

Sustainable, reliable and affordable low-carbon energy

Goal 7: “Ensure access to affordable, reliable, sustainable, and modern energy for all”

Summary

The world faces steep challenges in meeting current and future energy demands with low-carbon energy sources. Access to energy is important for health, economic development, education, and communications, but countries need to identify what kind of ‘modern energy’ is required, its intended impact and how it will be implemented.

Modern energy: sustainable, reliable, efficient energy supply

Goal 7 targets ‘modern energy’, but modern energy needn’t take the same form in every country. Instead, it should be understood as responding to the demands of consumers and communities. In Europe, this might mean high quality power with extensive infrastructure, but energy demands can be met in lower cost, and more decentralised ways. However it is understood, energy faces the same imperatives, including the need for sustainability, reliability of supply, and efficiency.

Sustainability: To make energy supply and transmission more sustainable, countries need to address the actual cost of carbon through carbon trading or taxation schemes. Otherwise it will be very hard for low-income countries to invest in renewables in place of fossil fuels. Costing carbon appropriately allows for the revenues generated to be reinvested into the low-carbon transition. Decarbonising countries’ energy supplies involves decommissioning (or reducing the running time of) fossil fuel-based energy generation. This ‘switch-off’ cannot take place all at once, and needs careful planning by a ‘system architect’ [1].

Reliability: As renewables penetrate the global energy market all countries will face issues of energy grid balancing and stability. Energy storage is vital to making clean energy resources available to all. Though expensive now, it will become increasingly available as the cost of carbon increases and the cost of renewable energy supply goes down. The problem of grid balancing does not necessarily need a high-tech solution, as energy can be stored in multiple forms at a range of scales appropriate to the needs of users [2].

Efficiency: In unbundled markets, the energy supplier has little commercial interest in increasing energy efficiency – they simply sell electricity, and have nothing to do with the wires that deliver it [3]. This makes energy efficiency hard to get off the ground. Instead, where the supplier and utility are bundled together, the savings from energy efficiency can offset – and outweigh – costs of infrastructure investment in efficiency. Efficiency at the level of the end-user is also important, with smart grid technologies allowing energy users to monitor their energy usage and identify potential savings.

Recommendations for developing implementation of goal 7

Countries that are beginning to establish or increase accessibility to electricity should:

- Avoid having an unbundled market that separates energy supply from transmission and distribution. Instead they should look at developing a system that sells energy as a service [4] rather than by the kilowatt-hour.
- Account for off-grid solutions – e.g. microgeneration and local delivery – as part of user – appropriate energy provision and promote decentralised, community-led energy provision.
- Cost carbon appropriately – as a ‘hidden cost’ in countries’ energy balance sheets it diverts attention from the actual cost of fossil fuel dependence.
- In making energy efficient, affordable and reliable it also needs to be appropriate and demand driven. Countries need to define, in a participatory way, their own energy needs and values.

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References:

[1] Taylor, P. ‘We need an independent architect to redesign the UK energy industry’. The Guardian. <http://www.theguardian.com/big-energy-debate/energy-industry-independent-market-architect-redesign>

[2] For examples in the UK see Lyons, PF, Wade, NS, Jiang, T, Taylor, P, Hashiesh, F, Michel, M, Miller, D. ‘Design and analysis of electrical energy storage demonstration projects on UK distribution networks’, Applied Energy, 137: 677-691

[3] Anuta, OH, Taylor, P, Jones, D, McEntee, T, Wade, N. (2014) ‘An international review of the implications of regulatory and electricity market structures on the emergence of grid scale electricity storage’, Renewable and Sustainable Energy Reviews, 38: 489-508

[4] Hinells, PBM, Rezessy, S. ‘Liberating the power of Energy Services and ESCOs in a liberalised energy market’.