Delta-ee enables organisations to develop the best strategies, business models and customer propositions for the energy transition

Clients work with Delta-ee because our unparalleled research base provides both breadth and depth of expertise, spanning:

### ‘New Energy’ Business Models

- **EVs & Electricity**
  Understand the opportunities and challenges from sector coupling between electricity and transport

- **Flexibility & Energy Storage**
  Take advantage of the opportunities emerging from an active demand side

- **Heat**
  How channel disruption, sector coupling and new technologies are changing the heat sector

- **Distributed Power**
  Global market insight & expertise into the growing role of decentralised generation

- **Digital Energy**
  Opportunities in the connected home market and how digitalisation is changing the energy customer relationship

Delta-ee provides:

- Subscription Research Services
- Consultancy

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Why Local Energy Systems?

- Energy assets are becoming increasingly distributed; in some cases even behind the meter.
- The energy system will increasingly be optimised at a local levels.
- Optimisation will increasingly happen for the whole value chain.
- This will deliver greater local benefits - network, energy, carbon and community.

Local Energy Systems Research Service

Enabling subscribers to take advantage of emerging opportunities and mitigate or avoid risks presented by Local Energy Systems

Download the Service Brochure
Outline of presentation

- What is a Local Energy System?
- Typologies
- From niche to value-driven application
- Case studies
What is Local Energy Systems (LES)?

- **Small energy systems** ranging from the simple integration of distributed energy to more complex systems.

- LES may contain conventional solutions with a **heat production component** and **dispatchable generation units**.

- **Provide solutions to specific technical, social or economic challenges.**

LES encompasses significantly different concepts, including several configuration and business model types.

Example of subsets:

- Energy Communities,
- Microgrids,
- Smartgrids,
- Local Energy Markets.
Local Energy Systems typologies

- **Private / Incumbents**
  - DER integration
  - LES with self-consumption
  - LES not islandable
  - LES islandable/LES off-grid

- **Community / Public**
  - Generation ≠ Consumption
  - Generation = Consumption
Local Energy Systems ownership

- Private / Incumbents
  - Private ownership
- Shared ownership
- Public / community ownership
- Community / Public

Generation ≠ Consumption vs. Generation = Consumption
## From niche to value-driven application

A pathway for LES to become mainstream

<table>
<thead>
<tr>
<th>From niche application...</th>
<th>...to subsidy-driven...</th>
<th>...to value-driven LES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Graciosa Island, Portugal</strong></td>
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<tr>
<td>An island in the Azores,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not connected to the mainland,</td>
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</tr>
<tr>
<td>Solar PV to displace diesel consumption in conventional generators.</td>
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<tr>
<td><strong>Harlaw Hydro, Scotland</strong></td>
<td></td>
<td></td>
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<tr>
<td>Based its economic viability on FiT payments, guaranteed for 20 years,</td>
<td></td>
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<tr>
<td>The scheme generates income by selling electricity to the grid at a commercial rate.</td>
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<tr>
<td><strong>Issy Grid, France</strong></td>
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<tr>
<td>A Smart Grid optimising energy generation and consumption over two districts.</td>
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</table>
A favourable combination of factors stimulates LES rise

Negative drivers

The current state of electricity markets and of the macrogrid in Europe is a driver pushing LES investments.

- European DSOs are concerned over possible grid defection, partly due to the increase of distributed generation at the distribution level.

- At the supplier level, there are issues around consumer trust, as well as the very low margins in commodity markets.

- There is a reduction or withdrawal of support mechanisms such as Feed-in-Tariffs in many EU member states. This is a driver to build value-driven LES and attract investments.

Positive drivers

Innovations create favourable conditions to access capital and to create more efficient microgrids.

- Renewable assets improve their performance and are reducing investment costs.

- Balancing and optimisation LES platforms enable functionalities such as assets and grid optimisation.

- Multiple sources of investments are now available from public funding to innovative funding such as crowdfunding.

- Innovative business models enable access for customers to high CAPEX assets, and allow the Local Energy System Company to smear costs.
Issy Grid, the first smart grid on a district level in France

Issy Grid, France

Value Proposition:
- Optimising energy generation and consumption at the local level:
  - Energy efficiency and peak demand are optimised;
  - Replicable solution to customers’ data reglementary challenge;
- Reducing carbon footprint of the district.

Value stream:
- Energy Efficiency.
- Attracting business and individual investments.

Future Developments:
- Development of new digital service;
- More PV will be installed;
- Flexibility services will be integrated;
- Expand partner types with heating networks, and new types of buildings.

Issy Grid: initiated in 2011, operational since 2016.

