Customer voltages are too high

- Voltage: 253V and 216V
- Time
- £, kWh, V

Diagram showing voltage levels over time.
**Reduce customer bills**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Annual Consumption</th>
<th>Estimate of Annual Customer Saving (for given percentage voltage reduction)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Typical Domestic</td>
<td>3,000kWh</td>
<td>£9</td>
</tr>
<tr>
<td>BEET Trial Area (15,000 customers)</td>
<td>45,000MWh</td>
<td>£135k</td>
</tr>
<tr>
<td>Northern Powergrid (3.9m customers)</td>
<td>11,700GWh</td>
<td>£35m</td>
</tr>
<tr>
<td>Great Britain (28.5m customers)</td>
<td>85,500GWh</td>
<td>£257m</td>
</tr>
</tbody>
</table>

Assumptions:
1% voltage reduction causes 1% reduction in energy consumption
Unit price for domestic energy: £0.30 per kWh
Smart meter voltage measurements

Audby Lane Primary

Leeds Road Primary

Warren Lane Primary

11kV Target Voltage

Smart Meter Gateway

BEET-Box

Network Management System

BOSTON SPA energy efficiency trial
Indications and Controls on Network Management System

- **BEET-Box**
  - Target Voltage
  - Error or Warning

- **PowerOn NMS**
  - Indications:
    - Target Voltage Voltage
    - MW
    - MVAr
  - Error or Warning

- **Control**
  - Enable / Disable BEET Algorithm
  - Guard Rail - Upper Limit
  - Guard Rail - Lower Limit

- **Substation AVC**
  - Target Voltage Voltage
  - MW
  - MVAr
Baseline Programme

October 2021
- Preparing for the trial.

January 2022
- BEET algorithm developed and infrastructure built

April 2022
- BEET-Box ready for testing.

July 2022
- All system components tested

August 2022
- Voltage control goes live.

August 2023
- Further testing & refinement.

November 2023
- Trial ends.

2023+ ...
- If the trial is successful ...
- Regional rollout

We are here!
Challenge 1 – Infrastructure

- **Smart Metering**
  - EnergyIP

- **Server DMZ**
  - Report Server

- **Management DMZ**
  - Fundamentals
  - Jump Server

- **DCC**
  - BEET Box
  - DMZ
  - Active Directory
  - Anti Virus

- **BEET FEP DMZ**
  - BEET FEP
  - Anti Virus
  - Active Directory

- **IP SCADA FEP DMZ**

- **SCADA LAN**

- **Internet**
  - Pulse Secure
  - Leeds Road Primary RTU
  - Warren Lane Primary RTU
  - Audby Lane Primary RTU
  - Fundamentals External PC

- **External PC**
Challenge 2 – Number of Business Functions

NPg Departments
- OT
- Field Operations
- Asset Management
- Innovation
- IT Security
- Smart Grid IU
- Smart Metering
- IT
- Telecoms

Principal Suppliers
- Fundamentals
- Siemens
- Siemens Advanta
Challenge 3 – Smart Metering

500 smart meters polled for voltage reading every 30 mins for 7 days
Questions & Answers

For further information please contact me:
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