

Leif Lia

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**Name:** LIA, Leif  
**Profession:** Professorin Hydro Power Structures at Norwegian University of Science and Technology (NTNU)  
**Year of birth:** 1968  
**Nationality:** Norwegian  
**Languages:** English, German (some).  
**Family:** Married, two children

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## Current position

Professor in Hydro Power Structures in Department of Hydraulic and Environmental engineering at Norwegian University of Science and Technology, NTNU(2009 - )

Vice President of International Commission on Large Dams (ICOLD)

## Education:

1994- 1998 Dr.ingeniør (PhD), Norwegian University of Science and Technology, NTNU  
1993 – 1995 Full pedagogical education, Norges Tekniske Høgskole NTH  
1989 – 1993 Master of science (MSc) in civil engineering, Norges Tekniske Høgskole NTH

## Experience:

2009 – dd.: Professor, NTNU, Department of Hydraulic and environmental engineering  
2001 – 2009: Ass.Professor (20%) in Dam Safety, NTNU

### Lecturing/supervision

- In charge of four courses, three MSc and one PhD course
- In charge of continuous education program in Dam Safety
- Coordinator of Project work and master theses for hydraulic engineering
- Main supervisor on 61 Master theses
- Main supervisor on 62 project work
- Main supervisor of four Phd students (one finished)
- Co-supervisor of two PhD students (both finished)
- Frequent speaker on several international and national courses related to hydropower and dams

### Research

- 2009 – 2012 Head of NTNU Hydraulic Laboratory (Vassdragslaboratoriet)
- Establishment of research and education program for hydro power structures between Energi Norge and NTNU, 2010 - 2014
    - Upgrading of laboratory
    - Research projects
      - Bergedammen, backflushing of trash racks
      - Coanda intake screens, winter performance
      - Viddal - New intake concept for small hydro
      - Dabbsjö I – modification of large spillway (Sweden)

- Dabbsjö II – New spillway design (Sweden)
- Dam Refsdal – Spillway design
- IntakeStasjon selv – sediment flushing for Tyrolian weirs
- Rock slides in Reservoir – overtopping of rock fill dams
- Full scale testing of Rip Rap for rock fill dams
- Participation in other projects

**1998 – 2009: SWECO Norge AS, Trondheim**  
**2003 – 2009 Head of Hydro power department**  
**2002 – 2003: Head of Trondheim office**  
**1998 – 2002: Consulting engineer**

### **Engineering experience**

Planning of hydro power projects included pre-feasibility and licensing

- 27 projects

Detailed design of hydro power projects

- 4 projects

Design of intakes for hydro power projects

- 14 projects

Design of new dams

- 11 dams

Upgrading of dams

- 28 main dams + secondary dams included

Reassessment of existing dams

- 35 dams

Safety evaluation of dams

- 24 dams

Fish passages/Fish obstacles

- 5 innovation projects

Head loss measurements and analyses

- 3 projects

Research projects

- 12 applied research projects related to hydro power. Some examples:
  - Air accumulation in hydro power tunnels
  - Ice loads on dams
  - Financing for hydro power (Handbook for investment banks)
  - New dam types for small hydro

**1987 – 1992 Statens vegvesen (Norwegian Road Authority)**, in total two years as junior engineer in planning and construction of roads

### **Other current membership and positions of relevance**

Vice president of Norwegian National Committee on large Dams (NNCOLD)

Board member of International Center for Hydro power (ICH)

Board member of IKN Industrial AS (Pltd. for investments in developing countries, previous chairman)

Member of Norwegian Foundation of Rock Mechanics (NFF)

Member of IAHR

### **Papers, peer review (13)**

Lia, L., Jensen, T., Stensby K.E., Midttømme, G.H. and Ruud, A.M., *The current status of hydropower and dam construction in Norway*, The International Journal of Hydropower & Dams, Issue 3, 2015

Vereide, K., Lia, L., Nielsen, T.K., *Hydraulic scale modelling and thermodynamics of mass oscillations in closed surge tanks*. Journal of Hydraulic Research 2015 s.

