/19** are based on data from charging years 2012/13, 2013/14, 2014/15, 2015/16 and 2016/17
Annual Load Factors (ALFs)

- **ALFs are calculated at power station level.**
  - For a power station with multiple Balancing Mechanism Units (BMU) representing generating sets and/or station demand, the BMUs are aggregated before calculating the ALF.

- **Cascade hydro schemes**
  - These may have multiple power stations included in a BMU. For these the ALF is calculated at scheme level by aggregating stations and their associated BMU before calculating the ALF. The scheme level ALF is applied to each station in the scheme.
How to calculate an ALF….

Charging Years used to set ALF

<table>
<thead>
<tr>
<th>Year</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>Max (Metered, FPN, 0) summed over 17520 HH ÷ Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2013/14</td>
<td>Max (Metered, FPN, 0) summed over 17520 HH ÷ Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2014/15</td>
<td>Max (Metered, FPN, 0) summed over 17520 HH ÷ Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2015/16</td>
<td>Max (Metered, FPN, 0) summed over 17568 HH ÷ Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2016/17</td>
<td>Max (Metered, FPN, 0) summed over 17520 HH ÷ Sum TEC / 2 over 17520 HH</td>
</tr>
</tbody>
</table>

ALF Calc. (Now)

- 2017/18
- 2018/19

ALF Applicable

- 2012/13
- 2013/14
- 2014/15
- 2015/16
- 2016/17

ALF is Average of remaining three years

Highest

Lowest
Four Full Years of Data

Charging Years used to set ALF

- 2012/13
  - Max (Metered, FPN, 0) summed over 17520 HH
  - \( \div \) Sum TEC / 2 over 17520 HH
  - = 2013/14 ALF

- 2013/14
  - Max (Metered, FPN, 0) summed over 17520 HH
  - \( \div \) Sum TEC / 2 over 17520 HH
  - = 2014/15 ALF

- 2014/15
  - Max (Metered, FPN, 0) summed over 17568 HH
  - \( \div \) Sum TEC / 2 over 17568 HH
  - = 2015/16 ALF

- 2015/16
  - Max (Metered, FPN, 0) summed over 17520 HH
  - \( \div \) Sum TEC / 2 over 17520 HH
  - = 2016/17 ALF

- 2016/17
  - Max (Metered, FPN, 0) summed over 17520 HH
  - \( \div \) Sum TEC / 2 over 17568 HH
  - = 2017/18 ALF

- 2017/18
  - ALF Applicable

- 2018/19
  - ALF Applicable

ALF Calc. (Now)

ALF is Average of remaining three years

Lowest
Three Full Years of Data

Charging Years used to set ALF

- 2012/13
- 2013/14
- 2014/15
- 2015/16
- 2016/17

\[
\frac{\text{Max (Metered, FPN, 0) summed over 17520 HH}}{\text{Sum TEC / 2 over 17520 HH}} = 2014/15 \text{ ALF}
\]

\[
\frac{\text{Max (Metered, FPN, 0) summed over 17520 HH}}{\text{Sum TEC / 2 over 17520 HH}} = 2015/16 \text{ ALF}
\]

\[
\frac{\text{Max (Metered, FPN, 0) summed over 17520 HH}}{\text{Sum TEC / 2 over 17520 HH}} = 2016/17 \text{ ALF}
\]

ALF Calc. (Now)

- 2017/18

ALF Applicable

- 2018/19

ALF is Average of remaining three years
Less than 3 full years, e.g.

<table>
<thead>
<tr>
<th>Year</th>
<th>Data Type</th>
<th>Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>No Data</td>
<td>ALF is Average of remaining three years</td>
</tr>
<tr>
<td>2013/14</td>
<td>No Data</td>
<td>ALF is Average of remaining three years</td>
</tr>
<tr>
<td>2014/15</td>
<td>Partial Year</td>
<td>Max (Metered, FPN, 0) summed over 17568 HH ( \div ) Sum TEC / 2 over 17568 HH</td>
</tr>
<tr>
<td>2015/16</td>
<td>Partial Year</td>
<td>Max (Metered, FPN, 0) summed over 17520 HH ( \div ) Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2016/17</td>
<td>Partial Year</td>
<td>( \div ) Sum TEC / 2 over 17520 HH</td>
</tr>
<tr>
<td>2017/18</td>
<td>ALF Applicable</td>
<td>ALF = 2015/16 ALF</td>
</tr>
<tr>
<td>2018/19</td>
<td>ALF Applicable</td>
<td>ALF = 2016/17 ALF</td>
</tr>
</tbody>
</table>

