UNIVERSITY OF CAMBRIDGE

IfM MANAGEMENT TECHNOLOGY POLICY

ECN
Your energy. Our passion.

Technology Roadmapping and the Technology Mechanism

'Technology roadmaps related to climate change'

Marc Londo, ECN

Bonn

March 25, 2013

Contents

- Highlights of the background paper for the TEC
- Some thoughts on TRMs and adaptation

What are Technology Roadmaps?

A Technology Roadmap (TRM) serves as a coherent basis for specific technology development and transfer activities, providing

- a common (preferably quantifiable) objective,
- time-specific milestones
- and a consistent set of concrete actions;

- … and is developed jointly with relevant stakeholders,
- who commit to their roles in the TRM implementation.

What are technology roadmaps?

- Strategic planning tool in development and diffusion of technologies
  - At corporate level (its origin)
  - At sector level
  - For (supra)national innovation policy

- Not strictly defined: open, flexible
  - In scope
  - In process
  - In result

- Common objectives:
  - Provide strategic focus,
  - Mobilise relevant actors/stakeholders
  - Create coherence in their actions

Evaluating Technology Roadmaps

ECN

UNIVERSITY OF CAMBRIDGE

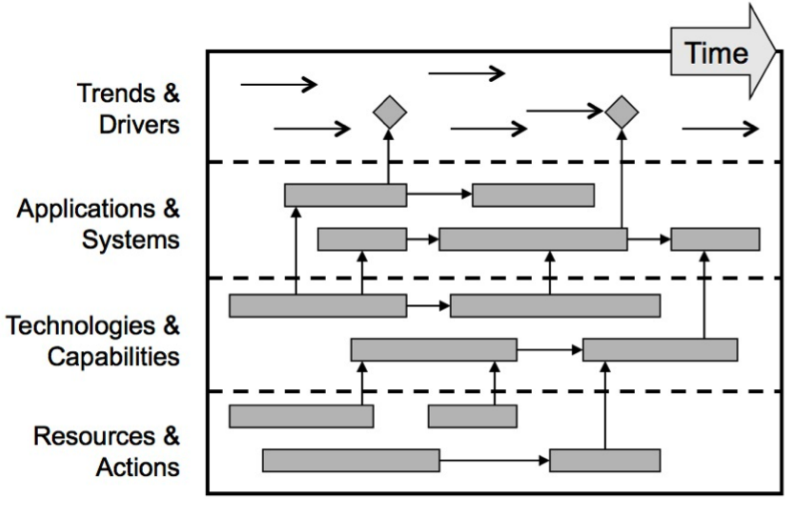
- What is a quality roadmap?
  - Process
  - Document
  - Visual Representation

- Evaluation criteria:
  - Credibility
  - Desirability
  - Utility
  - Adaptability

Possible relation with TEC and Technology Transfer

ECN
UNIVERSITY OF CAMBRIDGE

- Safeguard ‘demand-driven’ nature of TT
- Improve coherence in TT activities
- Improve stakeholder support and engagement (private and public parties)
- Follow-up to TNAs?



TRM review for TEC

- Inventory and selection of TRMs on climate change mitigation and adaptation technologies: 159 documents

Matrix 1 Summary	Geographical Source			
	International	Annex I	Non Annex I	Total
A1. Renewable Energy	12	39	4	55
A2. Other Energy	6	53	5	64
B. Transportation	6	29		35
C. Buildings	3	13		16
D. Industry	2	12		14
E. Agriculture		2	1	3
F. Waste Management		1		1
G. Adaptation	1	5	5	11
H. Geoengineering		1		1
Total	70	339	27	436

- Analysis:
  - Technology
  - Geographical source
  - Geographical coverage
  - Year of publication
  - Time horizon
  - Authoring organisation
  - Substantive elements
    - Process description
    - Quantifiable targets
    - Visual representation

Specs. of engaged stakeholders

Actions assigned

Plan for update

Key findings

- Mitigation technologies dominate over adaptation
- Geographical source: Annex-1 countries and IGOs
- TRMs on renewables energy technologies more recent than others
- IGO and Industry main authors
- Very few “quality” TRMs (based on six substantive elements)

