Killing the kilowatt hour

Rethinking energy as a consumer service

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The energy system is transforming

- **ELECTRICITY**
  - Generation
  - Transmission
  - Distribution/Consumer

- **HEAT**
  - Gas production
  - Transmission
  - Distribution/Consumer

- **TRANSPORT**
  - Fuel production
  - Distribution
  - Consumer

WHICH DIRECTION?

- Policy and Regulation
- National/Local?
- Top down/bottom up?

Communities, Data People, Society, Information

Electricity/multi-vector?
Future energy world won’t be dominated by the energy mindset

**Digital technology**
- Customer focus: very strong
- Timescales: short
- R&D appetite: radical
- Regulation: lags

**Utilities**
- Customer focus: weak
- Timescales: long
- R&D appetite: limited
- Role of regulation: leads

**Automotive**
- Customer focus: very strong
- Timescales: medium
- R&D appetite: radical
- Regulation: matches pace

**Thermal comfort services**: empowering customers behind the meter to demand better home comfort services

**Personal mobility services**: Ensuring customers can refuel their cars at their convenience

**Shared issues:**
- Capacity of infrastructure
- Cybersecurity
- Cost distribution between actors
- Agility of regulation
- Customer protection
  
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Current state ...
Progress .. but big challenges ahead
Internalising costs and aligning incentives
Barriers to market normalisation

\[ E_{in} - E_{out} = \Delta E_{\text{stored}} = E_2 - E_1 \]

\[ E_{in} = Q_{in} + W_{in} + m_{in} \left( h + \frac{v^2}{2g_c} + \frac{g\zeta}{g_c} \right)_{in} \]

\[ E_{out} = Q_{out} + W_{out} + m_{out} \left( h + \frac{v^2}{2g_c} + \frac{g\zeta}{g_c} \right)_{out} \]

\[ E_2 = m_2 \left( u + \frac{v^2}{2g_c} + \frac{g\zeta}{g_c} \right)_2 \]

\[ E_1 = m_1 \left( u + \frac{v^2}{2g_c} + \frac{g\zeta}{g_c} \right)_1 \]
Consumer Insight

**Last year I spent**
- £1,380 on
- 14,983 kWh of gas and
- 4,125 kWh of electricity.

**Next year, I’ve no idea**
- How much fuel I need
- What it will cost, or
- What experience I will get.

“Nobody understands a kWh, it makes no sense ... it’s nice to know what you are paying each month.”

I want to warm

the rooms I choose...

...to the temperatures I like...

...when I am home.

For a fixed monthly price!
Living Lab

4 million data points per home per day

Real-world homes

x 100

Understanding consumer preferences

Energy-as-a-service

Individual radiator controllers
Individual room temperature and humidity sensors
Individual radiator surface temperature sensors
Central boiler controller
Utility flow meters
Water pipe sensors

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Emerging Insights

People ARE interested – but on their terms.

People are interested in outcomes and options.

People are very open to different offers – the current paradigm isn’t the only paradigm.

People are open to broader, outcome-driven service propositions.

People can discriminate between proposals, without needing to take on the burden of being the system integrator, optimiser or obligated party.
ESC is working across three time horizons

current technologies, established actors, current regulation and market arrangements

- Smart Systems and Heat projects
- Local system integration and optimisation
- Modern Energy Partners

Optimising within current context

Laying foundations for scale up

- Living Lab
- ISCF – “Energy Revolution Integration Service”
- Co-ordination of learning and outcomes across ISCF demonstrators and design projects
- Local Area Energy Planning

Establishing innovation ecosystems

New processes, governance models, stakeholders, business models and market arrangements

• Energy Town

- Governance
- Business models
- Change

- Interoperability
- Access to consumers
- Digital infrastructure
- Simulation
- Shared data
- Trial delivery
Thank you

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