



Centre for environmental design of renewable energy - CEDREN



NATURHISTORISK MUSEUM
UNIVERSITETET I OSLO

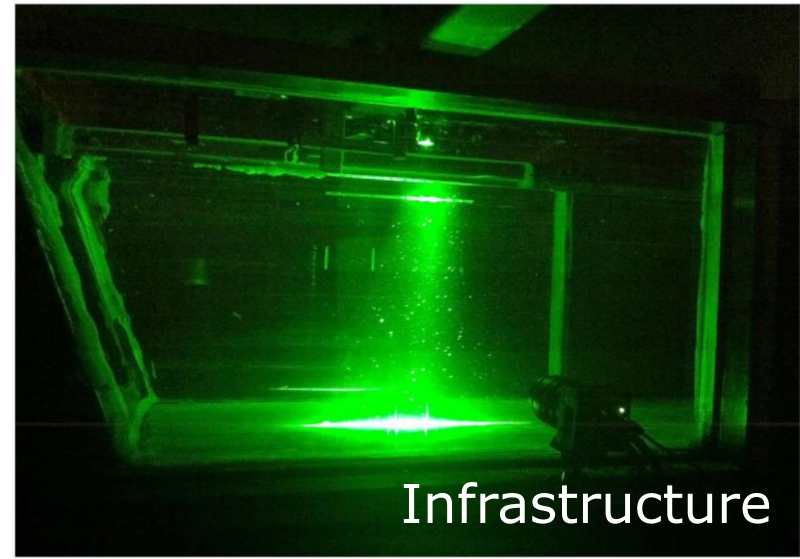


EcoManage meeting Dec 2014



"Highlights"

Innovation and implementation
of results





10th International Symposium on Ecohydraulics 2014

Norwegian University of Science and Technology
Trondheim, Norway, June 23rd - 27th



#ecohyd

Håndbok for miljødesign i regulerte laksevassdrag

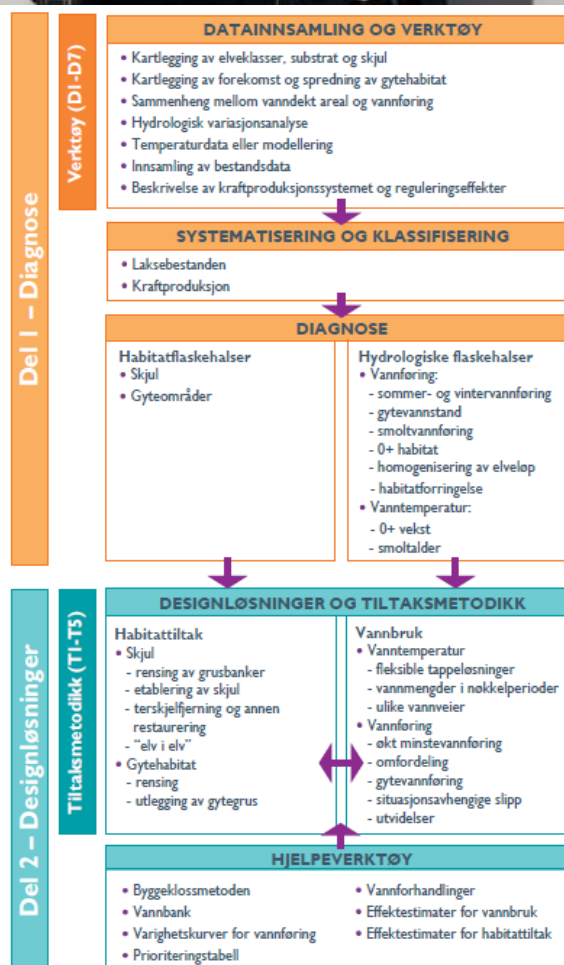
Redaktør:

Torbjørn Forseth og Arne

English version available

CEDREN

Centre for Environmental Design of Renewable Energy



	Habitatflaskehals	Produktivitet (1-3)
gel	Gyte	1
gel	Gyte	1
gel	Gyte	1
gel	Gyte	2
gel/parr	Begge	1
gel/parr	Begge	1
r	Skjul	2
r	Skjul	2
r	Skjul	2
en	Ingen	3
en	Ingen	3
gel	Gyte	2
gel	Gyte	1
gel	Gyte	2

