SteelCell: Establishing a new global standard

Mark Selby
Chief Technology Officer
31st January 2019
▪ Unique Fuel Cell Technology
▪ Development & Manufacturing Company
▪ Listed on AIM: Market Cap approx. £250m
▪ 50 patent families
▪ >200 employees
Increasing demand for increasing power.

SteelCell™ original

SteelCell™ plus
Why is the SteelCell™ unique?

- Fuel Cells most efficient way to generate power from any fuel
- Fuel flexible Natural Gas/Syn. Gas from Coal/Bio fuels/Hydrogen
- Affordable and robust Solid Oxide Fuel Cell for mass adoption
  - Made from conventional steel with small amounts of ceramic
- Uses conventional high volume manufacturing equipment from Solar PV industry
## Where can SOFC’s be used?

<table>
<thead>
<tr>
<th>REGION</th>
<th>APPLICATION</th>
<th>&gt;10 GW RESIDENTIAL</th>
<th>&gt;50 GW DATA CENTRE / BACK UP</th>
<th>&gt;70 GW COMMERCIAL</th>
<th>&gt;300 GW APU</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAPAN</td>
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<tr>
<td>KOREA</td>
<td></td>
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<tr>
<td>EUROPE</td>
<td></td>
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<tr>
<td>USA &amp; REST of the WORLD</td>
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</table>

**Customers**
Global Multi Billion $ Opportunity

- Addresses High growth multi $bn market in transition to post combustion era
- Replaces conventional engine and power generation
- Enabler for EV roll out and supports increased renewable penetration
- Highly scalable business - OEM partner & licensing technology

Possible annual gross margin

<table>
<thead>
<tr>
<th>APPLICATION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>&gt;70 GW</td>
<td>&gt;300 GW</td>
<td>&gt;100 GW</td>
</tr>
<tr>
<td></td>
<td>COMMERCIAL</td>
<td>RANGE EXTENDER/ APU</td>
<td>DATA CENTRE / BACK UP</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$190m</td>
<td>$370m</td>
<td>$340m</td>
</tr>
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</table>

Up to 5% market share at up to $140 gross margin / kW

Commercial: pro rata from US commercial property demand
Automotive: 20m large vehicles produced p.a.
Data centre market: 2% of Global electricity demand, larger than UK Residential market: >18m boilers and water heaters sold p.a.
DEVELOPMENT PARTNERS

- Manufacturing scale up/ 10 kW power systems for Data centre and commercial
- Manufacturing JV 2020
- Electric Bus and stationary power market
- Electric Vehicle Range Extender
- Commercial Scale CHP
- Data Centre & Commercial Scale
- Stationary power applications
Corporate Investment is now a significant part of the growth story
The 12 largest European cleantech venture investments in 2018
How we work with Partners

- Joint Product Development
  - License and Technology Transfer of System Design
  - SteelCell™ stack supply through manufacturing partners

- Product development
- Engineering Services
- SteelCell™ Technology Transfer & Licensing
- SteelCell™ Supply
- Manufacturing/partners
Licensing strategy – Inserting Technology into World Class OEM’s allow Ceres to scale by markets and applications quickly.
Steel Cells are in a sweet spot for performance, cost and robustness.

<table>
<thead>
<tr>
<th>Component</th>
<th>PEM</th>
<th>Steel Cell</th>
<th>High Temp SOFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathode</td>
<td>Polymer</td>
<td>Conducting ceramic</td>
<td>Conducting ceramic</td>
</tr>
<tr>
<td>Electrolyte</td>
<td>Carbon and precious metal</td>
<td>Ceria ceramic</td>
<td>Zirconia ceramic</td>
</tr>
<tr>
<td>Anode</td>
<td>Carbon and precious metal</td>
<td>Ceramic-metal mix (cermet)</td>
<td>ceramic-metal mix (cermet)</td>
</tr>
<tr>
<td>Support</td>
<td>Steel/Carbon</td>
<td>Perforated steel</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature</th>
<th>PEM</th>
<th>Steel Cell</th>
<th>High Temp SOFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;80°C</td>
<td></td>
<td></td>
<td>&gt;750°C</td>
</tr>
<tr>
<td>600°C</td>
<td></td>
<td></td>
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</table>
Fuel Cell Power System - Results

Efficiency %LHV

- SOFC
- PEM
- SteelGen
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Fuel Cell Power System – Multi-kW Prime Power

- **FULCRUM**: 1.5kW Proof-of-Concept
- **US-DoE Programme**: 5kW and BEYOND >60% LHV
- **SOFC**: Simulation Study (100kW plus)
- **SteelGen**: 700W
Manufacturing partnership

R&D in UK

UK Technical Centre develops next generation V5, V6 & V7 SteelCell®

Phase 1 → 2 MW

Phase 2 → 10 MW

UK Reference plant

100 MW plants
China/ Europe/US

Annual capacity equivalent in units:

HOME
1kW
2,000
10,000
100,000

WORK
10kW
200
1,000
10,000

CLOUD
datacentres
60*
0.25
2-5

ROAD
30kW
300
3,000

Manufacturing License / JV

100,000
10,000
2-5
3,000

Manufacturing License / JV

1kW
10kW
100,000
10,000
2-5
3,000

tech transfer

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NEW MANUFACTURING FACILITY

2,250 m² Warehouse
600 m² Office
Steel Cell is ready and being commercialised

Proven collaborative business model attracting the world's leading Product Development Companies

Multiple go-to-market partners in key market sectors

Proven world class technology - still getting better
Thank you

Mark Selby
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