Vereide, K., Richter, W., Zenz, G., Lia, L., *Surge Tank Research in Austria and Norway*. Wasserwirtschaft 2015, Volume 105.(1) s. 58-62

Nøvik, H., Lia, L. and Opaker, H., *Performance of Coanda-Effect Intake Screen in a Cold Climate*, Journal of cold regions engineering, ASCE (2014), ISSN: 0887-381X

Nøvik, H., Lia, L., Rettedal, B. and Nielsen, L.E., *Hydraulics of Backflushing for efficient cleaning of Hydro Power Intake Screens*, Canadian Journal of Civil Engineering (2014), 41(3): 263-269, ISSN: 0315-1468

Nøvik, H., Lia, L. and Wigestrang, M., *Horizontal Trash Rack – a New Intake Concept for Efficient Backflushing*, Journal of Applied Water Engineering and Research (2014), Accepted for publishing, ISSN 2324-9676

Gebre, S.B., Alfredsen, K., Lia, L., Stickler, M. and Tesaker, E., *Ice effects on hydropower systems - a review*, Journal of cold regions engineering, ASCE (2013) ISSN: 0887-381X

Vereide, K., Lia, L. and Ødegård, L., *Monte Carlo Simulations for economic analysis of hydropower pumped storage projects in Nepal*, Hydro Nepal – Journal of water, energy and environment, Issue No. 12 (2013), ISSN 1998-5452

Bråveit, K., Lia, L. and Olsen N.R., *An efficient method to describe the geometry and the roughness of an existing unlined hydro power tunnel*, Energy Procedia Volume 20 (2012), p. 200 – 206, Elsevier, (2012), ISSN: 1876-6102

Johnson, M., Mtalo, F.W. and Lia, L., *How fill material affects the overtopping process for earthfill dams*, Hydro Review Worldwide, online journal (2010), ISSN 1072-9542

Ruud, A.M. and Lia, L., *Environmental rehabilitation of Dam Bitdalen*, In Schleiss A. and Boes, R., Dams and reservoirs under changing challenges, CRC Press 2011, ISBN 978-0-415-68267-1

Lia, L. and Carstens, T., *Snow and ice blocking of tunnels*, 14. International Symposium on ice, IAHR, Potsdam N.Y., 1998, Balkema, ISBN 90-5410-971-8

Lia, L., *Ice in spillways in connection with dam safety*, Hydropower'97, Trondheim, 1997, Balkema, ISBN 90-5410-888-6

### **International conferences with proceedings (24)**

Lia, L., Aas, M.N., Killingtveit, Å., *Possible 6 – 60% increased generation from upgrading and extension projects*, International Conference Hydro2015, Bordeaux, France (to be presented 28. October)

Lia, L., Ruud, A.M., Belete, K., *Design and implementation of gated and ungated spillway at the Dabbsjö Dam in Sweden*, ICOLD 25<sup>th</sup> Congress, Stavanger, 2015

Sas, G., Bretas, E.M., Lia, L., *Advanced sliding assessment of Målset dam: tests and numerical analysis of unbonded joints*, ICOLD 25<sup>th</sup> Congress, Stavanger, 2015

Hiller, P.H., Lia, L., *Placed riprap as protection on the downstream slope of rockfill dams exposed to overtopping*, ICOLD 25<sup>th</sup> Congress, Stavanger, 2015