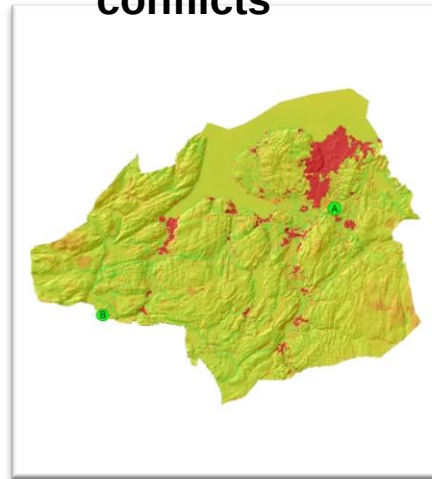
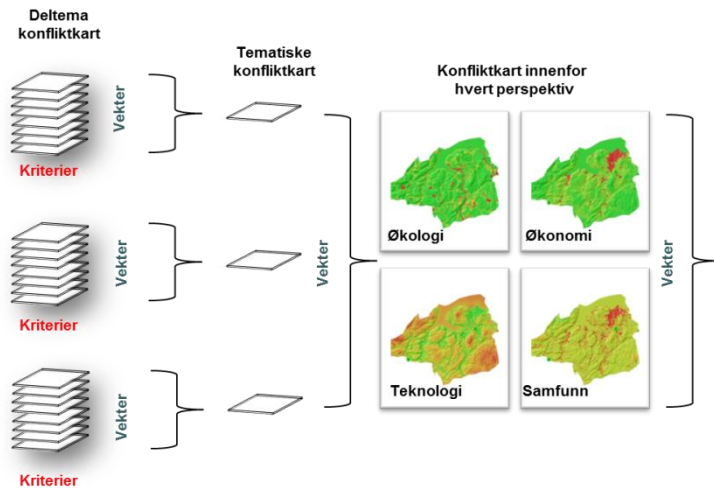
Least cost path for power lines



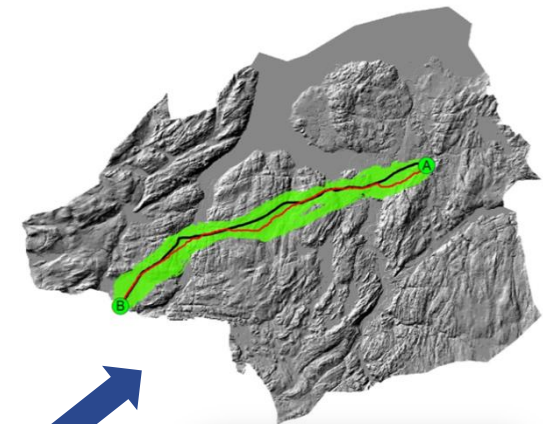
Thematic maps and weighing



Map of conflicts



Optimal path and macro corridor

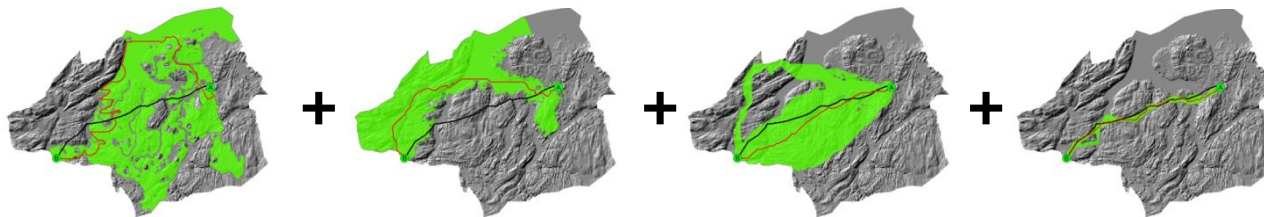


Ecology

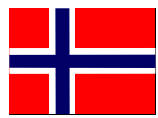
Economy

Society

Technology



LCP TOOLBOX 1.0
 ECOLOGY
 ECONOMY
 SOCIETY
 TECHNOLOGY



CEDREN in China

FutureHydro



Visit to Beijing
and Fengman
Hydropower

Presentations,
Discussions



New
dam to be
constructed
at Fengman

Group work



CEDREN

Centre for Environmental Design of Renewable Energy



"Renewable energy respecting nature"



