

Barriers to Market Entry for Green Tech

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Why haven't electric cars taken off yet? Why is microgeneration uptake so limited in the UK compared to Europe? Why is biogas technology not dealing with all of the food waste in the UK? In this View from the Field, we take a look at barriers to market entry for green technologies and see that they are many and often case specific.

Many technologies never make it out of the research department, the university lab, or through new product development, despite many potentially offering a real social and/or environmental benefit. Green technologies offer tangible environmental benefits and services, but in a commercial world, the bottom line still comes first. This is where government assistance may be necessary in order to tip the scales on economic viability of new technologies for the benefit of society.

Marine Current Turbines for example had a capital expenditure of approximately £9million in building the twin turbine SeaGen tidal power unit (beyond previous R&D). To be economically viable, this pioneering renewable energy build needed to receive a £4.27million grant from the DTI's Technology Program¹. But beyond large capital expenditures, Fisher (1979) defines a barrier to entry as "anything that prevents entry when entry is socially beneficial"². This is especially apt in the case of green tech.

Initially, all new technologies require development before transfer to market is viable. Big R&D spend and IP for private expenditure is necessary. How the technology then gets near market depends on the technology transfer route chosen by the developers – licensing, joint development/commercialisation or outsourcing of componentry are all viable options, but raise issues in terms of securing IP and mechanism for transfer.

Beyond this however, there are many barriers that near-market green tech – technology on the cusp of being commercially viable – needs to overcome³.

General barriers of entry for green tech

Several such barriers are common for most green tech – these can include large capital expenditures, lack of proven track record, difficulty in entering an established (non-green) traditional market and high entry pricing for consumers prior to economies of scale kicking in. The examples below give a practical demonstration of some of these barriers.

Microgeneration

Using microgeneration technology to produce heat and power at home could deliver large amounts of energy and reduce our carbon emissions. So why are only around 100,000 homes in the UK generating energy using micro-scale renewable technologies, mostly solar heating⁴?

¹ <http://www.alternative-energy-news.info/seagen-tidal-power-installation/>

² Fisher, Franklin M., "Diagnosing Monopoly," Quarterly Review of Economics and Business, Summer 1979, 19, 7-33

³ For a good review of economic literature to barriers to entry, see McAfee, R.P *et al* (2003) <http://www.mcafee.cc/Papers/PDF/Barriers2Entry.pdf>

Adoption rates of renewable energy technologies – such as photovoltaics and wind turbines – are far lower than our European counterparts such as Germany. The barriers for the consumer include the economic viability of the projects; inability to access finance to cover the capital outlay; lack of knowledge of the planning process they need to follow and lack of information on the best solution for their home. All of these are symptoms of the undeveloped green tech market in the UK.

Technology providers are active in this sector, poised to take advantage of more favourable economics that must be driven by the government. Fortunately – finally - the Government has high hopes for microgeneration, and is starting to deal with some of the barriers to adoption. As well as making grants available, the introduction of the feed-in-tariff may help ease the economic barrier, allowing home owners to earn a return from excess generation. Planning is improving too, with Permitted Development Orders streamlining the application process. Watch PV providers such as Solar Century take off as their business finally becomes economically more attractive to the mass market.

Large scale anaerobic digestion (AD)

The UK Government is promoting AD – using microorganisms to break down biodegradable material in the absence of oxygen producing biogas and low grade fertiliser – as means of diverting food and biological waste from landfill and as a generator of energy which can be returned to the grid via CHP.

Despite being given a green light from government in the form of economic incentives (double Renewable Obligation Certificates – ROCs, WRAP grants etc⁵), anaerobic digestion has certainly not been fast-tracked into the UK waste market or guaranteed success.

AD plants dealing with commercial and municipal food waste need to be fairly sizable in order to give decent returns – and this requires large upfront capital investment – of around £10 million for a 30,000 MT plant for example. An AD technology provider or operator also lack a track record in the UK, so must demonstrate European experience, if they have any, in order to attract backing. Builds of this size also depend on convoluted planning applications and the considerable uncertainty associated with this where there is no existing protocol or precedent.

They also face a mature waste market, dominated by several large waste management companies and a series of smaller companies owning transfer stations, MRFs (materials recycling facilities) and landfill sites, and have to compete with long term contracts between local authorities and their waste managers, who may have already invested heavily in other technologies such as incineration. Composting in this environment also mops up much of the segregated biological streams at a very competitive price.

To overcome these barriers, AD providers need to work in partnership with waste management providers or with large food waste producers directly to best place themselves in an established system which is ready for change.

Lithium Ion Batteries

Commercially available electric vehicles are now only a year or two away, but they've faced a series of barriers to market entry. The car manufacturers and other independent companies have invested large amounts into R&D to make electric vehicle engines, and design batteries and equivalents (fuel cells, hybrid drives).

⁴ <http://good-energy.typepad.com/greenenergyrepublic/>

⁵ For a full listing of available government support for Anaerobic Digestion, visit the Defra website <http://www.defra.gov.uk/environment/waste/ad/market.htm>

The current leader in the green tech battle for next generation eco-cars is the lithium ion battery, but its adoption means that vehicles will have large upfront costs which may put off consumers⁶. The manufacturers are trying to overcome this by dealing with the informational barriers⁷ that exist – improving information available to consumers through focused marketing drives. By publicising the low maintenance costs and the cheap running costs, the vehicles become much more attractive. But still unknown are the risks of the second hand value if battery life is depleted after several years of use, and recharging (or battery swapping) stations are not yet in place. Infrastructure to support electric vehicles is not yet in place, meaning that long-distance journeys are problematic. Until a threshold number of electric vehicles are on the road, investment in infrastructure is unlikely to occur on a large scale.

Conclusion

A few first movers or early adopters will invest in green tech without any more incentive than it is the right thing to do to move towards sustainability, to fulfil personal or company specific objectives.

However, economically viable mass market consumption, or efficiently occupying a potential niche in the market, may require more incentives to secure larger initial uptake and push prices to more competitive levels. Each new green tech innovation will have its own individual barriers, but the common strands of economic viability, access to finance and the need to garner consumer confidence are challenges that need to be addressed by governments, at least initially, until commercial organisations start accounting for the external benefits associated with green tech.

⁶ <http://www.greenbiz.com/blog/2010/04/09/secret-hurdling-barriers-electric-cars>

⁷ <http://www.bnet.com/blog/electric-cars/seven-barriers-to-the-electric-car/1491>