



Pumped Storage Powerplants

Challenges and opportunities

Stockage d'énergie par pompage
Challenges et opportunités

23 and 24 November 2011, Lyon
(France)

Hôtel de la Communauté urbaine de Lyon
20 rue du Lac - 69003 LYON

The possibility of storing and recovering a large amount of energy very quickly is one of the main challenges confronting the energy industry at the present time. Pumped storage power plants are presently one of the few ways for satisfying these two criteria.

Pumped storage has been previously used to absorb non-flexible energy sources such as nuclear and run-of-river power plants. However, the development of renewable intermittent energies makes energy production highly dependent on meteorological conditions. Wind power, solar energy and marine energy are all fatal energies, meaning that the energy produced is lost if it is not consumed immediately and is not generated during peak consumption hours. Energy storage is therefore the only means for managing production according to demand by smoothing production and consumption curves.

Lastly, the flexibility of this type of storage allows for recovering the energy almost immediately, a characteristic much appreciated by energy transport grids that have to deal with considerable fluctuations in supply and demand.

Pumped energy storage is therefore a key component in the development of new forms of energy. However, despite this observation, the development of this type of energy storage differs greatly from one country to another.

The symposium intends to encourage professionals in this field (producers, constructors, administrations, regulators of electricity systems, engineering offices) to meet and discuss technical-economic questions.

This meeting will be widely opened to the European and international field players.





Draft Program, November 17th 2011

Tuesday 22 November 2011 (from Lyon Part-Dieu, 9:00)

Conference tour to EdF Grand Maison PSP and to Hydraulic Laboratory of Sogreah in Grenoble

Wednesday 23 November 2011

9:15-9:40 Opening by **M. Reppelin**, vice-president of Grand Lyon, **D. Loudière**, president of SHF, **I. Milcent**, Tenerdis, **PL Viollet**, SHF and organizing Committee

Chair: Olivier Métais, ENSE3

9:40-10:10 Introductory address:

↳PSP in French energy policy

Axel Strang, DGEC - Energy and Climate General Direction- Ministry of Environment (France)

10:10-13:00 Session 1: *International overview*

↳Invited conference:

The integration of large amounts of renewable energy in the Portuguese Power System

Nuno Martins, Pedro Cabral, Helena Azevedo, REN Serviços, S.A (Portugal)

10:50-11:20 Coffee break

Chair: François Avellan, EPFL

↳Invited conference:

Opportunities and challenges for hydro-balancing from Norwegian reservoirs

Atle Harby, Eivind Solvang, Julian Sauterleute, Audun Ruud, Michael Belsnes, SINTEF, Ånund Killingtveit, Norwegian University of Science and technology (Norway)

↳ Projects for pumped storage plants – A new battery for Europe

Andreas Stettler, BKW (Switzerland)

↳ Pumped storage worldwide overview

Frederic Louis, Christophe Amiot, EDF (France)

13:00-14:15 Lunch

14:15-18:00 Session 2:

Integration of pumped storage power plants in the power system

Chair: Bruno Mathex, CNR

↳Invited conference:

Feedback from experience on French PSP

Xavier Ursat, Isabelle Rafaï, Henri Jacquet-Francillon, EDF (France)

↳Integration of Reversible Pump-Turbines in the energy production systems

Patrick Eberle, Olivier Teller, ALSTOM (France)

↳The quality of Norwegian grid frequency and the consequences of pumped storage

Pål Tore Selbo Storli and Torbjørn Nielsen, NTNU, CEDREN (Norway)

15:55-16:25 Coffee break

Chair: Maryse François, Alstom Hydro

↳Optimized Machine Concept for Pumped Storage Plants through Combined Dispatch Simulation for Wholesale and Reserve Markets

Klaus Engels, Michaela Harasta, Werner Braitsch, E.ON, Albert Moser, Andreas Schäfer, Technical University of Aachen (Germany)

↳Dietro La Torre PSPP little but particular

Franco Podio, Gian Luca Mancuso, ENEL (Italy)

↳Pump-storage with small hydropower – an option?

Benoît Mailler, EPFL, Philippe Heller, e-dric.ch, Nicolas Crettenand, EPFL (Switzerland)

18:00 Welcome drinks offered by Grand Lyon



Thursday 24 November 2011

Chair: Yves Bamberger, EdF et Académie des Technologies

↳ **Invited conference:**

Storage Pumps and Reversible Pump-Turbines: Technology Challenges and Progresses

François Avellan EPFL (Switzerland)

8:30-12:10 Session 3: Perspectives on energy storage

↳ **Options for more flexibility by large scale storages**

Dr. Hans-Christoph Funke, Dr. Olaf Heil, Jan Bruhn, Dr. Erik Riedel, RWE Innogy GmbH (Germany)

↳ **What future for the storage of electricity in electrical systems?**

Grégory Fayet EDF (France)

10:10-10:40 Coffee break

Chair: Christof Gentner, Andritz Hydro

↳ **Needs and solutions for coastal Pumped Storage Powerplants.**

François Lempérière, J.-P. Vigny, HYDROCOOP (France)

