Energy revolution

Demand for energy is increasing, the availability of fuel sources is changing, and a massive shift toward low carbon energy is required to keep climate change within internationally agreed 'safe' limits. The pressure to transform current energy systems is therefore intense, and there is a discernible move away from centralised models run mainly on fossil fuels, towards decentralised ones using renewable energy. [1]

Smart grids and the rise of digital technologies have added momentum to the transition. A low-carbon, smart, decentralised energy system would be more resilient, and would allow more people access to clean, cheap energy – particularly in rural areas of the Global South.

Renewables are not the only means for arriving at a low-carbon future: carbon capture and storage could also allow us to produce energy at less cost to the environment. Moreover, properly functioning energy markets will require investment and possibly some form of regional integration to deliver sustained benefits to all consumers. As energy infrastructure typically has a slow turnover rate, decisions made in the next decade will have a lasting effect on our ability to supply and use energy sustainably in the further future.

Footnotes:

1. [1] World Energy Council (2013). World Energy Scenarios: Composing energy futures to 2050.

Implications

- We are in the midst of a huge transformation in energy generation, distribution and consumption. Every organisation needs to plot its contribution to this transformation and ensure that it isn’t left exposed by a reliance on old systems.
- To accelerate the transition to a sustainable energy system – locally, nationally and internationally – we urgently need to find new ways of generating, selling, using and saving energy.
- Exciting alternatives to current systems and smart technologies promise a radically different future for energy production and consumption. An increasing number of ‘non-energy’ businesses are now taking bets on how this new system will work, including big players such as Google, GE and IBM. This demonstrates that the ‘rise of digital’ is complementary to many disruptive energy technologies.
- A new dialogue on climate change – and climate risk – is emerging and this, along with the on-th--ground ‘success’ of distributed renewables, is making international action on climate change more likely to happen. Any action that does occur will add further impetus to the energy transformation.

Current trajectory

- Based on business-as-usual models, total world energy demand is predicted to increase by 50% by 2030, [1] albeit at a slower pace than in the past ten years; non-OECD countries will drive the bulk

of the growth. [2] World primary energy consumption grew by 1.8% in 2012, well below the 10-year average of 2.6%. Consumption in OECD countries also fell by 1.2%, led by a decline of 2.8% in the US (the world's largest decline in volumetric terms). However, non-OECD consumption increased by 4.2%, which was below the 10-year average of 5.3%. [3]

- The cost of photovoltaic (PV) solar modules in the US today is around 1% of what they cost 35 years ago, and 2013-4 saw more new renewable capacity added to the US grid than new fossil fuel and nuclear capacity combined. [4]
- More than 30% of new electricity generation capacity added in 2010–2013 came from solar and wind power, up from less than 2% in 2000–2003. [5]
- According to Deutsche Bank, solar power will be at grid parity [6] in most of the world by the end of 2017. This is because grid-based electricity prices are rising across the world, while solar costs are falling. [7]
- On May 11, 2014, Germany produced 74% of its energy from renewables – a new record for the country. This occurred at midday, with solar and wind energy filling in a large portion of the power. The country is aiming to produce 80% of its power from renewables by 2050. [8]
- Globally over 1.3 billion people have no access to electricity, and 2.6 billion people are without clean cooking facilities. More than 95% of these people live either in sub-Saharan African or developing Asia, and 84% are in rural areas. [9]
- Due to dwindling supplies of non-renewable energy sources, oil companies are having to go farther and drill deeper to find new reserves even as their costs mount and returns diminish. [10]. Currently, around 10% of the world's oil and one-quarter of its natural gas production comes from the Arctic region. [11] Such expeditions depend on high oil prices to make them worthwhile.

Footnotes:

1. [2] These numbers will be rendered obsolete if the energy transition to renewables takes place. International Energy Agency (IEA). (2011). World Energy Outlook 2011.
2. [3] World Bank (2014). World Development Indicators, Chapter 3: Environment, pg 52.
3. [4] BP Statistical Review of World Energy, June 2013
4. [5] CleanTechnica (2014). Renewable Energy = 68% of New Electricity Capacity In September
5. [6] US Energy Information Administration. (2014). EIA projects modest needs for new electric generation capacity. Today in Energy
6. [7] The term "grid parity" is meant to describe the point in time at which a developing technology will produce electricity for the same cost to ratepayers as traditional technologies. That is, when the new technology can produce electricity for the same cost as the electricity available on a utility's transmission and distribution "grid".
7. [8] Cleantechnica (2015, Jan). Deutsche Bank Predicts Solar Grid Parity In 80% Of Global Market By 2017
8. [9] EcoWatch (2014, May). Germany Generates Record-Setting 74 Percent of Energy From Renewables
9. [10] International Energy Agency (2013). Energy Poverty.
10. [11] Earth Policy Institute (2014, September). Fossil Fuel Development in the Arctic is a Bad Investment
11. [12] Earth Policy Institute (2014, September). Fossil Fuel Development in the Arctic is a Bad Investment