Weighted by HH

ALF = \( \frac{\text{Max (Metered, FPN, 0) summed over 17568 HH}}{\text{Sum TEC / 2 over 17568 HH}} \)
TNUoS Transport and Tariff Model

Jo Zhou
Structure and Purpose of TNUoS Model

Transport Module

- Calculates locational signals (on nodal basis)

Aim

- Cost reflectivity – quantifying incremental MW*km (cost) at each node
- Transparency – “contractual” background

Tariff Module

- Aggregates locational signals from nodal to zonal tariffs
- Calculates residual tariffs

Aim

- Stability & predictability - zones
- Recovery of total network costs - non-locational residual tariffs
- Target revenue recovery from generators and overall
Peak Security - Reflects what we build to for demand security, under peak demand “stress”

Year Round - Reflects what we build under SQSS economic criteria

### Load Factor Scaling for Contracted Generation

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Year Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind, Solar, Tidal</td>
<td>Fixed 0%</td>
<td>Fixed 70%</td>
</tr>
<tr>
<td>Nuclear</td>
<td>Variable</td>
<td>Fixed 85%</td>
</tr>
<tr>
<td>Interconnectors</td>
<td>Fixed 0%</td>
<td>Fixed 100%</td>
</tr>
<tr>
<td>Hydro</td>
<td>Variable</td>
<td>Variable</td>
</tr>
<tr>
<td>Pumped Storage</td>
<td>Variable</td>
<td>Fixed 50%</td>
</tr>
<tr>
<td>Peaking</td>
<td>Variable</td>
<td>Fixed 0%</td>
</tr>
<tr>
<td>Other</td>
<td>Variable</td>
<td>Variable</td>
</tr>
</tbody>
</table>

### Transport Model Demand

<table>
<thead>
<tr>
<th></th>
<th>Peak</th>
<th>Year Round</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter Peak from Week 24 Data</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Transport Model – how to derive locational signals

- Peak Security
- Year Round
- Contracted Generation
- Network model (circuits)
- Week 24 peak Demand Forecast

How much electricity will flow down each circuit? → “base case” costs measured by MW*km

At any location, if increasing demand/gen by an extra 1MW, what are the additional MW*km (cost) for the network?

Marginal Cost for each Node
Principles of locational signal

**North:** More Generation than Demand
Higher Generation Charges
Lower Demand Charges

**South:** More Demand than Generation
Lower Generation Charges
Higher Demand Charges

Flow of electricity under both backgrounds

Cost reflective signal reflects incremental network development to meet flows
Tariff Model: Nodal to Zonal Signals

- **Generation**
- Converts nodal signals into zonal tariffs to provide more stability and predictability
- Gen Zone fixed for each price control
Tariff Model: Nodal to Zonal Signals

- **Demand**
  - Converts nodal signals into zonal tariffs to provide more stability and predictability
- Demand Zones fixed as DNO Areas
Tariff Model: Revenues & Residuals

- Revenue collected from zonal and local charges doesn’t recover all of allowed revenue.
- Residual Tariffs ensure overall revenue recovery in the correct pots

**Generation Residual:** Ensures that total generation recovered is within the €2.50/MWh Cap

**Demand Residual:** Ensures that total recovery is equal to allowed revenue
Generation Revenue 2018/19

OBR Spring Forecast

€2.50 per MWh
x 21% Error Margin

= €1.98/MWh

£1.98 ÷
£:€ exchange rate of €1.16

= £1.70/MWh

FES Forecast

Forecast of Generation
253TWh

×

£1.70/MWh

= £430m Revenue to be recovered from generation
## Residuals 2018/19

<table>
<thead>
<tr>
<th>GENERATION</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wider</td>
<td>322.2</td>
</tr>
<tr>
<td>Offshore Local</td>
<td>244</td>
</tr>
<tr>
<td>Local Circuits</td>
<td>20.7</td>
</tr>
<tr>
<td>Local Substation</td>
<td>18.5</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>605.2</strong></td>
</tr>
<tr>
<td>Gen Residual</td>
<td>-175.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>430</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DEMAND</th>
<th>£m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total TNUoS</td>
<td>2661</td>
</tr>
<tr>
<td>Less Generation</td>
<td>-430</td>
</tr>
<tr>
<td>Demand TNUoS</td>
<td>2231</td>
</tr>
<tr>
<td>Revenue from locational</td>
<td>-26.6</td>
</tr>
<tr>
<td>Paid to Embedded Export</td>
<td>-189.9</td>
</tr>
<tr>
<td>Demand Residual</td>
<td>2447.5</td>
</tr>
</tbody>
</table>

