

Curriculum vitae with track record

*PERSONAL INFORMATION

*Family name, First name: **Graue, Arne**

*Date of birth: **30.04.1955**

*Sex: **M**

*Nationality: **Norwegian**

*EDUCATION

1991 PhD (Dr. Philos.), Reservoir Physics, U. of Bergen, NORWAY, 1991

1981 MSc (Cand. Real.), Nuclear Physics, U. of Bergen, NORWAY, 1981

*CURRENT AND PREVIOUS POSITIONS

1997- Prof. Reservoir Physics, U. of Bergen, NORWAY

1991-1997 Assoc. Prof. Reservoir Physics, U. of Bergen, NORWAY

1985-1991 Research Scientist Reservoir Physics, NRC/U. of Bergen, NORWAY

1983-1985 Research Fellow, Reservoir Physics, U. of Bergen, NORWAY

1982-1983 Research Fellow, Theoretical Atomic Physics, U. of Bergen, NORWAY

1981-1982 Research Fellow, Experimental Nuclear Physics, U. of Bergen, NORWAY

MOBILITY

Visiting scientist and visiting professor at various institutions, including:

1981 Massachusetts Institute of Technology, Boston, Mass., USA.

1985-2014 Phillips Petroleum Company's Research Center in Bartlesville, Ok., USA.

2000-2005 University of Wyoming, Laramie, Wyoming, USA.

2009-2014 U. of Kansas, Kansas, KS, USA

2022-2023 Rice U., Houston, TX, USA

SUPERVISION OF GRADUATE STUDENTS AND RESEARCH FELLOWS

Student supervision at U. of Bergen 1992-2022:

Current Master Students:	11
Current PhD students:	5
Graduated PhD-students:	31
<u>Graduated Master Students</u>	<u>229</u>
<u>Sum students:</u>	<u>276</u>

- 120 of my students have had industry supported research terms in the US last 15 years

TEACHING ACTIVITIES

Teaching "Fundamental Reservoir Physics" and "Core Analysis" for 20 years.

Teaching various other Physics courses as Professor for more than 30 years.

ORGANISATION OF SCIENTIFIC MEETINGS

2013-2019 "Biennial CO2 EOR as CCUS Conference", Houston, TX, USA: 2013, 2015, 2017, 2019

Annual attendance: 120, 60 PhDs from 7 countries

2018 & 2022 "Whole Value Chain CCUS Conference", Golden, CO, USA. Att.: 75, 40PhDs from 9 countries

2010-2018 "Annual NFIP Seminar at Norwegian Oil Museum", Stavanger, Norway: att: 75 ann. for 7 years

PROJECT MANAGEMENT EXPERIENCE

1992-2005 Project lead for 6 industry/Research Council projects: 66,000 mill NOK (US\$ 6,6mill)

2005-2019 Project leader for 25 projects; total grants: 137,238 mill NOK (US\$ 13,7mill)

Sum grants as project leader: 203,238 mill NOK (US\$ 20,3mill)

Sum grants at U. of Bergen in international research collaborations: 450,000 mill NOK (US\$ 45mill)

COMMISSIONS OF TRUST

- Energy advisor for 3 Norwegian Consul Generals in Houston, TX USA, from 2009-2020
- Member of Ministerial Delegations for Bilateral Collaboration on Fossil Fuels and CCUS between Norway and USA.
- Invited speaker at CSLF meetings in prep for 15 Energy Ministers last 5 years
- National Expert Status at Norway National IOR Center at U. of Stavanger, 2013-2019

- 1 of 4 Profs receiving NOK 140mill (US\$14mill) for Center of Excellence, 2003 at U. of Bergen
- Head of Petroleum Research School of Norway (www.NFiP.no) and Chair of the Board
- Chair of the Executive Boards for NorTex Petroleum Cluster (www.NorTexpetroleum.org) and Colorado Norway Clean Energy Transition Research and Educational Collaboration (www.ColNor.org).

MAJOR COLLABORATIONS

Project lead: "Upscaling CO₂ Foam EOR from Lab to Field Pilots", 11 universities and 7 oil companies in 5 countries, collaborates to provide more sustainable oil production with CO₂ storage in EOR.