↳ **ENERSTOCK3: Hybrid storage for introducing renewable energy on islands**

Denis Lefevre, AEROWATT, Claude Guilbaud SOGREAH-Artelia (France)

↳ **Research and development in pumped storage hydro in Norway**

Bjarne Borresen, Energy Norway (Norway)

12:10-13:20 Lunch

13:20-16:30 Session 4: Technological progress

Chair: Atle Harby, SINTEF Energy Research

↳ **Latest Achievements in Pump turbine Development**

Etienne Parkinson, Ch. Gentner, M. Sallaberger, ANDRITZ (Switzerland), Bernd Nennemann, ANDRITZ HYDRO LTD (Canada)

↳ **Parametric Study of Water Column Separation in Francis Pump-Turbine Draft Tube**

Christophe Nicolet Power Vision Engineering, Anton Bergant, Litostroj Power, Sébastien Alligne et François Avellan, EPFL (Switzerland)

↳ **Efficient energy storage using modern pump storage power plants**

Alexander Schwery, Thomas Kunz, ALSTOM (Switzerland)

↳ **Modeling of hydro-pneumatic energy storage using pump-turbines**

Egoï Ortego, Antoine Dazin, Guy Caignaert, Frédéric Colas, Olivier Coutier-Delgosha, Arts et Métiers Paris Tech (France)

↳ **A decentralized pump storage scheme with pressurized air storage**

Albert Ruprecht, University of Stuttgart (Germany)

16:30 Conclusions

More information: www.shf.asso.fr/122-1-events-16.html

SHF - 25 rue des Favorites – F 75015 Paris - Tel : 33 (0)1 42 50 91 03 - Fax : 33 (0)1 42 50 59 83 -
contact@shf-hydro.org - www.shf-hydro.org

Organizing committee

Didier Roult (CNR)

Bruno Mathex (CNR)

Aziz Ouaabi (CNR)

Frédéric Louis (EDF-CIH)

Alain Petitjean (EDF-CIH)

Vincent Capuozzo (ALSTOM)

Farid Mazzouji (ALSTOM)

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Roland Vidil (HYDRO21)

Claude Guilbaud (SOGREAH)

Olivier Metais (ENSE3)

Jean Georges Philipps et Brigitte Biton (SHF)

INFORMATIONS PRATIQUES

Lieu/Location : Hôtel de la communauté urbaine de Lyon, 20 rue du Lac, Métro Part-Dieu ; à 200 m de la Gare SNCF Lyon Part-Dieu.

<http://www.grandlyon.com/Plan-d-acces.121.0.html>



Inscriptions : consultez et complétez le bulletin d'inscription joint, à retourner avec le paiement ou un bon de commande à / *Read and complete the registration form below, to be sent with the payment to SHF* (25 rue des Favorites, F 75015 Paris – Tél. 33(0)1 42 50 91 03 – Fax 33(0)1 42 50 59 83 – mail shf@shf.asso.fr). L'inscription inclut la participation aux conférences, le recueil des textes des interventions, les déjeuners / *Registration includes proceedings and lunches*.

Publication : le recueil des textes est remis aux participants. Il peut aussi être commandé indépendamment de la participation au colloque (voir le bulletin d'inscription) / *Proceedings may be ordered separately as mentioned in the registration form*.

Hébergement : les réservations hôtelières ne seront pas faites par la SHF. Une liste d'hôtels est proposée ci-dessous. / *Hotel reservation should be done by yourself. A short list of hotels is provided below*.

Formation : Cette manifestation est imputable au budget de la formation professionnelle continue (participants français uniquement). (N° de formateur : 11 75 02902 75)

Ce congrès entre dans le cadre de la formation professionnelle continue (France)

QUELQUES HOTELS / SOME HOTELS

(No special conditions - see more hotels and book on www.lyon-france.com)

MERCURE SAXE LAFAYETTE **** :	29 rue de Bonnel - B.P. 3239 - F.69404 LYON CEDEX 03 ; Tel : 33 (0)4 72 61 90 90
NOVOTEL Lyon Part-Dieu *** :	47 boulevard Vivier Merle - F.69212 LYON CEDEX 03 ; Tel : 33 (0)4 72 13 51
MERCURE Charpennes *** :	7 place Charles Hernu - F.69100 VILLEURBANNE ; Tel : 33 (0)4 72 44 46 46
VILLAGES HOTEL Espace ** :	93 cours Gambetta - F.69003 LYON ; Tel : 33 (0)4 78 62 77 72
ATHENA Part-Dieu ** :	45 boulevard Vivier Merle - F.69003 LYON ; Tel : 33 (0)4 72 68 88 44
CAMPANILE** Forum Part-Dieu :	31 Maurice Flandin - F.69444 LYON Cedex 03 ; Tel : 33 (0)4 72 36 31 00
IBIS Part-Dieu Centre ** :	78 rue de Bonnel - F.69003 LYON ; Tel : 33 (0)4 78 62 98 89
IBIS Part-Dieu Gare** :	Place Renaudel - F.69003 LYON ; Tel : 33 (0)4 78 95 42 11

