Solar and Storage in Scotland
Towards 2030

Chris Clark
About Emtec

- Scottish Based Company
- Currently circa £75M Turnover
- We employ circa 500 people
- Living Wage Employer
- Business Insider Top 500 Companies
- London Stock Exchange 1000 Companies to Inspire Britain
About Emtec Energy

We are energy and renewable experts focused on creating renewable technology solutions to assist in a variety of sectors. We offer a turnkey solution, from surveying and design to installation and maintenance, to enable your business or property to reach optimal energy efficiency.

We offer a wide range of energy saving and renewable technologies such as:

- Solar Photovoltaics (PV)
- Solar Thermal
- Battery Storage
- Electric Vehicle (EV) Charging
- Ground Source Heat Pumps
- Air Source Heat Pumps
- Combined Heat & Power (CHP)
- Bespoke Energy Monitoring
STA Scotland – Our Vision

A group of key industry individuals involved in solar industry in Scotland, lobbying hard for more solar and removing barriers for deployment

### 2030 Solar PV Deployment

<table>
<thead>
<tr>
<th></th>
<th>Scenario 1: Business as usual (GW)</th>
<th>Scenario 2: Reduced barriers (GW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Mount</td>
<td>0.35</td>
<td>1.38</td>
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<tr>
<td>Commercial</td>
<td>0.34</td>
<td>3.00</td>
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<tr>
<td>Domestic</td>
<td>0.82</td>
<td>2.23</td>
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</table>
Scotlands Low Carbon Vision

- One of the first countries in the world to achieve 100% reduction in carbon emissions
- Emissions cut by 2/3 by 2030, 90% by 2050
- WGBC All new buildings must be net zero by 2030, All buildings net zero by 2050 (Supported by CIBSE)
- Climate Change Bill 3 Core Principles
  - Whole System View
  - Inclusive Energy Transition
  - Smarter Local Energy Model
- Solar and storage will play a huge part in the energy transition towards 2030
<table>
<thead>
<tr>
<th>Building Name</th>
<th>Installed Capacity (kW)</th>
<th>Potential Capacity (kW)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brimmond Primary School</td>
<td>1.5</td>
<td>125</td>
<td>1.2</td>
</tr>
<tr>
<td>North Uist Primary School</td>
<td>1.75</td>
<td>136</td>
<td>1.3</td>
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<tr>
<td>Roslin Primary School</td>
<td>6.24</td>
<td>354.75</td>
<td>1.7</td>
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<tr>
<td>Dailly Primary School</td>
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<td>2.4</td>
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<tr>
<td>Kilmacolm Primary School</td>
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<td>124.75</td>
<td>3.6</td>
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<td>St Flannan’s Primary School</td>
<td>5.9</td>
<td>116.25</td>
<td>5.1</td>
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<tr>
<td>Udston Primary School</td>
<td>6</td>
<td>103</td>
<td>5.8</td>
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<tr>
<td>Lenzie Moss Primary School</td>
<td>12.75</td>
<td>185.25</td>
<td>6.9</td>
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<tr>
<td>Community School of Auchterarder</td>
<td>33</td>
<td>285</td>
<td>11.6</td>
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<tr>
<td>Annbank Primary School</td>
<td>5</td>
<td>33</td>
<td>15.2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>343.09</strong></td>
<td><strong>2611.3</strong></td>
<td><strong>13.14</strong></td>
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</tbody>
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<th>Potential Capacity (kW)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>St Joseph’s College</td>
<td>17.5</td>
<td>106</td>
<td>16.5</td>
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<tr>
<td>Markethill Primary School</td>
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<td>262.5</td>
<td>18.7</td>
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<td>St Pauls Primary School</td>
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<td>106</td>
<td>18.9</td>
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<tr>
<td>St Margaret’s Primary School</td>
<td>32</td>
<td>161.75</td>
<td>19.8</td>
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<tr>
<td>St Patrick’s Primary School</td>
<td>30</td>
<td>133.5</td>
<td>22.6</td>
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<tr>
<td>Libberton Primary School</td>
<td>10</td>
<td>43.8</td>
<td>22.8</td>
</tr>
<tr>
<td>Abington Primary School</td>
<td>10</td>
<td>32.75</td>
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<tr>
<td>Glassford Primary School</td>
<td>15</td>
<td>39.5</td>
<td>38</td>
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<tr>
<td>Biggar Primary School</td>
<td>32.25</td>
<td>70.25</td>
<td>46.3</td>
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<tr>
<td>Watriggs Primary School</td>
<td>48.2</td>
<td>88.25</td>
<td>54.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>343.09</strong></td>
<td><strong>2611.3</strong></td>
<td><strong>13.14</strong></td>
</tr>
</tbody>
</table>
Green: Requested installation
Red: Space available for installation
Installed capacity / Potential capacity

