Process Intensification

PI: Pathway to sustainability

Wouter Siemers
SenterNovem

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Content

- Introductions SenterNovem, network PIN-NL
- Energy transition
- Action Plan PI
  - ADL study
  - Roadmap
  - PI quick scans
  - international context
- Results till now

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Introduction SenterNovem

- SenterNovem is an agency of the Ministry of Economic Affairs for implementing policies on:
  - innovation
  - energy and climate
  - environment and spatial planning

  SenterNovem aims to strengthen the economy through sustainable development and innovation by clustering knowledge.
- Started on 1 May 2004 from the merger of Senter and Novem

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The network PIN-NL

Aims:

- Dissemination and exchange of knowledge of and experience on PI
- Stimulation of cooperation projects concerning PI (ADL study, Roadmap)
- Stimulation and establishment of PI as a mature technology in the Netherlands

- Since 2006 financial contribution from members
- 20 members from industry, technology institutes and engineering companies

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Introduction transition policy

Drive: Expensive energy, pollution, and dependance of oil and gas from outside Europe

Aim: Sustainable energy system in 2050

- Government and market are working together (PPP)
- Start in 2001 with early project groups
- 2005 Taskforce Energy Transition and 6 platforms, 30 transition routes

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Scheme of platforms per transitiontheme

- Voice of the market
- Develop a strategic vision
- Stimulate transition pathes
- Initiate projects
- Find bottle necks in policies
- Improve involvement of market

New Gas

Sustainable mobility

Chain efficiency

Green feedstocks

Renewable electricity

Built environment

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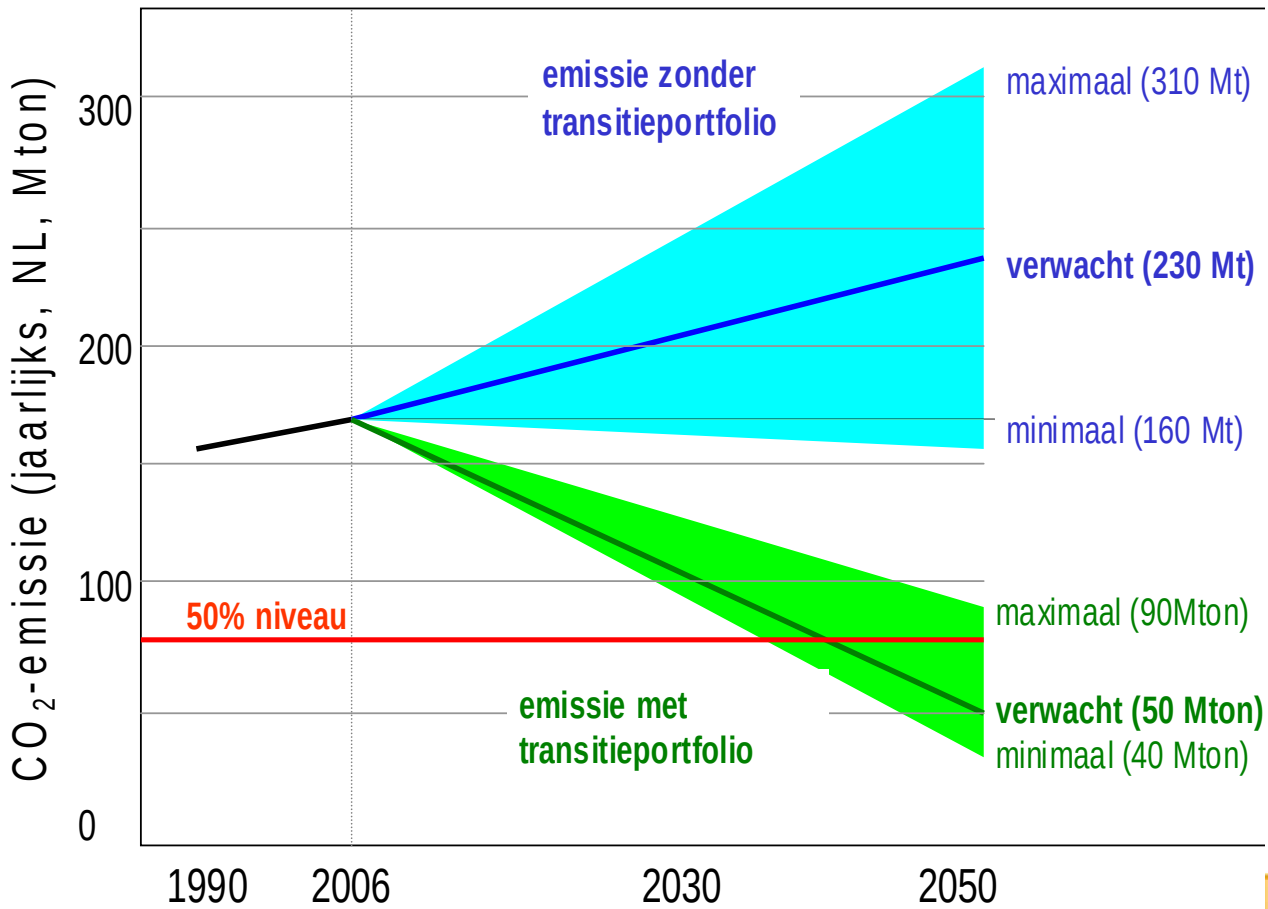
Action plan Taskforce Energy transition