Generation & storage

- Solar PV 300 sqm
- 2nd life EV batteries Partnership with Renault

Consumer

- Business district: ~160,000 sqm of office buildings.
- Residential district: ~2,000 residential households, commercial, train station, a school.
- Public installations with smart lights, EVs charging points.

Prosumer

- A university school, and some business buildings have roof-mounted PVs.

Control: Smart

- Multiple PCC
- 14 information systems optimises in real time generation and consumption.

Grid: interconnected

- Distribution substation new generation with distance control monitoring.
ISSYGRID - le 1er réseau de quartier intelligent

**Issy-Grid on the LES matrix**

A consortium of 10 stakeholders

- **Issy Grid project management**: Bouygues Immobilier
- **Information system architecture**: Microsoft and Sopra Steria
- **EV charging points**: Schneider Electric
- **Residential controls**: Bouygues Telecom
- **Energy Generation**: Total
- **Optimisation software**: Embix
- **Public lights and local storage**: Bouygues Energy, EDF, Enedis.

**Private / Incumbents**
- DER integration
- LES with self-consumption
- LES not islandable
- LES islandable

**Generation ≠ Consumption**

**Generation = Consumption**

**Community / Public**
Opportunities

Private / Incumbents
- DER integration
- LES with self-consumption
- LES not islandable
- LES islandable
- LES off-grid

Community / Public
- Opportunities
- Generation ≠ Consumption
- Generation = Consumption
- Smartgrids
Simris, Sweden a 100% renewable energy microgrid village

Simris, Sweden

Value Proposition:
- Building and demonstrating technical capabilities with a microgrid based 100% on renewables.
- Customer flexibility: transforming passive customers into active customers.
- Creating a Local Energy Market.

Value stream:
- Simris is used as a testbed by E.ON.
- Price optimisation with intelligent steering of storage assets.

Future Developments:
- In April 2019, a Redox Flow battery was added.
- The P2P local market is meant to be launched in collaboration with Lumenaza by the end of 2019.
- There are plans to provide ancillary services to the grid in the form of voltage control.

### Generation & storage

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<th>Description</th>
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<th>Annual Output</th>
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### Consumer

- Residential: ~150 households, 800kW, 2.1GWh/y
- Control: Smart
  - Automated grid operation.
  - Automated residential asset control.

### Prosumer

- Controllable PVs + battery solution.
- Controls for water heater, and heat pump, new controllable heat pump.

### Control: Smart

- Single PCC Islandable
- Grid: interconnected
  - Connected on the Medium Voltage (MV) distribution network.

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Simris: operational since 2017.
Simris has a mixed-ownership model.

E.ON is the DSO that manages and operates the microgrid.

Simris on the LES matrix

Simris, Sweden

Third party

Simris

DER integration

LES with self-consumption

LES not islandable

LES islandable

LES off-grid

Private / Incumbents

Generation ≠ Consumption

Generation = Consumption

Community / Public
Simris has little weaknesses and no particular threats

The business model of Simris microgrid is quite resilient as it is based on innovation and cherrypicked the site.

Opportunities in engaging more with the community, through investment and participation.

**WEAKNESSES**
Even if many aspects are replicated in other projects, Simris microgrid is hardly replicable as it is.

**STRENGTHS**
The constant developments and technology tests allows E.ON to be on top of innovations and market trends.

**THREATS**
There are no particular threats attached to Simris microgrid for the foreseeable future.

**OPPORTUNITIES**
Lowering energy prices using P2P and enhancing energy efficiency. Engaging furthermore with the community.

Internal factors
Organisation advantages, USP, team members, etc.

Positive factors
Changes and trends in policy, technologies, social patterns, etc.

External factors
Political, Economical, Social, Environmental, and Technological factors.

Negative factors
Factors to improve, avoid, and make organisation lose value.
Opportunities for LEC to access more value-streams

By Partnering with Private / incumbents

By becoming more balanced and optimised

Private / Incumbents

- DER integration
- LES with self-consumption
- LES not islandable
- LES islandable

Community / Public

Opportunities

Local Energy Communities

Generation ≠ Consumption

Generation = Consumption

Generation ≠ Consumption

LES off-grid
Moving from subsidy led to value led LES using solar

**Increasing value:**
- Multi-energy vector integration (electricity, heat, power, transport)
- Stacking up value-streams (flexibility)
- Optimising self consumption
- Multiplying partnerships

**Reducing cost:**
- Reducing CAPEX
- Reducing cost of capital
- Leveraging existing assets (e.g. PPA with nearby wind farm)
- Connection cost tailored to needs of LES customers
Thank you for your attention

E-mail us for a copy of the presentation!
Rita.Desmyter@delta-ee.com

We’d be delighted to talk with you by phone or in person – at our Edinburgh office, Cambridge office, Paris office or at your offices.

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