Big Messages!
(from 2014-16 Projects)

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Energy Research Partnership

Projects 2014-16

General
- Public Engagement
- Horizon Scanning
- Economics of Low C Paths
- International Engagement

Transport
- Transport Energy

Heat
- Heat Buildings

Power
- Flexibility
- CO₂ EOR

Resources
- Demand Reduction
- Barriers to Storage
- Smart Energy
- Cities
- Community Energy
- Hydrogen
- Future of Utilities
- Resource Use Strategies
Energy Research Partnership

Seven Big Issues

Strategic Narrative

Governance and Ownership

Whole System Approach

Valuing System Services

Demand Reduction

Upstream

Technology Implications
1. Whole System Approach

- **Flexibility**: Don’t look at techs in isolation
- **Economics**: Include local and national economy
- **Hydrogen**: Consider effects on import dependency
- **Resources**: System will adapt to perceived constraints
- **CO2-EOR**: Have to consider source & sink
- **Storage**: Need to look at whole sys to value
- **Transport**: Don’t look at fuels in isolation
2. Valuing System services

- Flexibility
- Storage
- Smart

Technologies that provide system services need to feel market pull

- Inertia
- Reserve
- Response
- Black start
- Constraint relief
- Strategic
- Diversity
- Voltage control
- Firm capacity
- Reactive power
2. Valuing System services

DEMAND
is increasing
More intermittents + Hinkley:
• More reserve
• Less inertia (stability)
• More response
• Response has to be faster

SUPPLY
is disappearing
Traditional suppliers going:
• Closure of coal & Aux GTs
• Closure of Oil
• AGR end of life
• Poor economics for CCGT
2. Valuing System services

South Australia blackout 28/9/16

- 50 Hz
- 49.5 Hz
- windfarms disconnect
- Interconnect opens, SA islanded
- rapid frequency fall
  - no Frequency response in SA
  - very little inertia

8 seconds
3. Think Upstream

Hydrogen
- Where does the energy come from?

Transport
- What are life cycle emissions?
- Will it impact energy security?

Heat

Resources
- How will system adapt?
4. Dem Reduction is central

**Demand**
Many ways to reduce demand for materials and energy

**Transport**
Reducing energy consumption + decarbonising energy vector

**Buildings**
Need to tackle 3 gaps: Ambition, Prediction and Performance

**Hydrogen**
Need demand reduction to counteract reduced efficiency

**Recommendations**
- Tax “bads”
- Food waste & packaging regs
- Public procurement
- Not over-specifying buildings
- Lighter Vehicle
- Random testing of build quality
- Tighter building regs
5. Governance & Ownership is Changing

Utilities 2050: Many models for utilities going forward

Cities: How do local authority ambitions stack with national?

Community Energy: What benefits does community energy bring?

Smart Energy: How will individuals respond?

National

Household
6. Implications for Techs

(a) Need a portfolio in each area

- One tech can’t do it all / fast enough
- need for diversity
6. Implications for Techs

(b) Some things are almost unavoidable

- CCS
- Smart controls
- Dem reduction
6. Implications for Techs

(b) Some things are almost unavoidable
- CCS
- Smart controls
- Dem reduction

Technology dependencies in energy system
7. Need for Strategic Narrative

- What are the challenges?
- What are the constraints?
- What are the technologies?

Developed through open engagement

Deliver the transformation

Builds trust

Strategic Narrative
7. Need for Strategic Narrative

Example: Energy Prices

It’s clear they have to rise x2?

Little engagement with the public

So lack of trust of energy co.s + gvt
Qs

- What themes have you seen?
- What are important ones to pursue?