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PI is one of the routes!

- Strong reduction in energy demand
- Combines innovation and efficiency
- Study by Core Team of PI experts (PIN-NL) guided by ADL (2006)

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Approach – PI study ADL (2006)

- Broad scope: food & feed, pharma and fine chemicals, bulk
- Focus:
  - Selected groups of technologies (4)
  - Business drivers ⇔ market applications (3)
- Estimate of energy saving potential (2015/2030)
- Specification of “enabling actions”

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Dit is een initiatief van de overheid

Conclusions/recommendations ADL-study

Key findings in support of increased efforts to accelerate PI :

- Promising potential energy savings, CO_2 reduction and potential for industry competitiveness
- Strong interest of stakeholders from different sectors
- Concrete steps towards broad adoption of PI are now needed

Recommendation to build Roadmap on a solid foundation:

- Strong mandate from government
- Support from top people from key stakeholders
- Link with existing initiatives (abroad) and consortiums

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Action Plan Roadmap

Action Group PI
(on behalf of stakeholders)

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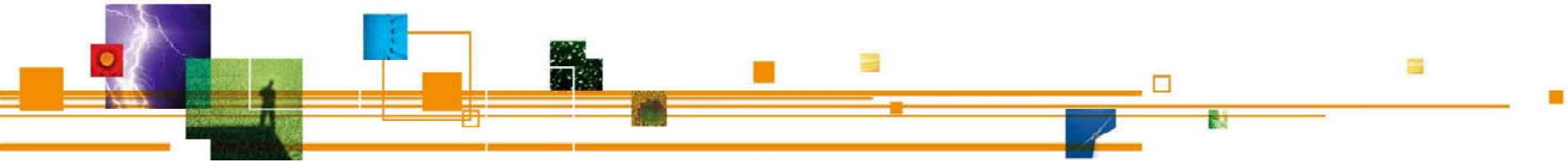
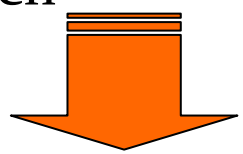


Input	Interaction with stakeholders	Output
	Supply info	Pick low-hanging fruit
Facts & Figures		
	Quick Scans	Roadmap: Organize Broker Implementation and developm. consortia
Ranking PI technologies		
	Workshops	Organize LT R&D cooperation
Q1 Q2	Q2 Q3 Q4	Q3 Q4 2008..etc

Facts & Figures: Filling the PI matrix

- Questionaires to 100+ experts
- Patent search
- Literature search



Review reports for each PI technology:

- Potential benefits
- Barriers
- Development status
- Suggest actions

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Roadmap input

- Rank PI Technologies -> A, B, C
  Main criteria
    - Energy
    - CO_2
    - Cost

- Upgrade review reports for class A technologies

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Interaction with stakeholders

- Supply info
  - Publicity
  - Visit companies
  - Organize symposia
- Do Quick Scans (1)
  - Methodology available (courtesy DSM)
- Workshops
  - Ask companies needs & priorities: business goals
  - Design route to achieve goals

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PI Quick Scans

1. **Basic blue PRINTscan of customer's process**
   - **quick** (1-2 person-days) and cheap
   - suggestions for further R&T activities/contacts
   - information will be used for Raodmap

2. **PI improvement concepts**
   - idea generation, screening and selection
   - 2-3 most promising concepts recommended for further development
   - labourcost: 4-8 person-days

3. **Process concept development and economic evaluation**
   - conceptsof intensified processes developed in details
   - Cost estimates at D-niveau
   - Labour cost depends on process

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International context

- For practical reasons limited at start
- Contacts with Germany (DECHEMA/VDI) :
    - To share the work burden
    - To improve diversity of input

- Link with Working Party PI of the EFCE

- Later other European stakeholders will be invited to build strong consortia

Status

- Roadmap is on scheme to start Q2
- Industry contributes 1/3 in cash + in kind
- Government to finance 2/3 (May 07)

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Questions?

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Action Group Process Intensification

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