Equivalent to **-2.34 £/kW** on charging base of 75GW

Equivalent to **46.66 £/kW** on HH tariffs (charging base 52.5GW)
Small Generators’ Discount

- Small generators (<100MW) connected at 132kV transmission receive a £11/kW reduction in their TNUoS
- This is recovered from demand customers
- The licence condition and the scheme expire 31 March 2019

For 2018/19
- Total cost: £30.8m for 2.78GW of eligible generation
- Gross HH rate = 30.8m / 52.4GW
  = 0.58 £/kW, for 19.8GW of HH demand
- NHH rate = (30.8 - 0.58 * 19.8GW) / 24.2TWh
  = 0.08 p/kWh for 24TWh of NHH demand
Coffee Break

Around 10 minutes
TNUoS tariff forecasting process
Modelling Inputs and Timescales

Tom Selby
## Which inputs change in quarterly forecasts

<table>
<thead>
<tr>
<th>Methodology</th>
<th>March</th>
<th>June</th>
<th>Oct</th>
<th>DRAFT Dec</th>
<th>FINAL Jan</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Locational</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNO/DCC Demand Data</td>
<td>Previous year</td>
<td></td>
<td></td>
<td>Week 24 updated</td>
<td></td>
</tr>
<tr>
<td>Contracted TEC</td>
<td>Latest TEC Register</td>
<td>Latest TEC Register</td>
<td>Latest TEC Register</td>
<td>TEC Register Frozen at 31 October</td>
<td></td>
</tr>
<tr>
<td>Network Model</td>
<td>Previous year (except new local circuits)</td>
<td></td>
<td>Latest version based on ETYS</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Allowed Revenue</td>
<td>Update financial parameters</td>
<td>Update financial parameters</td>
<td>Latest onshore TO Forecasts</td>
<td>Latest TO Forecasts</td>
<td>From TOs</td>
</tr>
<tr>
<td>Demand Charging Bases</td>
<td>Previous Year</td>
<td>Revised Forecast</td>
<td>Final Forecast</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation Charging Base</td>
<td>NG Best View</td>
<td>NG Best View</td>
<td>NG Best View</td>
<td>NG Best View</td>
<td>NG Final Best View</td>
</tr>
<tr>
<td>Generation ALFs</td>
<td>Previous Year</td>
<td></td>
<td></td>
<td></td>
<td>New ALFs published</td>
</tr>
<tr>
<td>Generation Revenue</td>
<td>Forecast</td>
<td>Fixed Gen Rev £m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Demand Charging Base Monte Carlo Model

- Demand modelling process (Monte Carlo) changed for inclusion of embedded generation export and gross demand under CMP264/265 modifications.

- Factors/variables being assessed include:
  - Historical trends of metered triad demand & export volume provided by Elexon under P348/349.
  - Weather conditions/patterns.
  - Future demand shifts on the transmission system.
  - Triad behaviour.
  - Levels of renewable generation & forecast growth.
Timetable for Future TNUoS Tariff Publications

Paul Wakeley
Timetable for future publications

2018/19 Tariffs
21/12/17 Draft Tariffs
31/1/18 Final Tariffs

2019/20 Tariffs

Five Year Forecast
31/11/17 Five Year Forecast

By 31/3/18 March Update
By 30/6/18 June Update
By 31/10/18 October Update
By 24/12/18 Draft Tariffs
31/1/19 Final Tariffs

Timetable to be confirmed early 2018
Impact of next price control on Tariffs

- The next RIIO-T2 price control is expected to start on 1 April 2021.
- The CUSC requires **various parameters** to be updated at that point for the 2021/22 tariffs, but are dependent on each TOs RIIO ‘deal’

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value/Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Allowed Revenue</td>
<td></td>
</tr>
<tr>
<td>AGIC</td>
<td></td>
</tr>
<tr>
<td>Security Factor</td>
<td>= 1.8</td>
</tr>
<tr>
<td>Generation Zones</td>
<td>= 27</td>
</tr>
<tr>
<td>Expansion Constant</td>
<td></td>
</tr>
<tr>
<td>Offshore Tariffs</td>
<td></td>
</tr>
<tr>
<td>Expansion Constant</td>
<td></td>
</tr>
</tbody>
</table>
| Assumption in Five Year Forecast for 2021/22 | Increase by RPI | Modelled as no change
Opportunities to engage

