



A Collection of Primary Tools



Clean Energy

Technology options for decentralized new energy supply.

Cities are in the frontline for cutting carbon emissions. Decarbonising urban buildings and transport is key to attain Paris climate goals, but slow progress will test governments' commitment. Cities must take the lead in the transition to a low-carbon energy sector (IEA 2016). This is particularly so since urban areas account for up to two-thirds of the potential to cost-effectively reduce global carbon emissions. "Cities today are home to about half the global population but represent almost two-thirds of global energy demand and 70% of carbon emissions from the energy sector, so they must play a leading role if COP21 commitments are to be achieved,"... "Because cities are centres of economic growth and innovation, they are ideal test-beds for new technologies – from more sustainable transport systems to smart grids – that will help lead the transition to a low-carbon energy sector."¹

What this tool does:

This tool tries to help local governments to select most relevant and energy-efficient technologies. There are four technology revolutions available today. In the last five years they have achieved dramatic reductions in cost and this has been accompanied by a surge in consumer, industrial and commercial deployment. Although these four technologies still represent a small percentage of their total market (e.g. electricity, cars and lighting), they are growing rapidly. The four key technologies this report focuses on are: (i) onshore wind power; (ii) polysilicon photovoltaic modules; (iii) LED lighting; and (iv) electric vehicles (see: US Department of Energy, 2013).

Applications:

- Urban buildings provide useful space to self-generate the electricity they consume: by 2050, rooftop solar could technically meet one-third of cities' electricity demand. And those buildings offer significant demand potential for the roll-out of the most efficient technologies, like energy-efficient windows and appliances.
- Best electric vehicles and public transport can lead to a low-carbon mobility system while reducing investment needs compared with current development trends in cities.
- The total renewable energy capacity installed currently provides around 23% of global electricity generation, sustained by progress in solar PV and on-shore wind that pushed the growth of renewable energy capacity to a record high, exceeding 150 gigawatts in 2015. This is an encouraging trend in line with the 2°C goal of having in excess of two-thirds of electricity generated by renewables in 2050. China is the largest renewable energy market, accounting in 2015 for more than half of the world's new global onshore wind capacity and one-third of the solar PV capacity installed.²

How does it work: The tool proposes to screen new or newly emerging technology options for the most cost-effective technologies for low-carbon cities.

- Technology screening.
- Review of alternative technology options.
- Comparison of new energy solutions versus conventional technology.
- Calculation of cost-efficiency of new energy solutions, taking into account:
 - Capital costs.
 - Life span of technology.
 - Maintenance costs.
 - CO₂ impacts.
- Compare local with imported products.
- Availability of products on national/local market.
- Quality of maintenance services.

Consider Smart Objectives

Energy performance standard

S: Focus on specific product or product group

M: Performance characteristics aimed for/set baseline

A: Performance standard links to best available product on the market and is regularly updated

R: Best available product is accepted by the target group

T: Set clear target period

Subsidy scheme

S: Focus on specific target group and on specific technologies

M: Quantified energy savings target/set baseline

A: Minimize freeriders

R: Link the savings target to the available budget

T: Link the energy savings target to a target period

(Voluntary) Energy audit³

S: Focus on specific target group

- M: Quantify the target audit volume (m2, number of companies, % of energy use, etc.)/set baseline
- A: Encourage to implement recommended measures, e.g. by offering financial incentives
- R: Ensure that sufficient qualified auditors have been assigned and financial incentives are in place to carry out audits
- T: Link the quantified target to a target period

References

¹ Source: <http://www.iea.org/topics/cleanenergytechnologies/>

² see IEA: <http://www.iea.org/topics/cleanenergytechnologies/>

³ (Source: EU. 2010. *How to Develop a Sustainable Energy Action Plan (SEAP) – Guidebook*. Brussels. http://www.eumayors.eu/IMG/pdf/seap_guidelines_en.pdf)

Further Reading

International Energy Agency. 2016. Energy Technology Perspectives 2016. Towards Sustainable Urban Energy Systems. http://www.iea.org/bookshop/719-Energy_Technology_Perspectives_2016

US Department of Energy. 2013. Revolution Now: The Future Arrives for Four Clean Energy Technologies. <http://energy.gov/sites/prod/files/2013/09/f2/Revolution%20Now%20--%20The%20Future%20Arrives%20for%20Four%20Clean%20Energy%20Technologies.pdf>