TRACK RECORD

1. The total number of publications during the career: **310 + 235 reports**
2. Granted patents: 3, H-factor: 40, RIS: 2205, citations: 5090
3. Major contributions to the early careers of excellent researchers:
Mentoring Martin Fernø; Meltzer award winner.
4. Examples of leadership in industrial innovation or design:
 - **Within 9 years developed the idea of CO₂ sequestration in hydrates for carbon neutral gas production technology by CO₂ injection, to obtaining worldwide patents and instigated a successful US\$ 30mill field pilot in Alaska.**
 - **Within 10 years developed a low carbon oil production technology using CO₂ foam EOR for mobility control and enabling commercial CO₂ storage within CCUS, including a field pilot in Texas.**
5. Invited talks:
 - **IEA/OGTI in New York, Firenze og Houston last 5 years.**
 - **Presenting in MoU negotiations between USA and Norway at Ministry level**
 - **Invited speaker for 5 Energy Ministers in Eastern Europe in 2015 for COP21 strategies**
 - **Heading Energy Ministerial Delegations in: 1) North Dakota 2) from Argentina and 3) Texas**
6. 10 Selected Reviewed Publications for Arne Graue:
 1. Enge, H.A., Salomaa, M., Sperduto, A., Ball, J., Schier, W., Graue, Arnfinn, Graue, Arne: "Neutron Deficient Platinum and Osmium Isotopes Produced in the ³²S + ¹⁴⁴Sm Fusion Reaction", Phys. Rev. C. Vol. 25 No. 4, 1830-37, 1982.
 2. Rosnes, J.T., Graue, A., Lien, T.: "Activity of Sulfate-Reducing Bacteria Under Simulated Reservoir Conditions", SPE 19429, SPE Prod- Engineering, Vol.6, No.2, (217-220), May 1991.
 3. Graue, A.: "Imaging the Effect of Capillary Heterogeneities on Local Saturation Development in Long-Core Floods", SPEDC, Vol. 9, No. 1, March 1994.
 4. Graue, A., Viksund, B.G., Baldwin, B.A., Spinler, E.: "Large Scale Imaging of Impacts of Wettability on Oil Recovery in Fractured Chalk", SPE Journal, Vol 4, No. 1, March 1999.
 5. Graue, A., Viksund, B.G., Baldwin, B.A.: "Reproducible Wettability Alteration of Low-Permeable Outcrop Chalk", SPE Res. Eng. and Eval., Vol. 2, No. 2, April, 1999.
 6. Graue, A., Bognø, T., Baldwin, B.A., Spinler, E.A.: "Wettability Effects on Oil Recovery Mechanisms in Fractured Reservoirs", SPEREE, Vol. 4, No. 6, (455-466), Dec., 2001.
 7. Graue, Arne; Kvamme, Bjørn; Baldwin, Bernie A.; Stevens, Jim; Howard, James; Aspenes, Eirik; Ersland, Geir; Husebø, Jarle; Zornes, D. R.. "Environmentally Friendly CO₂ Storage in Hydrate Reservoirs Benefits from Associated Natural Gas Production." SPE 2006 OTC; 2006-05-01-2006-05-04
 8. Graue, Arne; Fernø, Martin; Aspenes, Eirik; Needham, Riley: "Wettability effects on water mixing during waterflood oil recovery", J. of Petroleum Science and Engineering 2012 ;Vol. 94-95. s.89-99.
 9. Alcorn, Z.P., Sharma, M., Fredriksen, S. B., Fernø, M.A., and Graue, A. 2018. An Integrated CO₂ Foam EOR Pilot Program with Combined CCUS in an Onshore Texas Heterogeneous Carbonate Field. SPE Reservoir Evaluation and Engineering, 2019.
 10. Eide, L.I.; Batum, M.; Dixon, T.; Elamin, Z.; Graue, A.; Hagen, S.; Hovorka, S.; Nazarian, B.; Nøkleby, P.H.; Olsen, G.I.; Ringrose, P.; Vieira, R.A.M. Enabling Large-Scale Carbon Capture, Utilisation, and Storage (CCUS) Using Offshore Carbon Dioxide (CO₂) Infrastructure Developments—A Review. *Energies* 2019, 12, 1945.