Ideas on how to stimulate more energy network related innovation

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Preliminaries: framing the innovation issue

- No single definition of innovation: broad division between ‘radical’ and ‘incremental’ innovation.
- Types of innovative activity: technological, personnel-related, process, structural etc..
- The innovation cycle: (1) idea conceived; (2) idea transformed into new practices/products; (3) diffusion among multiple parties.
- General acceptance there is no linear/direct relationship between regulatory initiatives and the achievement of ‘innovation’.
- By nature, difficult to predict/assess *ex ante* what outcomes will emerge from innovative activity → reason for a focus on ‘innovation frameworks’.
- Mindful of the fact that innovation can come from inside or outside the energy sector – developments in ICT for example.

Preliminaries: An innovation deficit in energy networks?

- The extent of the innovation deficit in energy-network related activities
  - Magnitude of the deficit?
  - Manifestation of the deficit? Where in the cycle – ideas, transformation, diffusion?

- On the one hand, clearly some significant innovations since liberalisation
  - Smart grids and smart metering.

- However, R&D expenditure and activity have reduced since liberalisation. Why?
  - Pressure to reduce those costs not related to short-term performance;
  - Firms may have become more risk averse: focus only on certain areas where investments in innovation will bear fruit – eg: second adopters in water sector;
  - Re-orientation of innovative efforts toward those that have concrete customer benefits;
  - Uncertainty about future changes in government or regulatory policy;
  - Other reasons: firm size; vertical integration; and composition of staff (loss of creative types).

Encouraging innovation: the input side

1. *R&D allowance*

- Allow for the automatic expensing of a pre-specified amount of R&D expense within the regulatory period.
- Similar to PPRS, where a maximum of 20% R&D costs can be expensed.
- Positives: non-prescriptive; encourages risk-taking; could foster a 'culture of innovation'.
- Drawbacks: a non-contingent subsidy; limited to price-controlled firms.
- What rate of 'R&D allowance' would be appropriate for energy networks?
  - In pharmaceuticals, 20% on basis R&D a central activity and socially desirable.
  - Do same arguments apply to energy networks?

Encouraging innovation: the input side

2. *Capitalising R&D expenditure*

- A ‘capital allowance’ for R&D which is incorporated into the asset base and capitalised over time.
- Similar to the ‘R&D allowance’, but changes the inter-temporal allocation of these costs; current customers bear only a proportion of costs, while future customers exposed to costs of a previous regulatory period.
- Positives: flexible; no need to specify *ex ante* what projects or activities the R&D will relate to?
- Drawbacks: a non-contingent subsidy; limited to price-controlled firms.

Encouraging innovation: the input side

3. *Return of the glidepath*

- Adapt the regulatory timing to allow for (a proportion of) any efficiency benefits of innovation to be 'kept' in next regulatory period.

- Balance between Po adjustments (immediate reductions) and gradual adjustments to path of prices (glide-path).

- May provide greater incentives for regulated firms to engage in innovative activities which reduce costs during a regulatory period, with knowledge that they can retain some of benefits in a future period.

Encouraging innovation: the output side

1. *Ex post adjustments to reward successful innovations*

   - Additional reward at end of regulatory period if can point to successful areas of innovation.

   - For example:
     - An additional return on cost of capital for significant and tangible improvements in network performance as result of innovation.
     - A 'regulatory holiday' where there is a substantial and specific innovative output – largely unrestricted in pricing for new and innovative services.

   - Benefits: customers only exposed to costs of successful innovations; non-prescriptive; still encourages innovation.

   - Limitations: innovation concentrated only in 'successful' areas; does not address concern about 'risk-taking'; difficulties in measurement, especially for less tangible forms of innovation (process or management changes); limited to price controlled firms.

Encouraging innovation: the output side

2. *A prize based mechanism*

- Addresses limitation of other approaches in so far as incentives are not limited to regulated firms only.
- Possibility of a 'prize' based mechanism which supports/rewards firms or individuals for innovations that can be shown to lead to significant and tangible benefits
- Could operate on an *ex post* basis, or support innovative activity in developmental stage through seed funding.
- Variation might be 'prizes' for companies who can demonstrate that they are the first to develop new ideas/mechanisms for particular problems or to meet a certain output requirement/target.
  - For example, the first organisation to develop ways of connecting different voltages of distributed generation to grid on a reasonable scale.
- Benefits: non-prescriptive; wide participation.
- Limitations: innovation concentrated only in 'successful' areas; does not address concern about 'risk-taking'; difficulties in measurement.

Encouraging innovation: Institutional possibilities

1. *A greater role for comparative benchmarking?*

   - In water sector, this is claimed (by some) to have created an environment that encourages the seeking out innovative solutions (although link to outputs is not clear).

2. *Role for a dedicated industry research body?*

   - To address the 'coordination problem' (private costs > social benefits)
   - Other sectors: UK Water Industry Research Council
   - Other countries: Germany Energy Agency (dena) a combined public-private organisation that 'initiates, coordinates and implements innovative campaigns particularly in relation to sustainable energy networks and systems'

Final thoughts

- Notion of ‘innovation’ difficult to define with precision.
- No single approach will represent an off-shelf solution.
- Best way forward may be to try a number of approaches on a test scale and see which ones are most effective (similar to R&D approach).
- Could combine different measures: a small R&D allowance plus a prize based mechanism.
- Identify where in innovation cycle problems or blockages may exist – is there a lack of creative thought/ideas? Are there problems in converting those ideas?
- Key theme: regulatory framework should seek to be as least prescriptive and deterministic as possible.