

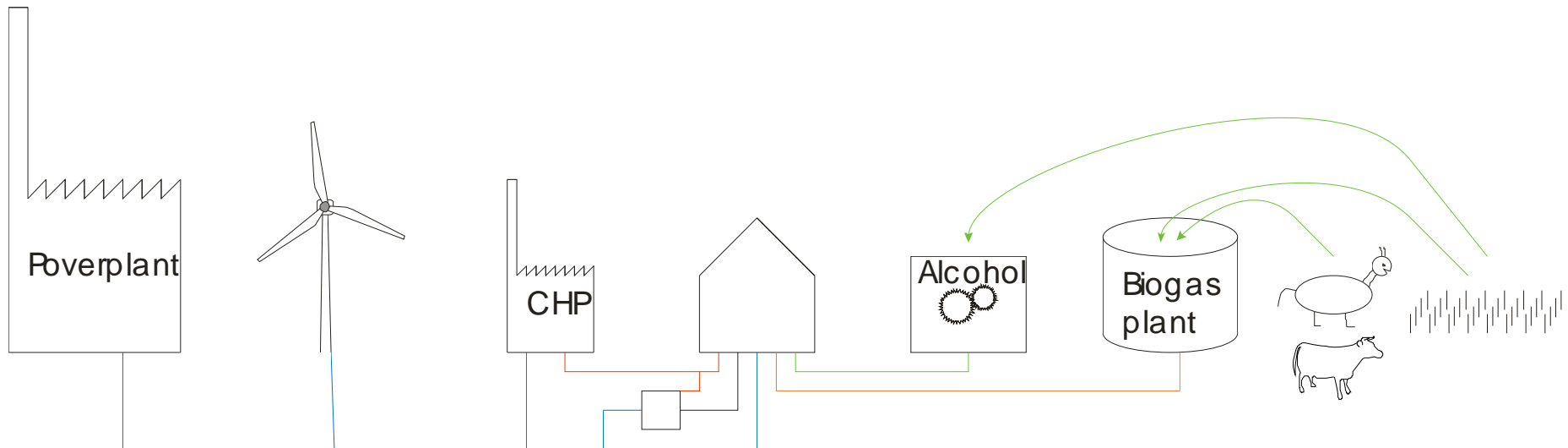
Need Heat and Power? Microgeneration with fuel cells - Herning, 24 June 2008

Ten regional market development plans

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Aim of the work

Make market development plans:
 10 markets of approximately 300 consumers each
 defining areas and task to perform in order to develop the market



The ten markets and the contributors

- **Biogas – possibly mixed with natural gas**
 - Jutland, Denmark Responsible: AAU Esbjerg
 - Baden-Württemberg, Germany Responsible: IBBK

- **Ethanol/methanol from bio-resources**
 - Jutland, Denmark Responsible: Elsam
 - Baden-Württemberg, Germany Responsible: KIBZ
 - Reykjavik, Iceland Responsible: University of Iceland

- **Low cost excess wind electricity/Hydrogen**
 - Jutland, Denmark Responsible: HIRC
 - Schleswig-Holstein, Germany Responsible: KIBZ
 - North Friesland, The Netherlands Responsible: ECN
 - Navarra & Basque Country, Spain Responsible: CENER
 - Coimbra, Portugal Responsible: ISR-UC

Contents of a market development plan

- **General description of the Market Development Plans**
- **Brief description of the ten regional markets – the energy needs, the fuel possibilities**
- **Brief description of the frame-work conditions and barriers**
- **Identification of relevant stakeholders**
- **Involvement of relevant stakeholders and stakeholder analysis**
- **Step-by-step implementation plan**
- **Summary**

Template for actor analysis – Carriers of technology

- Carriers of technology: A carrier of technology is an actor (a person or an organisation) able to influence the direction of technological change in the society. In the context of RES FC Market, it is an organization with the capability and interest in implementing a technology based on small-scale RES FC in dwellings

Carriers of technology

- 1. The actor(s) must have an *interest* in choosing, innovating and implementing the technology or at least a component of the technology
- 2. The actor(s) must have sufficient social, economic and political *power* to materialise its interests
- 3. The actor(s) must be adequately *organized* to be able to formulate and decide what technology is able to solve their problems.
- 4. The actor(s) must have *information* about the existence of the technology – or at least a component of the technology.
- 5. The actor(s) must have *access* to the technology
- 6. The actor(s) must have or must be able to gain sufficient *knowledge* about how the specific technology is used.

Germany

- Biogas, methanol and wind

The situation

- There are currently producers of both ethanol and methanol in Germany
- Hydrogen is not yet being produced, however there is a very high degree of wind power

The Barriers

- ethanol and hydrogen should not be used for stationary applications
- Costs and robustness

Over-coming barriers

- Germany plans 72000 units before 2020 and a reduction in the capacity price to 1700 € per kW through economy of scale effects

Denmark

- Wind power

The situation

- Large-scale utilisation of wind power
- Need relocation technologies
- Need for heat

The barriers

- Too low price variations on the spot market
- Technology costs

Over-coming barriers

- Appropriate feed in tariffs
- Demonstration projects – already on the way

Denmark

- Methanol

The situation

- Denmark is an agricultural country with many residual resources. Good infrastructure for handling wastes
- The technology uses hydrogen – hence able to supply downward regulation

The barriers

- Economic

Over-coming barriers

- See wind

Denmark

- Biogas

The situation

- Denmark is an agricultural country
- Denmark has a solid biogas experience

The barriers

- Economic

Over-coming barriers

- See wind

Netherlands

- Wind

The situation

- Netherlands is a country of good wind resources
- A market for the supply of upward and downward regulation
- Heat demand

The barriers

- Economic

Over-coming barriers

- Demonstration projects on the way

Spain

- Wind

The situation

- Spain is a country of good wind resources
- A market for upward and downward regulation
- Low heat demand
- A feed in tariff of 0.12 €/kWh has been introduced

The barriers

- Economic
- Lack of confidence

Over-coming barriers

- R&D to increase reliability, financial support

Portugal

- Wind and biogas

The situation

- Portugal is a country of good wind resources
- The country focuses on pumped hydro
- Hence focus on the relatively unexploited biogas
- FC from RC receives 0.2 €/kWh

The barriers

- In spite of a generous feed in tariff, economy is an issue

Over-coming barriers

- financial support
- Improved performance

Iceland

- Methanol

The situation

- Iceland is a country of good hydro resources
- Low heat demand (geothermal)
- Dwellings beyond the electric grid and geothermal areas
- Already hydrogen production

The barriers

- Economic

Over-coming barriers

- National target of reducing fossil fuel use
- Company with the core business of producing methanol

Concluding remarks

- The RES FC technology is not economically competitive at current costs and performance
- RES FC units must be enabled to supply up and downward regulation
- In order to introduce the technology, demonstration projects are required where technology carriers can develop the market with a safety net
- Some prospective markets have been identified. These are many in niche markets (e.g. off-grid plus consumers with particular focus on energy and environment)