Indo-Norwegian seminar,
Mumbai, 7-8 May 2013



- Opening session
- Renewables and their integration in the energy system
- Sustainable hydropower
- Roundtable discussions on research needs
- Future collaboration possible



Run-of-river hydro

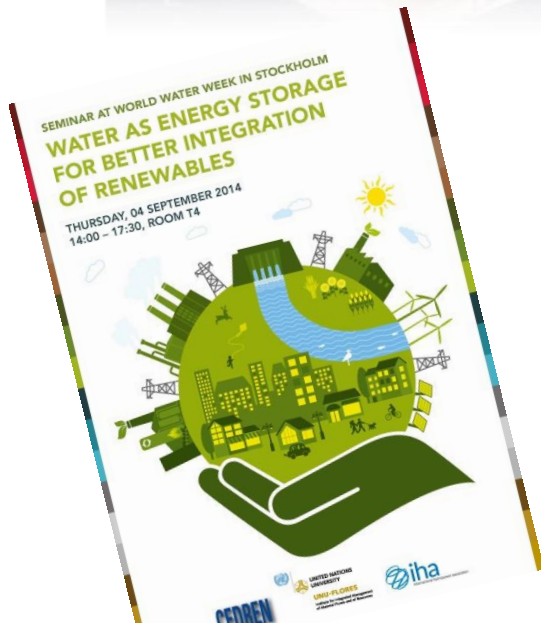


Hydropower typology, covering all scales of development

Storage hydro



Pump-storage hydro



Seminar at World Water Week, Stockholm, Sep 2014

From Taylor, IHA



Multiple roles for hydropower in water and energy

- Electricity for heat, power and transport
- Energy storage for grid systems
- Water storage for
 - Flood/drought mitigation
 - Irrigation
 - Water supply
 - Navigation
 - Downstream flow regime



New design and more news www.cedren.no

LOGIN





CEDREN News



Seminar om energilagring - fra batterier til vannkraft

Bli med å diskutere behovet for energilagring i Europa og få siste nytt om en rekke energilagringsteknologier.



Luft i vann skaper trøbbel for fisk og kraftselskap

For mye luft i vannet i et kraftanlegg kan både drepe fisken og føre til eksplosjoner. Nå tester norsk forsker et nytt designverktøy for å unngå disse problemene.

Improved development and management of energy and water resources- EcoManage



The main objective of EcoManage is to test, evaluate and adapt new concepts and indicators for the improved development and management of energy and water resources.

What is the value of water? Photo © Edelpix

The selected set of concepts and indicators to be studied are Energy Payback Ratio (EPR), water consumption in the hydropower sector and the off-set options for ecosystem services.

The study sites will mainly be in river basins regulated for hydropower production. Secondary objectives are:

