


Reach the vision!

Workshop on Materials, processes and technologies for a water sustainable process industry in 2050

Nienke Koeman, TNO
Jitka Macadam, Cranfield University


Chemwater Project

- Workshop 1: March 2012, Vision 2050
- Workshop 2: May 2012, Arrangements needed to implement the vision
- Workshop 3: Sept 2012, Materials, processes and technology challenges


Vision 2012

- Sustainable water use
- Drivers for change
- Realistic picture of the future chemical industry
- Challenges

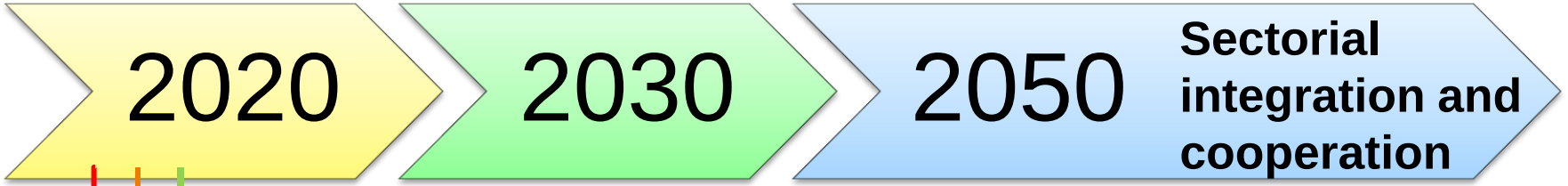

Vision 2050 and Arrangements needed

- Vision/ Goals 2050 (14)
- Short-term action 2020 (Horizon 2020)
- Leaders for action/ actors:
  - Industry
  - Government
  - Research
- Importance for society


TNO innovation for life

Vision 2050 and Arrangements needed

Sectorial integration and cooperation



	Importance for society
Industry: Actively seek regional solutions for resource management challenges	high
Government: Awareness raising of successful projects and interventions	Medium
Industry: Instigate more demonstration projects which exploit industrial synergies	low


Initiative: Industry

2050	2020	Importance for society
Exploit the industry's strategic position as an enabler for the entire economy	Dedicated initiative to identify high value initiatives and interventions.	High
Sectorial integration and cooperation	seek regional solutions for resource management challenges	High
Address the water-energy nexus	Create insight in costs of energy ←→ water production	Medium
Fostering quality innovation	Develop innovative business and financing models so that innovative solutions can be implemented.	Medium
Reuse industrial and oil and gas wastewater	demonstration projects which exploit industrial synergies	Low


Initiative: Government

2050	2020	Importance for society
Decouple economic growth from environmental impacts	Provide enabling legislation and incentives	High
Risk sensitivity	risk taking in environmental and resource sustainability should not be harshly penalised.	High
Minimise pollution (water quality challenge)	support integrated assessments of water pollution dynamics.	Medium
Convincing professionals and the public of the feasibility of innovative sustainable water solutions	Awareness raising of successful projects and interventions.	Medium
Minimisation of water consumption of industrial products as well as of customers	provide information about the water footprint of products and services	Low
Limited access to water sources of sufficient quantity or quality	High quality water sources should attract added protection	Low


Initiative: Research

2050	2020	Importance for society
Make biochemistry more water sustainable	Identify which components of the biochemical industry have the best potential for water conservation	Medium
Recovery of raw materials from water that can be used in other processes and industries	Develop new processes for economical resource recovery and reuse	Medium
Implementing solutions using existing infrastructure	Identify how retrofit opportunities can be made resource and economically efficient.	Medium



Discussion

- Address a driver/ challenge
- Answer questions

1. What does it mean for industry?
2. Who (what) benefits? *e.g.: Companies, environment, civilians, etc.*
3. What is needed to make this work? *(processes, materials, and technologies)*
4. How can this work? *(concepts, tools)*


Challenge/ driver:
Reduction in the chemical industry's dependency on water

What does it mean for industry?	Who (what) benefits	How can this work? *(processes, materials, and technologies)*	What is needed to make this work? *(concepts, tools)*
• More selective use of water resources for key processes • Opportunities to transfer knowledge about de-coupling value from high consumption to other sectors • Increased competitiveness performance • Use less cooling water	• *Nature* • *Industry*	TO BE DISCUSSED NOW Higher recovery on treatment? Different products? Other production processes? E.g. at lower temperature?	TO BE DISCUSSED NOW Model to calculate where losses can be reduced?


