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ROUND TABLE DISCUSSION
Brussels, 23 May 2012

Discussion Document

Providing recommendations for policy makers on the national and European level on how to facilitate further development of PHES while protecting the environment

Objective

- Provide recommendations for policy makers on the national and European level on how to facilitate further development of PHES while protecting the environment

Policy & Legislation Context

- Important Directives:
  - RES: PHES not mentioned explicitly but it is a RES enabler
  - WFD: Further development possible but difficult (art.4.7 and art.9)
  - Habitats and Birds: Avoid significant impacts to Natura 2000 sites
  - SEA (Energy Plans) and EIA (Further project development)
- Lack of policy or government support for PHES in some countries

Strategic Planning

- Lack of strategic planning for energy infrastructure therefore lack of SEA's to inform project siting and planning

Project Level Planning & EIA Process

- PHES development is mainly developer driven
- Appropriate siting / feasibility
- EIA process tool to determine significant environmental impacts and compliance with standards and legislation
- IHA sustainability assessment protocol – a guidance tool for the hydropower sector

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Environmental Impact

- Impacts of different PHES technologies: open, semi-open and closed
- Impacts during construction and operation

Mitigation

- “Environmental optimization”
- Hierarchy of mitigation: Strategic, design and management
- Involves high costs due to loss of peak-load capacity and designated function

Recommendations

- PHES development is developer driven (bottom-up) but need for national and strategic planning (top-down)
- Need for clear and transparent policy and strategy on an EU and national level for PHES
- SEAs upstream facilitate projects and their EIAs
- Need for guidance and best practice for project development
- EIA improvement and guidance for PHES
- More research needed on how PHES impacts on the environment and how to mitigate (environmental optimisation)

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Background information on PHES

What is stoRE?

The EU funded stoRE project (2011-2013) aims to facilitate energy storage as a means to allow for higher penetration of variable renewable energy such as wind to the reach the electricity grid. Historically, energy storage has been used in connection with nuclear power or fossil fuel power plants (i.e base load). However, the stoRE project sees an alternative use for bulk energy storage technologies such as pumped hydro energy storage (PHES) namely to help integrate large scale wind farms. This would help reduce curtailment of wind and potentially help mitigate GHG emissions by reducing the need for fossil fuel fired thermal generators for system balancing.

PHES are large civil constructions that if not developed correctly could have adverse environmental impacts. A key task of the stoRE project is therefore to assess the environmental impacts of such infrastructures during construction and operation. On a project level PHES require an environmental impact assessment (EIA) but on a national level there needs to be an energy storage policy in place that has been subjected to strategic environmental assessment (SEA).

New developments of PHES are becoming increasingly difficult since the implementation of the Water Framework Directive and Natura 2000 site designation. The question we therefore have to ask ourselves is what level of environmental impacts we are willing to accept and what the compromises will be between our water and energy needs.

What is PHES?

The first pumped hydro energy storage (PHES) facilities were operating in the 1890s in Italy and Switzerland. Today there are about 300 PHES facilities in operation worldwide. As the name implies, the PHES facility pumps water from a lower to an upper reservoir during off-peak hours to store energy. During peak hours this water is released through turbines to generate electricity to the grid. To fully understand the potential impact of PHES on the surrounding

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environment, the stoRE project has identified three main categories of PHES facilities according to its water management:

- Open-system PHES: a system where there is continuous flow of water through both the upper and lower reservoir. The most common type is the pump-back PHES.
- Semi-open PHES: consists of one artificial or modified reservoir and one modified lake or river impoundment with continuous through flow.
- Closed-loop PHES: consists of two reservoirs that are separated by a vertical distance, neither of which is connected to another body of water.

For further information on the environmental issues regarding PHES and the technologies please find the document entitled, "Environmental Performance of Existing Energy Storage Installations" under latest Project results on the stoRE webpage.

What are the main environmental impacts of PHES?

The stoRE project has, by using an adapted environmental impact assessment (EIA) method, identified the main impacts of PHES to be:

- Biodiversity
- Fisheries
- Water resources and water quality
- Hydrology and Hydrogeology

The above list is however generic for all PHES and each specific site will have to be investigated according to all thematic headings of the EIA.

For further information on the environmental issues regarding PHES and the technologies please find the document entitled, "Environmental Performance of Existing Energy Storage Installations" under latest project results on the stoRE webpage.

What are the key policy instruments?

- Water Framework Directive 2000/60/EC: specifically article 4.6 and 9
- Habitats Directive 92/43/EEC: in particular article 6(3) and 6(4)
- Strategic Environmental Assessment Directive 2001/42/EC
- Environmental Impact Assessment Directive 85/337/EE
- Directive 2003/87/EC: GHG emission trading
- Directive 2007/60/EC: flood risk
- Renewable Energy Directive 2009/28/EC
- Birds Directive 2009/147/EC

What are the key messages so far?

The key messages so far for further development of PHES are:

- There is a need for strategic planning
- Sustainable development and site selection
- Incorporation into River Basin Management planning process
- Need for coordination between energy and water
- Competing users for Water bodies
- Imposing “minimum flow” may reduce operational flexibility and ability to provide fast reserve to accommodate variable RE with associated costs

Regarding EIA:

- Improved scoping
- Early stakeholder involvement
- Early involvement of Competent Authority and Statutory Bodies
- The EIA needs to ask the right questions
- Low number of new developments à Need for good practice guidelines
- Need for land use plans

Expected outcome of the round table discussion

Recommendations for policy makers at the national and European level on improving the environmental regulations facilitating PHES development while protecting the environment.