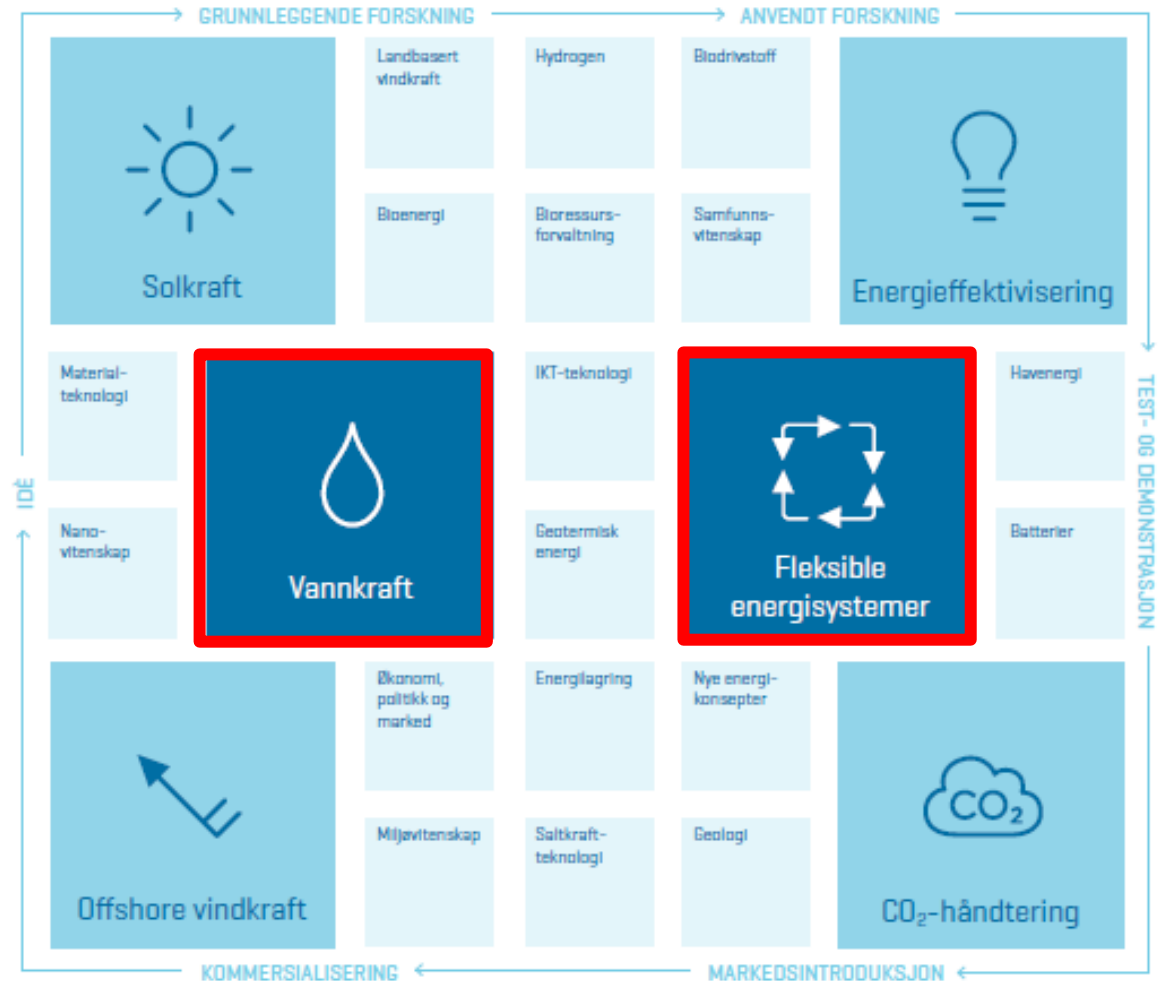
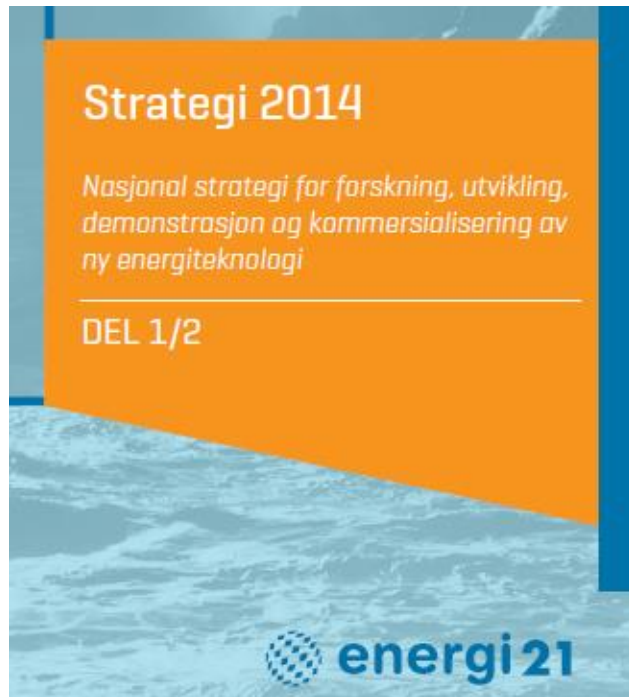
CEDREN research applications 2014