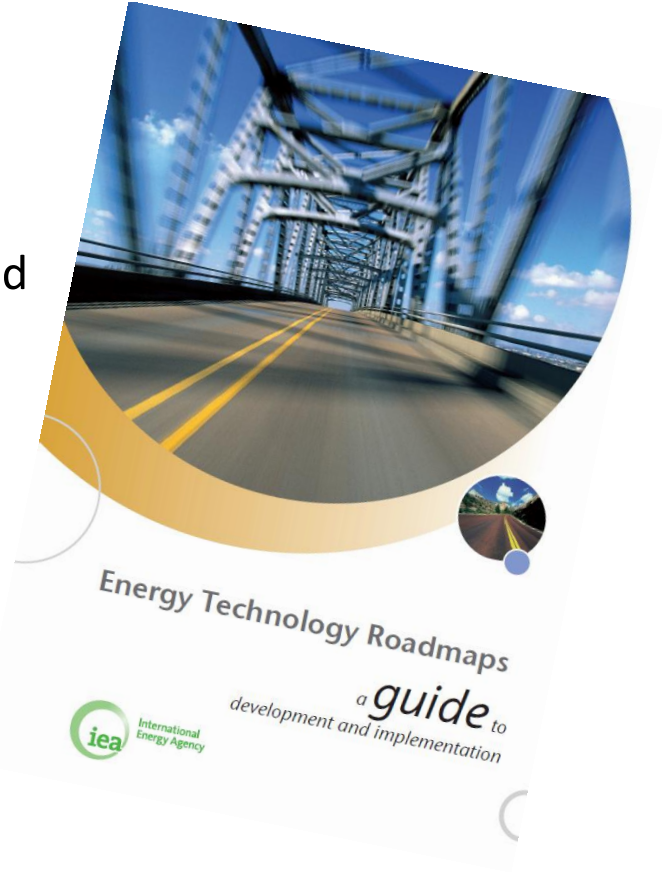
- Need for guidance in order to improve the quality of TRMs.

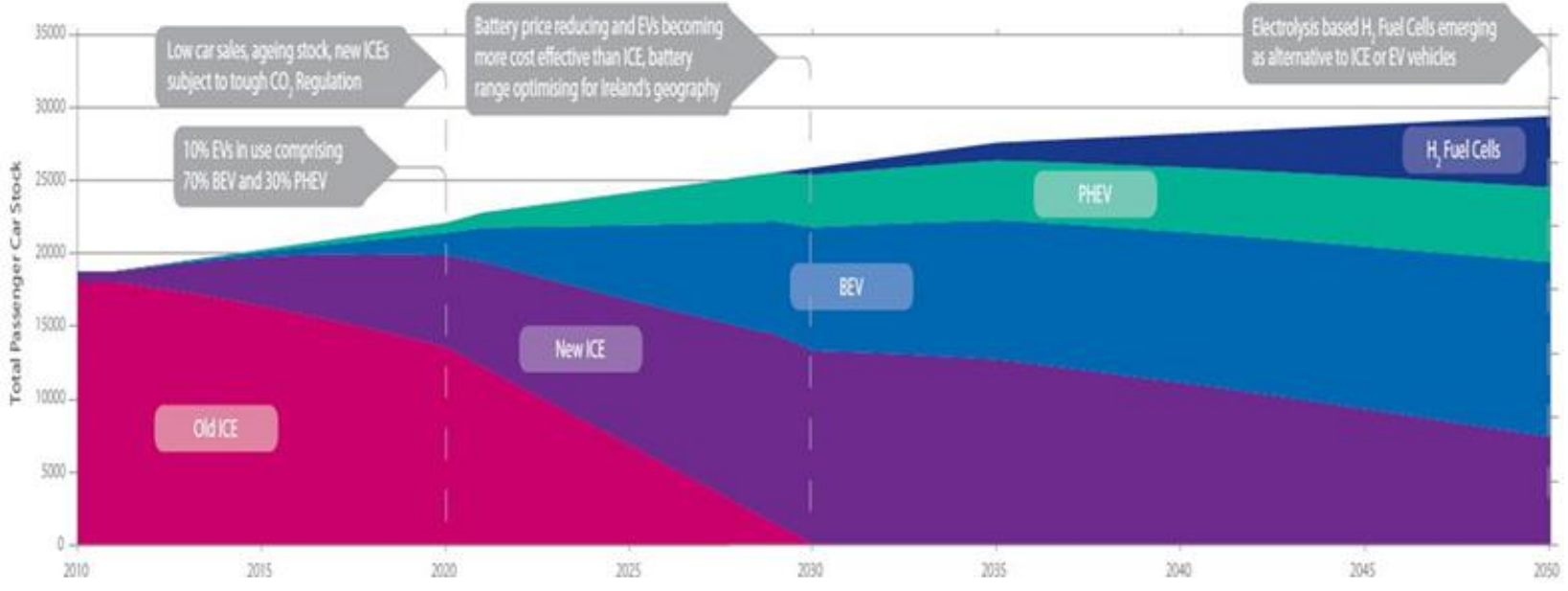
Technology	Substantive Elements					
	Process	Stakeholders	Targets	Actions	Visual	Update
All TRMs	**32%**	**36%**	**60%**	**54%**	**40%**	**9%**
A1. Renewable Energy	23%	14%	61%	55%	43%	9%
A2. Other Energy	31%	40%	55%	46%	45%	6%
B. Transportation	37%	49%	66%	51%	31%	9%
C. Buildings	44%	56%	44%	38%	56%	0%
D. Industry	64%	64%	71%	64%	57%	7%
E. Agriculture	100%	67%	0%	33%	33%	0%
F. Waste Management	100%	100%	0%	0%	0%	0%
G. Adaptation	36%	55%	82%	55%	9%	27%
H. Geoengineering	100%	100%	0%	0%	0%	0%