- Quarterly publications
- Webinars occur ~ 1 week after each tariff publication
- Contact us for a copy of the T&T model
- Model Training sessions

Also in planning for 2018
- New supplier training
- Tailored “Charging events” with TNUoS, BSUoS for group of customers
- Refresh our information on our website
- New online training guides
Longer Term CUSC Modifications

Jon Wisdom
# New Modifications and Ofgem decisions

## Two new Modifications tabled at the October CUSC Panel

<table>
<thead>
<tr>
<th>Mod Ref</th>
<th>Mod area</th>
<th>Customer impacted</th>
<th>Proposal raised by</th>
<th>Process stage</th>
<th>Key activities since last update</th>
<th>next steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP286</td>
<td>Improve the predictability of TNUoS demand charges by bringing forward the date at which the target revenue used in TNUoS tariff setting is fixed to allow customer prices to more accurately reflect final TNUoS rates.</td>
<td>Suppliers, Generators, embedded generators and National Grid</td>
<td>Npower</td>
<td>Workgroup nominations open ~ close date 8 Nov 17</td>
<td>n/a</td>
<td>9 nominations received to sit on the Workgroup. No date arranged for first WG</td>
</tr>
<tr>
<td>CMP287</td>
<td>Improve the predictability of TNUoS demand charges by bringing forward the date at which certain parameters used in TNUoS tariff setting (such as demand forecasts) are fixed to allow customer prices to more accurately reflect final TNUoS rates.</td>
<td>Suppliers, Generators, embedded generators and National Grid</td>
<td>Npower</td>
<td>Workgroup nominations open ~ close date 8 Nov 17</td>
<td>n/a</td>
<td>9 nominations received to sit on the Workgroup. No date arranged for first WG</td>
</tr>
</tbody>
</table>
## Modifications with Ofgem

<table>
<thead>
<tr>
<th>Mod Ref</th>
<th>Mod area</th>
<th>Customer impacted</th>
<th>Proposal raised by</th>
<th>Process stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP251</td>
<td>Ensuring that there is no risk of non-compliance with European Regulation 838/2010 by removing the error margin introduced by CMP224 and by introducing a new charging element to the calculation of TNUoS</td>
<td>Suppliers and Generators</td>
<td>British Gas</td>
<td>With the Authority for decision (expected Dec 17).</td>
</tr>
<tr>
<td>CMP261</td>
<td>Ensuring the TNUoS paid by Generators in GB in Charging Year 2015/16 is in compliance with EU Regulations</td>
<td>Users who pay either Generation or Demand TNUoS tariffs</td>
<td>SSE</td>
<td>Rejected 16th Nov-17</td>
</tr>
<tr>
<td>CMP283</td>
<td>Facilitate the Interconnector Cap and Floor regime through creating the process for data provision between Interconnectors and National Grid within the CUSC</td>
<td>Interconnectors and the SO</td>
<td>NGET</td>
<td>Approved</td>
</tr>
<tr>
<td>CMP282</td>
<td>TNUoS tariff setting</td>
<td>Suppliers and Embedded Generators</td>
<td>NGET</td>
<td>With the Authority for decision (expected 28th Nov 17).</td>
</tr>
</tbody>
</table>
### Ongoing modification proposals

<table>
<thead>
<tr>
<th>Mod Ref</th>
<th>Mod area</th>
<th>Customer impacted</th>
<th>Proposal raised by</th>
<th>Process stage</th>
<th>Key activities since last update</th>
<th>next steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP271</td>
<td>Improving the cost reflectivity of demand transmission charges</td>
<td>Generators, Suppliers, Embedded Generators</td>
<td>RWE</td>
<td>Workgroup meetings ~ suspended</td>
<td>WG received update on impact of SCR on CMP271</td>
<td>Panel at its September meeting agreed to provide an extension based on a fixed event e.g. the publication by Ofgem on its further thinking and that the Workgroup should reconvene w/c 13 November 2017 as by this point the industry will have information from Ofgem.</td>
</tr>
<tr>
<td>CMP274</td>
<td>Winter TNUoS Time of Use Tariff (TToUT) for Demand TNUoS</td>
<td>Generators, Suppliers, Embedded Generation, Transmission Network Operators, HH Demand Customers</td>
<td>UK Power Reserve</td>
<td>Workgroup meetings ~ suspended</td>
<td>WG received update on impact of SCR on CMP274</td>
<td>Panel at its September meeting agreed to provide an extension based on a fixed event e.g. the publication by Ofgem on its further thinking and that the Workgroup should reconvene w/c 13 November 2017 as by this point the industry will have information from Ofgem.</td>
</tr>
</tbody>
</table>