Project name	R&D partners	User partners	Budget
SafePass Safe and efficient two-way migration for salmonids and European eel past hydropower structures	NINA, SINTEF, Uni Research, NTNU, Karlstad Universitet, DTU, BOKU, EDF, HydroNet	Eidsiva, GLB, Agder, Sira-Kvina, Miljødir., Energi Norge, Statkraft, TrønderEnergi, E-CO, SFE, BKK, Lyse, NVE	24 532 000 (8 932 000) 2015-2018 ENERGIX Fornybar
SuperSat Hydropower induced supersaturation - effects on ecosystems, mitigation measures and guidelines for sustainable water management	Uni Research, NIVA, NINA, SINTEF, NTNU, Univ. Idaho, BOKU, Ferskvannsbiologen	Otra Kraft, Statkraft, Troms Kraftforsyning, E-CO, BKK, Miljødir., Fylkesmannen i Aust-Agder, NVE	12 000 000 (3 200 000) 2015-2018 ENERGIX Fornybar
SusWater Sustainable governance of river basins with Hydropower production	SINTEF, NINA, Stockholm Environment Institute, NIVA	Energi Norge, BKK, SFE, Sira-Kvina, TrønderEnergi, Statkraft, Hydro, Lyse, Agder, Miljødir., NVE	18 000 000 (5 000 000) 2015-2018 ENERGIX Samfogøk
InterHydro Improved methods for sustainability in international hydropower development	SINTEF, NTNU, NINA, Multiconsult	Statkraft, Hydro, Centre for Ecology and Hydrology, METLA, SEI, Multiconsult	16 000 000 (3 200 000) 2015-2018 ENERGIX Fornybar
HydroClim Hydropower and future climate extremes	SINTEF, NINA, NTNU	-	7 385 000 (410 000) 2015-2018 KLIMAFORSK

Research applications supportet by CEDREN

Project name	R&D partners	User partners	Budget
FlowerPower Transforming invasive aquatic species from nuisance to renewable Energy	UMB, NTNU, NIVA, SINTEF	-	12 704 000 (3 021 000) 2015-2017 ENERGIX Fornybar
BirdTrack Tracking climate change impacts in arctic bird migration using avian radar systems	NINA, Meteorologisk institutt, Univ. Amsterdam, NOF, NTNU	-	9 260 000 (0) 2015-2018 OKOSYSTEM
EnergyMap Norwegian Energy Road Map	SINTEF		15 400 000
Towards sustainable renewable energy production: Developing a Life Cycle Impact Assessment framework for biodiversity impacts	NTNU		
NORSUSBAL The Political Feasibility of Sustainable Balancing Power from Norway: A Contribution to Europe towards 2050	SINTEF, Cicero, Inst. Samfunnsforskning, Freie Univ. Berlin	-	11 000 000 (0) 2015-2018 ENERGIX SAMFOGØK