Good practice examples

- IEA:
  - Comprehensive set of consistent TRMs,
  - Guidance document

- Various good elements in several TRMs identified





POLICY & SUPPORT MEASURES

- Incentives to secure early adaption and acceptance of EV technology and operational characteristics
- Main policy support measures may include fiscal incentives along with soft incentives such as priority parking or congestion change exemption
- EU CO_2 regulations encouraging more investment in battery production facilities resulting in greater variety of BEV & PHEV models from mainstream automotive manufacturers
- Planning system regulations optimised for EV charging infrastructure development on private and public properties
- Electrical trading system rules optimised for sale of electrical energy and electrical services to and from EVs

TECHNOLOGY

- Commercial ready Lithium Ion and Lithium Polymer battery technology resulting in energy densities of 100 to 150 Wh/kg with manufacturing process feedback to battery design leading to reduced battery costs
- High surface area and high ion current intercalation electrodes with advanced electrolyte providing energy densities of 150 to 300 Wh/kg which could also suit retrofit applications
- Lithium carbon nanofibers and advanced chemistries allowing energy densities of 300 to 600 Wh/kg
- Vehicle to Grid Operations enabled through better battery lives and higher current discharge rates with probable assistance from on board vehicle capacitors

Vehicle Type

ICE - Internal Combustion Engine
PHEV - Plug-in Hybrid Electric Vehicle
BEV - Battery Electric Vehicle

KEY

- Government & governing bodies
- Industry
- Power systems & regulators

Further conclusions

Advantages of using TRMs

- Particularly suitable for technology management and related policy
- The strong consensus-building element useful for CTC&N?
- Flexibility, adaptability: strength for Technology Mechanism with diversity of country contexts and technologies

Limitations of using TRMs

- Risk of 'lock-in' or tunnel vision through consensus building.
- Alignment with existing (governmental) plans and strategies.
  - Create culture of openness
  - Follow-up: iteration, refinement, monitoring, updating outcomes
  - Integration with broader policy strategy

Profile of adaptation TRMs

- Only 11 out of 159
  - Water resources (8)
  - Coastal zones (1)
  - Public health (1)
  - Generic (1)
- OECD: 5
  - Various techs.
  - Relatively elaborate
- Non-OECD: 5
  - All on water
  - Relatively concise

Why so few adaptation TRMs?

Not analysed thoroughly, but speculating:

- Generally more attention for mitigation
- Less prominent role of technology (development)
- Underrepresentation in our selection? Hidden adaptation TRMs?
  - Not explicitly climate change
  - Not explicitly adaptation
  - Not explicitly TRM

However, adaptation TRMs could be very useful

ECN
UNIVERSITY OF CAMBRIDGE

- Tech transfer in broad sense
- Importance of knowing context and capabilities in receiving country
- Stakeholder engagement on both sides

So: A case for the TEC!

Thank you for your attention

Marc Londo (ECN) londo@ecn.nl
Elliott More (IfM) egm27@cam.ac.uk
Rob Phaal (IfM)
Laura Würtenberger (ECN)

ECN
Westerduinweg 3
1755 LE Petten
The Netherlands

P.O. Box 1
1755 ZG Petten
The Netherlands

T +31 88 515 49 49
F +31 88 515 44 80

info@ecn.nl
www.ecn.nl

University of Cambridge
Institute for Manufacturing

17 Charles Babbage Road
Cambridge CB3 0FS
UK

T +44 (0)1223 765824
www.ifm.eng.com.ac.uk