TNO innovation for life

Challenges: group discussions

	Challenge	What does it mean for industry?	Who (what) benefits
1	Become a leader in sustainable water management	• supply new products, services, and technology solutions • promote a positive picture of the industry • Being better prepared to comply with more stringent legislation	• Businesses • Industry through better acceptance • Chemical industry
2	Reduce production cost	• Minimising water consumption/increase resource efficiency • Minimising pollution • Dialog and cooperation with other sectors • Adopting new technologies • Nutrient recovery & reuse • Use of renewable energy sources	• Less stress on water resources • Consumers • R&D institutes • Less stress on grey energy demand/ CO_2 emissions


Challenges: group discussions

	Challenge	What does it mean for industry?	Who (what) benefits
3	Legislation (WFD, Blueprint to safeguard Europe's waters')	• Increased costs of water production • Increased energy consumption	Nature, human health, ecological risks
4	Reduce energy costs/ higher energy prices	• Incentive to minimise water consumption and reduce pollution at source • Opportunity to integrate renewable energy sources into operations	• Less stress on energy resources, • Less stress on water resources, • Renewable energy R&D and sales


TNO innovation for life

Challenges: group discussions

	Challenge	What does it mean for industry?	Who (what) benefits
5	Integrated water management	• Need to manage emerging risks • Need to develop new, more efficient water treatment technologies • Increased water reuse and recycle • Innovation and R&D	• Less stress on water resources • R&D institutes
6	More output / m^3 of water used required	• Need to increase resource efficiency • Minimise fresh water use • Investment in new infrastructure • Embrace innovation, adopt practises	• Industry: less dependent on water • Less stress on water resources • R&D institutes


Challenges: group discussions

	Challenge	What does it mean for industry?	Who (what) benefits
7	Rapid growth in biotechnology	• Challenge of sustaining growth without increasing water consumption • Additional pressures on existing water sources	• Chemical industry: green chemistry gives good image • Nature: less stress on fossil fuels • Nature: biotechnological processes usually have milder conditions • Chemical industry: milder conditions → lower energy costs
8	Change negative public perception of chemical industry to positive	• Increased cost • Widespread adoption and use of sustainable water management metrics (WF, LCA) • Efforts in benefits dissemination and communication	• Chemical industry: better acceptance of products • R&D: more funding • R&D: more chemistry students


Challenges – Make it work!

Morning discussion

- Discuss now in your group for 2 challenges:

3. What is needed to make this work? *(processes, materials, and technologies)*
4. How can this work? *(concepts, tools)*

- Be precise: Which area's of research do you see? Do we have tools that need further application? Where do you see the research done: university/ company/ etc.? Do we need different laws and legislations? Are concepts or tools dependent on location? For what technologies is there potential? To what amount can we reach this challenge?


People, profit, processes

Afternoon discussion

- Relation and perspectives between developments and vision/ challenges

- Allocation of skills, competencies, coordination and funding needed to reach the vision
  - (Demo)sites/ locations
  - Who should take the lead: companies, industry, government
  - Funding: EU programs, funds from companies
  - Benefits and technologies focussed on water quantity, water quality and energy and resources


Summarize results:

Our **vision** is to …(use less water). The benefit from this is that …(we have more output/m3). To reach this we will need ..(technology e.g. new catalysts). To develop ..(new catalysts) the .. (EU) has to provide funding to ..(university X).

Our **vision** is to …(implement integrated water management). The benefit from this is that …(increase water reuse and recycle). To reach this we will need ...(to cooperate with other sectors). To..(cooperate with other sectors) ... (Wsstp) has to facilitate … (meetings with agricultural organizations).


TNO innovation for life

Summarize results:

- Our **target** is to …().
- The benefit from this is that …().
- To reach this we will need ..().
- To develop ..() the .. ()
- has to provide funding to … ()/ has to facilitate …().