**Brimmond Primary School**
1.5 / 275 kW

**Roslin Primary School**
6 / 358.3 kW

**Annbank Primary School**
5 / 66.8 kW

**St Flannan’s Primary School**
5.9 / 222 kW
Solar Funding Mechanisms

- Self Funding
- Export Tariff
- Local Energy Scotland / CARES / Innovation Funding
- SME Low Carbon Loans
- PPA Agreements
- Peer to peer trading

- Solar is most cost effective when installing as part of a new build site
- Synergy between other tech (EV, batteries)
Battery Storage (BTM)

- AC / DC Coupled Systems – Tesla, Sonnen, Powervault
- Battery Technology still in early stages of adoption
- High Cost versus load payback
- New business streams emerging
- Balancing Markets
- Virtual Power plants – Aggregating (Limejump)
- Perfect when combined with Solar / Wind
- Seen as generating device by DNOs
- Assists with export limitation devices
Sonnen Virtual Power Plant (VPP)
Battery cluster becomes one large virtual battery asset

Measured values:
- Battery power actual
- Battery baseline actual
- Grid Frequency
- State of Charge (SoC)
- Battery capacity remaining (positive / negative)
- Battery power available (positive / negative)
- Battery charge / discharge delivered
- # of batteries available
- System availability

Control values:
- Battery charge / discharge request
- Frequency control activated / deactivated
- Frequency injection (test value)
- Adjust SoC setpoint minimum / maximum charge (for all batteries)

Commercial opportunities:
- Frequency Response (FFR) with local AI (!)
- Ancillary Services (SRL, Feed-In, ...)
- Wholesale / Arbitrage / Intraday / Spot market trading
- Demand Response
- DSO support
- Balancing group adjustments
- Forecasting (via Portal connectivity)
- White Label (B2B)
Barriers to Deployment

- Ticking a box
- Section 6 compliance
- Value Engineering
- Lack of Understanding
- Grid Constraints
- Co-ordination with other services
- Structural Constraints
- Time Constraints
- Business rates
- Planning
- Capex Cost
- Uncertain how to access certain funding streams
- Building Regulations
- Fee Constraints
- Political Uncertainty (Subsidies)
Grid connection Issues

Scottish Power: Southern Scotland

Green
All operational factors are within tolerable limits. Connection opportunities may exist.

Amber
At least one factor is nearing operational limits. Network reinforcement may be required.

Red
At least one factor is close to operational limits. Installation of a local connection is highly unlikely.

SSE Network: Highlands and Islands
Our Vision

Scotland
One of the first countries in the world to achieve 100% reduction in carbon emissions
Emissions cut by 2/3 by 2030, 90% by 2050
WGBK All new buildings must be net zero by 2030
Paris Agreement – 2 degrees

STA
6GW of Solar by 2030
Every new building to have as much solar installed as possible
DNO-DSO transition complete
Smart Battery solutions as standard (with or without wheels)
Economies of Scale in Battery technology
What can CIBSE members do?

• Better Specifications
• Don’t tick a box
• Let clients know about funding streams
• Don’t look for the easiest design solutions
• Understand the synergy between the technologies
Thank you

Any Questions