- Rognes, M., Midttømme, G.H., Lia, L., *Uplift pressure under concrete dams on rock foundation*, ICOLD 25<sup>th</sup> Congress, Stavanger, 2015
- Hiller, P.H., Lia, L. and Aberle J., *Riprap design on the downstream slope of rockfill dams - Laboratory test rig and "Smart Stone" measurement device*, JuWi 2014, (In German)
- K. Vereide, L. Lia, T. Nielsen, *Physical modelling of hydropower waterway with air cushion surge tank*, IAHR International symposium on hydraulic structures, Brisbane, Australia, 2014
- Richter, W., Vereide, K., Schneider, J., Knoblauch, H., Lia, L. and Zenz, G., *Druckluftwasserschlämmer für alpine Hochdruckwasserkraftlagen*, Wasserbausymposium 2014, Zürich, Sveits
- Vereide, K., Richter, W. and Lia, L., *Benefits of the Air Cushion Surge Chamber for Alpine Hydropower Plants*, HydroVienna 2014, Wien, Austria
- Hiller, P.H., L. Lia, Johansen, P.M. and Guddal, R., *Dam Svartevatn An example of challenging upgrading of a large rockfill dam*, Symposium for ICOLD Annual Meeting 2014, Bali, Indonesia
- Thomas-Lepine, C. and Lia, L., *Capacity of Passive Rock Bolts in Concrete Dams Improved Design Criteria*, Symposium for ICOLD Annual Meeting 2014, Bali, Indonesia
- Lunde, M., Halvorsen, A., Strokkenes, S. A., Panthi, K. and Lia, L., *Strengthening of the Right Abutment at a Norwegian Arch Dam*, Symposium for ICOLD Annual Meeting 2014, Bali, Indonesia
- Smith, H.B. and Lia, L., *Seismic aspects of Ambursen dams*, 12<sup>th</sup> ICOLD Benchmark Workshop in Numerical Modelling for Dams, Graz, 2013
- Eltervåg, Ø., Sas, G. and Lia, L., *Numerical Analyses of Stability towards Sliding - Influence of Surface Roughness*, 12<sup>th</sup> ICOLD Benchmark Workshop in Numerical Modelling for Dams, Graz, 2013
- Midttømme, G.H., Lia, L. and Ruud, A.M., *Risk analyses in Norway – rules, recommendations and practical application for dam safety*, Publishing and oral presentation in Symposium for ICOLD Annual Meeting 2013, Seattle USA
- Lia, L., Vartdal, E.A., Skoglund, M. and Campos, H.E., *Rip rap protection of downstream slopes of rock fill dams – a measure to increase safety in an unpredictable future climate*, 9<sup>th</sup> ICOLD European Club Symposium, 2013, ITCOLD
- Belete, K. Bjørkmo, D, Guttormsen, O. Lia, L. and Guddal, R., *Physical Model Study to Evaluate a Combined Spillway and Emergency Outlet System of Dam Svartevatn in Norway*, 9<sup>th</sup> ICOLD European Club Symposium, 2013, ITCOLD
- Ittelin, K.S, Strokkenes, S.A. and Lia, L., *Abutment Deformation of a Single Curved Arch Dam*, 9<sup>th</sup> ICOLD European Club Symposium, 2013, ITCOLD
- Belete, K., Lia, L., Guttormsen, O. and Liif, J., *Physical model study for optimum design of side channel spillway of Dabbsjödam in Sweden*, Canadian Dam Association 2012 Annual Conference, Saskatoon Canada
- Bråveit, K., Lia, L. and Olsen N.R. and Torpe K., *An efficient method to describe the geometry and the roughness of an unlined hydro power tunnel*, Technoport Renewable Energy Research Conference RERC, 2012, Trondheim Norway

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Nøvik, H., Jørstad, O.A. and Lia, L., *Experimental Study of Back Flushing of Trash Rack*, Proceedings of the IAHR 34th World Congress of the International Association for Hydro- Environment Research and Engineering: 33rd Hydrology and Water Resources Symposium and 10th Conference on Hydraulics in Water Engineering. Barton: Engineers Australia 2011 ISBN 978-0-85825-868-6. s. 2522-2529

Nøvik, H, Lia, L. and Jørstad, O.A., *Back flushing of trash racks at intakes to small hydro power plants*, *International Conference Hydro 2011*, 2011, Lisboa Portugal

Lia, L., *Ice in spillways and tunnels – Problems and physics, Part I*, 13. International Symposium on ice, IAHR, Beijing, 1996

Lia, L., *Ice in spillways and tunnels – Calculations and measurements, Part II*, 13. International Symposium on ice, IAHR, Beijing, 1996

### **Other international publications**

ICOLD Bulletin No. 163, *Dams for hydroelectric energy*, 2013, 21 authors

Bjørkmo, D, Guttormsen, O, Belete, K. and Lia, L., *Svartevassdammen – Fysiskmodellforsøk av flomløpsystemet*, NTNU Forskningsrapport, 2013, ISBN 82-7598-086-0 (in Norwegian)

Belete, K., Guttormsen, O., Lia, L. and Shigdel, P., *Physical Model Study of Dabbsjö I Spillway*, NTNU Forskningsrapport, 2011, ISBN 82-7598-080-1

Belete, K., Guttormsen, O. , Lia, L. and Speth, C., *Physical Model Study of Dabbsjö II Side Channel Spillway*, NTNU Forskningsrapport, 2011, ISBN 82-7598-082-8

### **National conferences**

40 papers/presentations in national conferences