Introduction to Energy Technology Roadmaps

Energy technology roadmaps
Overview

- About technology roadmaps
- IEA Generic Roadmap Guide
- Examples of IEA roadmaps
ABOUT TECHNOLOGY ROADMAPS
IEA Roadmap Definition

“A technology roadmap is a dynamic set of technical, policy, legal, financial, market & organizational requirements identified by all stakeholders involved in its development. The effort shall lead to improved and enhanced sharing and collaboration of all related technology-specific RDD&D information among participants.

The goal is to accelerate the overall RDD&D process in order to deliver an earlier uptake of the specific energy technology into the marketplace”.

Technology roadmaps provide answers

- Where is technology today?
  - GW installed capacity/kWh of savings
  - Leading countries/regions
  - Cost, efficiency

- What is the deployment pathway needed to achieve 2050 goals?
  - Use IEA Energy Technology Perspectives BLUE Map scenarios

- What are the priority near-term actions?
  - R&D gaps and how to fill them
  - Identify barriers and obstacles and how to overcome
  - Market requirements and policy needs
  - Technology diffusion/transfer and international collaboration needs
Technology roadmaps status

2009
- Wind (China) and Cement (India)

2010
- Bioenergy for heat and power
- Vehicle Fuel Economy
- Solar heating & cooling
- High efficiency, low emissions coal
- Chemical catalysis
- Hydropower
- Energy efficient building envelopes

2011
- Energy Technology Roadmaps
- Technology Roadmap
- Energy Technology Roadmap
- Energy Technology Roadmap

2012 / 2013
- National Roadmaps

And.....Wind (China) and Cement (India)
National roadmaps
IEA GENERIC ROADMAP GUIDE
Energy technology roadmaps guide

• Guide published in 2010 by IEA
  – Understanding roadmaps
  – Roadmap development process
  – Tailoring the roadmap process

Roadmap logic

- Goal to achieve
- Milestones to be met
- Gaps to be filled
- Actions to overcome gaps and barriers
- What and when things need to be achieved

Energy technology roadmaps
Roadmap process outline

Planning and preparation

- **Expert judgement and consensus**
  - Establish Steering Committee; determine scope, boundaries, and implementation approach
  - 3-12 people

- **Data and analysis**
  - Develop energy, environmental, and economic data to establish national baseline
  - 1-2 months

Visioning

- **Visioning**
  - Conduct senior-level vision workshop to identify long-term goals and objectives
  - 10-40 people

- Analyse future scenarios for energy and environment
  - 1-2 months

Roadmap development

- **Roadmap development**
  - Conduct expert workshop(s) to identify and prioritise needed technologies, policies, and timelines
  - 25-150 people

  - Assess potential contributions of technologies to future energy, environmental, and economic goals
  - 2-4 months

  - Develop roadmap document, launch strategy, and tracking systems
  - 2-6 months

  - Conduct review and consultation cycles with key stakeholders; refine roadmap
  - Recurring (1-5 years)

Roadmap implementation and revision

- **Roadmap implementation and revision**
  - Conduct expert workshop(s) to reassess priorities and timelines as progress and new trends emerge
  - 20-100 people

  - Track changes in energy, environmental, and economic factors as roadmap is implemented

**Note**: Dotted lines indicate optional steps, based on analysis capabilities and resources.
The Smart Grids Experience with the guide

• Principles apply – but some challenges
• Difficulties:
  – Lack of data and modeling
  – Lack of understanding (or misunderstanding) of Smart Grids
  – Systems based technology
  – Complex and highly regulated environment
  – Difficult to define baseline – where are we?
An imperfect process......

• Understood the IEA audience and IEA role
• Engaged broad based steering committee and stakeholder group – manufacturers, utilities, government, industry associations, research organisations, implementing agreements.

• 6 workshops:
  – What are smart grids? What are key technologies?
  – Role of Government and Private sector
  – Smart grid – smart customer policy
  – Developing country context
  – 2 joint workshop with ENARD implementing agreement
....for an imperfect technology area

• Engaged with a number of global experts and leveraged political interest.

• Tried to answer the key questions....
  – What are smart grids?
  – Why are they important? Why do we need them?
  – Can they do everything? (NO!!!)
  – New modeling to investigate peak demand and CO$_2$ reductions

• Defined future work, and key gaps.

• Did not attempt to be everything to everyone
A final thought

• Roadmaps can be powerful tools for
  – Aligning interests and skills of diverse stakeholders
  – Identifying steps and timing needed to achieve a chosen future
  – Generating buy-in and support that leads to real action
  – Monitoring progress against stated milestones and adjusting the plan as needed
But.....

- It is not a one size fits all
- Systems based technologies are difficult
- Defining why it is difficult is a challenge
- Over 35,000 downloads to date
- Discovered a large body of work that is not being adequately addressed
For more information

• Download the guide:

• Smart Grid Technology Roadmap:

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