

Financial challenges of clean energy technology projects

Can we finance hydrogen infrastructure?

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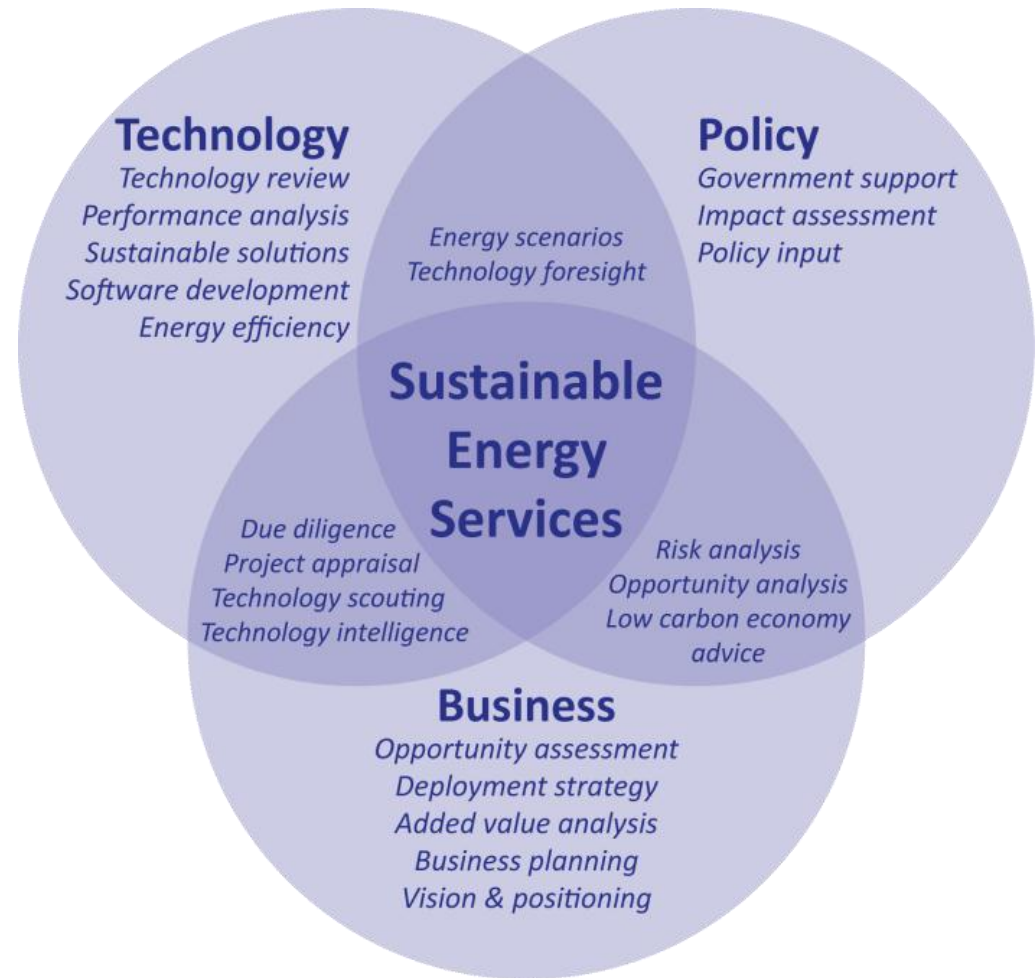
E4tech helps businesses, policy makers and technology developers with strategic issues in sustainable energy

Successful sustainable energy solutions consider:

- Competing technologies
- Evolving policy environments
- Business and finance imperatives

E4tech's objective analysis and expertise provide:

- Evaluation of different risks in these disparate areas
- Guidance under uncertainty
- Support in taking the next steps



Financing new technology is difficult...

- New technology brings risk and cost
- It faces clear structural barriers versus the incumbent(s)
- Agency splits complicate incentives
 - Landlord / tenant
 - National vs local mechanisms, costs and benefits
- Anything requiring 'big infrastructure' is even trickier
 - Stranded assets
 - Systems dependency/lock-in/network effects
- And end-use consumer goods face different barriers from enabling services



Image: European Commission

...and it is hard to finance clean technology *just because it is clean...*

- Social benefit : private cost
- Energy is a commodity – few niche markets
- Uncertainty
 - Boundary conditions (e.g. cross-border taxation)
 - Policy environment (e.g. feed-in tariffs)
 - Consumer uptake
 - Competing solutions (VHS, Betamax)
- Financing the right part of the chain
 - Biomass power: do you finance the electricity, the plant or growing the fuel?
- Incentives can have unintended consequences
 - European solar market support partly helped Chinese firms



Image: iStock

Financing hydrogen infrastructure is harder still

- Vehicles may be (fairly) straightforward to finance – not utilisation dependent
 - Make them desirable (comfort, performance, mains power offtake etc)
 - Reduce cost to affordable level
 - Provide public incentives to support uptake and build volume
 - Cash – subsidy, tax break etc (measurable per vehicle)
 - Benefit – free parking, congestion charge avoidance etc
- Infrastructure is much harder – utilisation dependent
 - Needs demand/throughput, lacking initially (lower cost of fuel may not be enough)
 - The chain/risk has multiple owners
 - It's local/regional not global so scale economics poor
 - First mover disadvantage – others can copy, or learn from mistakes
- And hydrogen even more so:
 - Fuelling pressure, dispensing equipment, immeasurable contaminant levels...



Image: Royal Society for Chemistry

However, infrastructure changes from the past offer lessons

- UK switch to **North Sea Gas** in 1960s
 - **Nationally-owned industry** co-ordinated household-level equipment change to allow a different fuel
 - Government financing allowed local costs to be absorbed for national benefits. End user benefit minimal
- Establishment of **mobile phone networks** since 1980s
 - Government licenses **limited number of market actors** who raise private finance against future revenues
 - Restricted competition creates business case for finance
- **US rural electrification** in 1930s
 - Special Rural Electrification Agency loans to state / local governments, farmers' cooperatives, and nonprofits (not end users) to fund grid extensions
 - Strong user benefit creates demand and willingness of **intermediaries** to aggregate demand and take on financing risk



Can we learn from history and target the right areas for support?

- Ideally unify incentives
 - OEMs and infrastructure providers are not equal
- Break down the key areas of pain / risk and address in turn
 - Low early utilisation → guaranteed cashflow (subsidise early fuel sales, tax later)
 - First-mover disadvantage solution (e.g. tradable station permits; geographic buffers)
- Model cashflows in detail and decide what to finance
 - Flatten / share the pain and the gain
- Think about non-traditional models
 - Allow as much modularity as possible to minimise up-front cost and maximise utilisation
 - Cross-finance high & low throughput stations
- Sign up buyers in advance
- Maintain international dialogue



Image: CollegeView

Some options are more obvious than others

- Attract new entrants: growth is easier to finance than cannibalisation
 - IGCs: Intelligently-enabled roaming tankers which visit the vehicle when parked
 - Power utilities: use 'spare' electricity to enter at specific locations
 - Supermarkets: with user fleets that can guarantee utilisation
- Users pay in advance
 - Infrastructure premium per vehicle, recouped by infrastructure providers on fuel
 - Pre-paid fuel – like a leasing deal bundled with the car
- Insurance for infrastructure costs
 - Station has throughput forecast, insured by an instrument paid for jointly by fuel and vehicle cos. Shortfall triggers payment to infrastructure provider
- OEM CO₂ targets/credits used to make tradable instruments for infrastructure
- Set up owners' co-operatives to fund local fuelling stations
- Find a sugar daddy – or a group of them

Thank you

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