Given the overlap in the issues to be discussed as part of these two modifications, the Workgroup meetings will be arranged on the same day and are being progressed following a normal timetable.
## Ongoing modification proposals

<table>
<thead>
<tr>
<th>Mod Ref</th>
<th>Mod area</th>
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<tbody>
<tr>
<td>CMP276</td>
<td>Socialising TO costs associated with ‘green policies’ (reduction in the demand residual element of the TNUoS £/kW (“Triad”) charge by creating two new charge lines for all demand offtakes)</td>
<td>Parties that manage demand during Triad periods, i.e. embedded generators and those half hourly metered consumers who respond to Triad</td>
<td>Alkane Energy</td>
<td>Workgroup meetings ~ suspended</td>
<td>WG received update on impact of SCR on CMP276</td>
<td>Panel at its September meeting agreed to provide an extension based on a fixed event e.g. the publication by Ofgem on its further thinking and that the Workgroup should reconvene w/c 13 November 2017 as by this point the industry will have information from Ofgem.</td>
</tr>
<tr>
<td>CMP280</td>
<td>Removing liability for the TNUoS demand residual from directly connected generators</td>
<td>Suppliers</td>
<td>Scottish Power</td>
<td>WG 3rd WG held 16 October</td>
<td>WG to continue developing the Proposal. Meeting due at start of December 17</td>
<td>Workgroup to continue developing options and progress to a consultation.</td>
</tr>
</tbody>
</table>

### CMP276
- **Socialising TO costs associated with ‘green policies’ (reduction in the demand residual element of the TNUoS £/kW (“Triad”) charge by creating two new charge lines for all demand offtakes)**
- **Customer impacted**: Parties that manage demand during Triad periods, i.e. embedded generators and those half hourly metered consumers who respond to Triad
- **Proposal raised by**: Alkane Energy
- **Process stage**: Workgroup meetings ~ suspended
- **Key activities since last update**: WG received update on impact of SCR on CMP276
- **Next steps**: Panel at its September meeting agreed to provide an extension based on a fixed event e.g. the publication by Ofgem on its further thinking and that the Workgroup should reconvene w/c 13 November 2017 as by this point the industry will have information from Ofgem.

### CMP280
- **Removing liability for the TNUoS demand residual from directly connected generators**
- **Customer impacted**: Suppliers
- **Proposal raised by**: Scottish Power
- **Process stage**: WG 3rd WG held 16 October
- **Key activities since last update**: WG to continue developing the Proposal. Meeting due at start of December 17
- **Next steps**: Workgroup to continue developing options and progress to a consultation.
# Ongoing modification proposals

<table>
<thead>
<tr>
<th>Mod Ref</th>
<th>Mod area</th>
<th>Customer impacted</th>
<th>Proposal raised by</th>
<th>Process stage</th>
<th>Next steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP284</td>
<td>Improving TNUoS cost reflectivity (Reference Node)</td>
<td>Suppliers, Generators and end customers that pay TNUoS</td>
<td>PeakGen</td>
<td>Initial meeting for CMP284 was held on the 11 September. The Authority confirmed that they did not see any overlap with this modification and the launch of the SCR. The Workgroup requested a teach in session a session on ‘modelling’. Following the modelling session a formal workgroup meeting will be scheduled to discuss the outputs from these sessions.</td>
<td>Proposer has withdrawn the modification</td>
</tr>
</tbody>
</table>
Charging Futures and the Targeted Charging Review

Alice Grayson
Do we have the original image so that we could lose the grey background on this?

The Charging Futures ecosystem
How will Charging Futures help you?

Resource
- Portal
- Training material
- Access to Charging experts

Navigate
- Single access point
- Sign posting
- Plain English

Influence
- Strategic change
- Whole system
- Implementation
Your involvement

Learn

Ask

Contribute
Visit the new website

www.chargingfutures.com
Question and Answer

Paul Wakeley
Feedback

- We welcome your feedback
- We are circulating a feedback form about your experiences today
- Please help us to understand how we can improve these events, and how we can support you further

TNUoS Queries
charging.enquiries@nationalgrid.com
01926 654633
Lunch, Networking and Experts

Our Team are available to answer any further questions