ENERGI 21

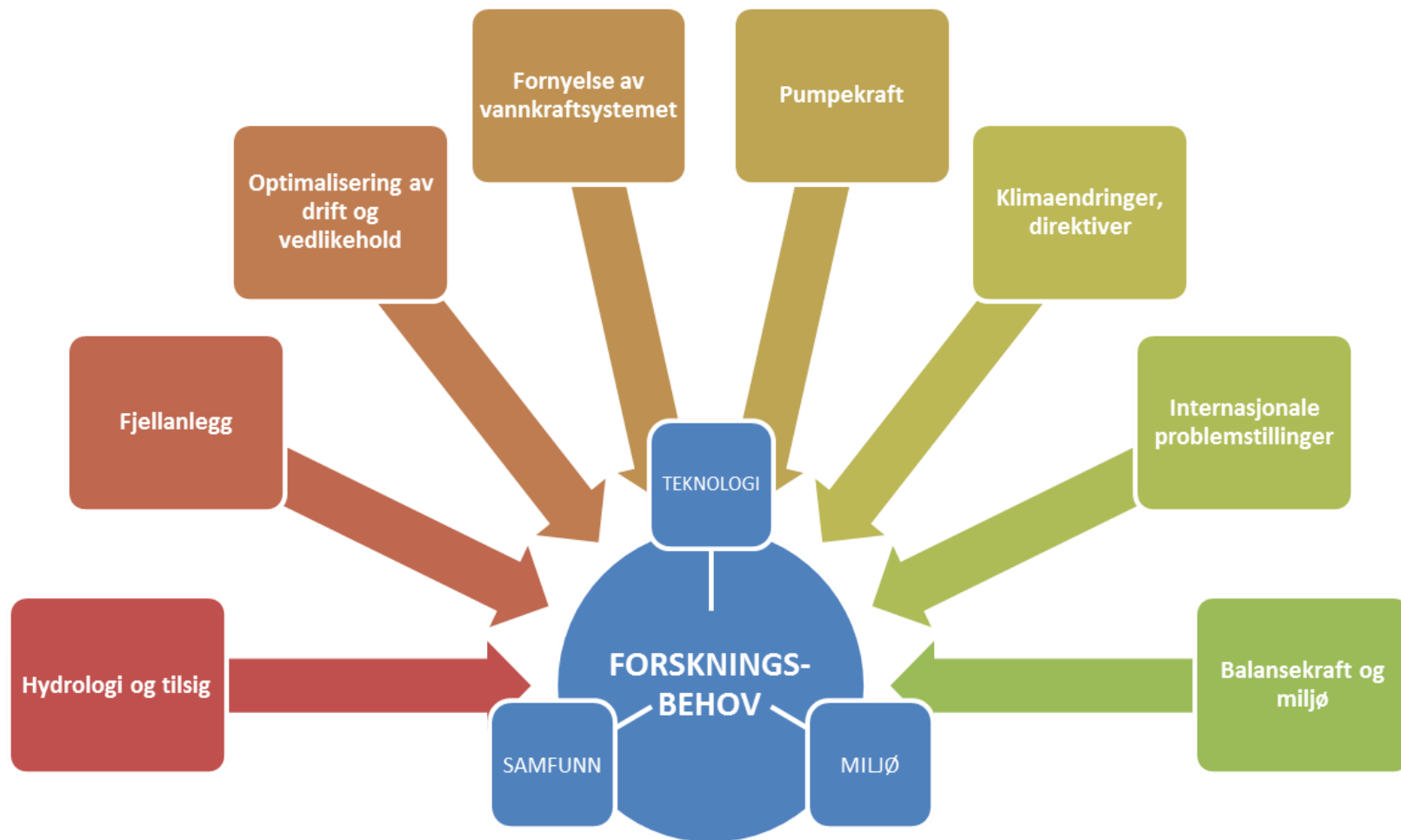


NORSK VANNKRAFTSENTER

Norsk Vannkraftsenter (NVKS) er et nasjonalt samlende senter for å sikre og videreutvikle undervisning og forskning innen vannkraftteknologi. Senteret drives i samarbeid mellom universiteter, forskningsinstitusjoner, vannkraftbransjen og norske myndigheter, med hovedsete på NTNU.



Energi21





Forskningscentre for miljøvennlig energi

Planlegging av ny utlysning

10. des.: DS vedtar utlysning forprosjekt

Des.-jan.: Utlysning forprosjekt

1. april 2015: Frist forprosjektsøknad

15. mai 2015: Respons NFR

Sommer 2015: FME hovedutlysning

25. nov. 2015: Frist hovedsøknad

Mai 2016: Offentliggjøring av resultat



Forskningscentre for miljøvennlig energi

Planlegging av ny utlysning

FME modell og innretning:

- Brukerinvolvering
- Internasjonalt fokus
- Fleksibilitet i finansieringen
- Ramme: 120-125 mnok/år (tot. pott)
- Antall senter: 6-8

Varighet: 5+3

Horizon 2020 – LCE9 Call

The priorities are demonstration and validation of:

- pumped hydro storage in new locations such as **underground storage** concepts, storage using **seawater** or similar concepts addressing large scale applications aiming at GWh scale;
- storage with **compressed air**, liquid air, and similar concepts aiming at the large scale (ideally > 100 MWh scale if appropriate);
- **retrofitting of existing hydro** dams with pumped hydro or other storage to enable flexible operation, large scale balancing and storage, while applying environmentally friendly design and operation;
- integrated **management of existing or retrofitted pumped hydro** storage (with variable speed pumps/turbines) also across national borders (e.g. smart grid concepts across alpine (or other) borders and enclosing many existing facilities);
- linking such storage projects with the development of the **Northern Seas, Mediterranean ring and other Trans-European grid infrastructure** concepts may be envisaged.

Type of action: Innovation Actions

R&D: 100 % of costs covered

Industry: 70 % of costs covered

The H2020 call LCE-09-2015

- **Expected impact**

- A wider use of storage technologies in the energy system through **validation of solutions with reduced cost**, increased efficiencies, and lower environmental impact.
- **Provision of services** for increased renewable energy integration, resulting, among others, in a reduced need for curtailment of wind, solar and other variable renewable energy resources
- **Deferred investment for transmission grid reinforcements** and lower societal costs associated with high penetration of variable renewable energy resources
- **Integration with ICT tools** for the control and management of electricity networks

The impacts are expected to be **linked to either energy balancing or improved grid congestion management** at transmission level.

Search for Demonstration case and case studies with industry