



Case Study: Fuel Cell City

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Overview



- Case Study Background
- The Innovation Field of Fuel Cell Technology
- Hydrogen and Fuel Cell Futures
- The Scenario Method
- Workshop Tasks

Case Study Background



- Project ‚Open Innovation‘ within programme ‚Factory of Tomorrow‘
- Stakeholder Involvement in Innovation Processes (Environmental Technologies)
- Fuel Cells and Wood-Plastic Composites
- ‚Lead User Method‘ and ‚Constructive Technology Assessment‘
- CIPAST WS: Scenario Process on Future use of Fuel Cell Technology at Municipal Level

Fuel Cell Technology



- Basic principle: Exploiting chemical reaction energy (e.g. hydrogen and oxygen)
- Application areas:
 - Mobile (Fuel Cell Vehicles)
 - Stationary (Decentralised energy supply)
 - Portable (Laptops, mp3-players, mobile phones)
- Hydrogen as energy *carrier*

Ecological Risks and Potentials



- Cycles of Hype and Disappointment
- Ecological Potential:
 - High energy efficiency
 - Avoiding local emissions
 - Possibly strong reduction of total emissions
- Ecological Risks:
 - Reinforcement of fossil fuel regime
 - Use of nuclear energy and CCS as contested alternatives

Status Quo



- Niche Applications:
 - Military applications and space technology
 - Yachts and luxury travel vans
 - Pilot and Demonstration Projects
- Barriers to Mass Market Introduction:
 - Costs
 - Durability
 - Hydrogen storage and distribution

Future Developments?

- In competition with other technologies
- Reluctance to make prognoses – introduction to mass market not before 2015-2020
- Potential future niches:
 - Emergency power supply
 - Off-grid power supply
 - Fuel cell vehicles in public transport
 - Hybrid utility vehicles (electric / fuel cell)

Visions of the Hydrogen Economy



- Niche applications or mass market?
- Centralised or decentralised supply?
- Fossil, nuclear or renewable energy sources?

- Transition Pathways?
- Contribution to reduction of GHG emissions?

The Municipal Level

- Dependence on larger-scale developments
- Local niches important for learning processes in relation to emerging technologies
- Profiling as Eco- and High-Tech-City
- Local air quality
- Regional resources (firms, research institutes)
- Graz: Hydrogen fueling station 'HyCentA'

The Scenario Method

- Used in complex situations, when future developments are highly uncertain
- Aim: Developing a variety of *possible* future development pathways, to explore the risks and potentials involved
- Participatory Scenario development: Integrating experts from various fields, the 'lay' public

The Scenario Method: Realisation

- Preparative Work:
 - Background research
 - Framing of the Issue
 - Selection of stakeholders
- Implementation of Scenario Process:
 - Identification of Framework Conditions / Driving Forces
 - Developing Basic Scenarios
 - Fleshing out of Scenarios
 - Scenario Assessment
 - Strategy Development

Workshop Tasks (Overview)

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|-------------|---|
| 9:30-10:30 | Group Work on Task 1: Framing of Issue |
| 10:30-11:15 | Sharing of Results and Discussion |
| 11:15-11:45 | Group Work on Task 2: Basic Design of Scenario Process (Part 1: Pros and Cons) |
| 11:45-12:15 | Break |
| 12:15-13:00 | Group Work on Task 2: Basic Design of Scenario Process (Part 2: Defining an Outline) |
| 13:00-14:00 | Sharing of Results and Discussion in Plenary |

Task 1: Framing of Issue

Background: A Research Institute is Planning a Scenario Process concerning the Future Use of Fuel Cell Technology at the Municipal Level of a Medium-Sized City (Graz)

Tasks:

- Define Focus and Scope by
 - Formulating *one* central question
 - Defining goals (max. 5 sentences or bullet points)
- Describe which Stakeholder Groups should be involved and how.

Task 1: Framing of Issue

Issues to be Considered: Think about

- Framing: Not too narrowly technical, not too broad
- Appropriate time horizon
- Appropriate focus (local/global scenario development)
- Communal Interests (Why should a municipality engage with the issue?)
- Use of Scenario Methodology (What can this method achieve?)

Task 2: Basic Design of Scenario Process:

Background: Based on the framing of the issue, a scenario process consisting of the following broad steps should be implemented:

- Identification of relevant framework conditions / driving forces
- Using possible patterns of framework conditions for the development of scenarios
- Fleshing out of scenarios
- Scenario assessment
- Strategy development

Task 2: Basic Design of Scenario Process:

Tasks:

- (1) Discuss and Document Pros and Cons of Various approaches to the Scenario Procedure

Orientation Questions:

- Which factors need to be taken into account and balanced against each other ? (e.g. time constraints vs. maximising participation)
- Under which circumstances may one or another approach be more appropriate?

Task 2: Basic Design of Scenario Process:



Tasks:

(2) Define:

- Number and content of meetings
- Types of scenarios to be developed
- Approach to scenario assessment
- Approach to strategy development
- Amount of prior specification

Actual Implementation



Three Step Scenario Process:

- (1) Framework Conditions and Basic Scenario Development
- (2) Fleshing out of Scenarios and Scenario Assessment
- (3) Backcasting and Potential Pilot Projects

(1) Framework Conditions and Basic Scenario Development



- Introduction to the issue and scenario method
- Brainstorming: framework conditions
- Group work: Storylines
- Plenary: Presenting storylines and grouping them to basic scenarios

(2) Fleshing out of Scenarios and Scenario Assessment



- Presentation and discussion of fleshed out scenarios
- Presentation and discussion (selection) of assessment criteria
- Group work: Qualitative assessment of more/less sustainable variants of individual scenarios according to criteria
- Report to plenary and discussion

(3) Backcasting and Potential Pilot Projects

- Backcasting: Timeline for necessary steps to be taken in various policy areas
- Discussion of relevant strategies at the communal level (adaptive / normative)
- Discussion of possible pilot projects