U-Battery Layout

Key to Layout
1. Turbine Generator
2. Heat Exchanger
3. Reactor
4. Maintenance Floor
5. Fuel Cartridge Store
6. Fuel Store Ventilation
7. Fuel Handling Facility
8. Control Room

At a Glance
• Single unit – U-Battery produces 10MWe which can be delivered in a CoGen configuration with up to 4MWe electricity or 750°C process heat.
• Gas cooled – Helium in primary circuit, nitrogen in secondary circuit.
• High integrity TRISO fuel – Enables simplicity of design.
• Construction – Adaptable configuration to meet local need. It can be installed above or below ground level.
• Flexible – Installation can be single or in multiple units.
Canadian and UK early markets

Remote communities and mines

- Oil sands
- Steam for SAGD and electricity for upgrading at 96 facilities
- 210 MWe average size for both heat and power demands
- 5% replacement by SMRs between 2030 and 2040 could provide $350-400M in value annually
- 70 remote communities in Canada with energy needs > 3 MWe
- SMRs replacing costly diesel and heating oil could reduce energy costs to the federal government
- High cost of energy, hence diesel is a barrier. SMRs could facilitate and enable new mining developments
- 24 current and potential off-grid mines

High-temperature steam for heavy industry
- 85 heavy industry locations (e.g., chemicals, petroleum refining)
- 25-50 MWe average size
- 5% replacement by SMRs between 2030 and 2040 could provide $46M in value annually

Energy Intensive Industries needing process heat

Alongside renewables, U-Battery can play a vital role in UK’s transition to a clean energy future by providing process heat and electricity to Energy Intensive Industries.

<table>
<thead>
<tr>
<th>Sector</th>
<th>No. of U-Batteries</th>
<th>Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass</td>
<td>14</td>
<td>Heating raw materials and annealing</td>
</tr>
<tr>
<td>Paper</td>
<td>20</td>
<td>Drying paper</td>
</tr>
<tr>
<td>Steel</td>
<td>20</td>
<td>Less likely – very sensitive to price</td>
</tr>
<tr>
<td>Minerals</td>
<td>10</td>
<td>Cement production</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Large and varied</td>
<td>Heating fluids at 450°C</td>
</tr>
</tbody>
</table>

Source: NRCan Roadmap Nov 2018

Source: University of Manchester Report – October 2018
Two Pillars of Safety

Highly Accident-Tolerant Fuel
TRISO coated particle fuel: demonstrated to retain all significant fission products to temperatures > 1600°C for at least 500 hours
Structural integrity retained to at least 2000°C

Inherently Safe Plant Design
Small thermal power output (10 MWt)
Low power density (~6 W/cm³ cf. 100 W/cm³ for LWRs)
High thermal capacity of graphite structures
Strongly negative temperature coefficient of reactivity
Refractory core structural materials