SOCIETE HYDROTECHNIQUE DE FRANCE

Non-profit association founded in 1912

FLUID DYNAMICS AT THE SERVICE OF MANKIND

The **SHF**, working at the forefront of research and industrial processes, carries out its activities in the following areas:

- in the field of water, under various aspects of resources management, everyday use for human needs, energy, agriculture, industry and transport, including environmental impact and the study of natural phenomena related to hydrology, meteorology, flood, low flows and drought;
- and the more general field of fluid mechanics of all types, industrial applications and hydro machinery.

► **ACTIONS**: The association's purpose is to encourage progress in and development of scientific culture and knowledge in all the fields relating to water resources and hydrotechnical sciences (Clause 1 of its statutes). It is a meeting point for scientific exchanges between researchers, engineers, government services and local communities, industrials, students ...

The results of the SHF's work are reflected in the great variety of events organized by the association. Reports and papers are printed on transactions, guides and other topics which are published in great part in the journal "La Houille Blanche"

La Houille Blanche (International journal on water) proposes detailed analysis of the most up-to-date developments in all branches of hydraulics. Its theme files, prepared by renowned specialists, make "La Houille Blanche" a reference for water engineers and researchers not only in France but all over the world.

► **ANNUAL AWARDS**: The Henri MILON award is granted to the author of a book or thesis related to hydrology. The Jean VALEMBOIS's prize is awarded to the author of a book or thesis related to the field of fluid mechanics. The winner of the "Grand prix Hydrotechnique" is elected for his large contribution to the fields in which the SHF is active.

25 rue des Favorites – F 75015 Paris France – Tel. 33 (0)1 42 50 91 03 - Fax : 33 (0)1 42 50 59 83 - shf@shf.asso.fr - www.shf-hydro.org



TENERRDIS

Competitiveness through innovation Exploiting and developing all energy industries

The role of the cluster is to strengthen the competitiveness of French industry in the area of new energy technologies with the help of innovation.

Tenerdis stimulates partnerships between businesses, research and educational organisations and public institutions in order to promote projects that create a platform for the generation of competencies, activities and employment.

Tenerdis is involved in energy production, storage and management, through six industries:

- **Solar energy:** Photovoltaic, thermal and concentrated solar energy
- **Energy efficiency in buildings:** Integration of renewable energy in buildings, thermal engineering for buildings, low temperature geothermy
- **Smart grids and power storage:** Network infrastructure, Storage (batteries)
- **Biomass:** Use of forest and agricultural resources, Conversion processes
- **Hydrogen/fuel cell :** Hydrogen production/storage/distribution , Fuel cell
- **Hydro electricity:** Turbines, turbine-pumps, water turbines

Uniting and supporting the parties involved in innovation

Tenerdis facilitates and structures the Rhône-Alpes ecosystem through: Collective actions for each industry, Strong relationship building, Project support

Polytec - 19, rue des Berges - 38024 Grenoble Cedex - FRANCE
Tel. +33 (0)4 76 51 85 34 - contact@tenerdis.fr - www.tenerdis.fr

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Lyon, 23-24 november 2011

Registration Form

Please fill in and return this registration form with payment to

SOCIETE HYDROTECHNIQUE DE FRANCE
25 rue des Favorites - F- 75015 PARIS
Tél. 33 (0)1.42.50.91.03 - Fax 33 (0)1.42.50.59.83
shf@shf.asso.fr

Name : _____ First Name : _____

Company : _____

Address : _____

Postal code : _____ City : _____

Country : _____ Phone : _____ Fax : _____

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Registration fees (euros) (VAT 19,60 % included)

Proceedings and lunches included

	<i>Before October 20th</i>	<i>After October 20th</i>
<input type="radio"/> General	385,00	425,00
<input type="radio"/> Speakers, Affiliates SHF, Academics	310,00	340,00
<input type="radio"/> Students, (with proof)	100,00	110,00
<input type="radio"/> Conference tour November 22 th	60,00	60,00

<input type="radio"/> Proceedings only (VAT included)	56,00	

LUNCHES :

Please register for lunches

Wednesday 23 Thursday 24

Payment

- by Credit card on www.shf.asso.fr
- by check to SHF - SOCIETE HYDROTECHNIQUE DE FRANCE
- by bank transfer IBAN FR76 3005 6000 7300 7354 0218 023 – BIC: CCFRFRPP -:(**free of bank charge for the beneficiary**) with the mention "**psp**" and your name)

Filled form with payment is due for access to the conference

*An invoice would be sent to each participant. *Confirmations of the registration will be sent by Email.*

Refunds are subjected to a 50 Euros deduction if requested (by post, fax or Email) prior to 10 November 2011. No refunds will be granted after that date.

<http://www.shf.asso.fr>