



Annual Report  
2023



## FORCE annual report 2023

### Opening remarks from FORCE MC Chairman

Same procedure as every year, let me start with quick reminder on the purpose of FORCE; - to play a significant role in the future value creation on the Norwegian Continental Shelf, through facilitating cooperation between industry, research institutions and authorities.

We are now fully back to the good “pre-covid” times and are again experiencing the value of meeting face-to-face. “In person” is the preferred way to meet for longer seminars and workshops, where webinar can still provide efficiency for the shorter events. In total, 13 in-person seminars, 16 “webinars”, 6 hybrid meetings, and one field trip have been conducted in 2023. These have been attended by some 1900 participants, showing the continued relevance of the FORCE cooperation.

Machine learning and AI are amongst the newer and popular themes, with five seminars organized by the Data Analytics group - attracting lots of attention and valuable discussion.

The newly established CCS group has been highly active with five well attended seminars and a field trip to Bergen to visit the fluid flower rig. Our climate is more vulnerable than ever, and FORCE has established the Energy Efficiency & Environment committee to reflect our industry’s focus on climate and environment footprint. During 2023, we have also encouraged all committees to have themes that focus on how we can reduce our climate footprint. We don’t get a 2nd change when it comes to our global climate. On that note, we also welcome Horisont Energi as new member in FORCE.

Integrated Reservoir Modelling is, as always, very active and organized a total of seven in-person seminars at NPDs premises, with high attendance and room for good open discussions. The traditional and evergreen themes also attract interest and are well attended. Structural Geology (five), Petroleum Systems (four), Sedimentology and Stratigraphy (three) have also been very active, followed by Well Technology and Drilling, Production Optimisation and Reservoir Management, and Carbonate and Chalk Reservoirs.

Thanks to our secretariat, we are in safe hands in terms of promoting and organizing events and keeping the FORCE website and our books updated and in good order. In 2023, we started issuing regular FORCE Newsletters containing relevant event news, and also reminders on how we do things in FORCE. On LinkedIn and YouTube, we have almost 2000 followers. This is the backbone of keeping the FORCE organization running smoothly and ensuring successful events.

Looking ahead, the 2024 FORCE program already starts to fill up with 9 planned events, mainly in-person seminars. In addition, this year we will be organizing the bi-annual “Joining Forces” conference. The FORCE ambition is to aid in faster technology adoption by initiating JIPs where cost and risk can be shared across several companies. One additional vehicle to do this is the Joining Forces, we are matching up the desires from the industry with competencies and ideas from academia and research organizations.

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In the Management Committee, we are impressed with the dedication you put into the Force cooperation. This is done in addition to all your other professional and private obligations. It is also great that FORCE, with our seminars and workshops based on shared interest and curiosity, is a place to enjoy interesting and relaxed dialogues with trusted colleagues - a safe place to discuss. So again - a big thank you to committee members, network participants and secretariat for all your efforts and hard work in 2023! May 2024 be another great FORCE year.

Søren Andersen, Wintershall Dea, FORCE Chairman

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## About FORCE

FORCE is a cooperating forum for Sustainable Recovery (SR), Improved exploration (IE) and Energy efficiency & environment (EEE) conducted by oil and gas companies and authorities in Norway. Our ambition is to play a significant role in the future value creation on the Norwegian Continental Shelf, through facilitating cooperation between industry, research institutions and authorities.

The basic idea of the forum is to improve collaboration by sharing knowledge through network groups and by enabling the establishment of cross licensees /company piloting projects within exploration and enhanced oil recovery through project groups.

	<b>Role/task</b>	<b>Participants</b>	<b>Meetings</b>
<b>General assembly</b>	<ul style="list-style-type: none"> <li>• Decide budget</li> <li>• Select members for committees</li> </ul>	<ul style="list-style-type: none"> <li>• All member companies</li> </ul>	<ul style="list-style-type: none"> <li>• Yearly</li> </ul>
<b>Selection committee</b>	<ul style="list-style-type: none"> <li>• Propose members for committees</li> </ul>	<ul style="list-style-type: none"> <li>• 3 members</li> </ul>	<ul style="list-style-type: none"> <li>• Biennial</li> </ul>
<b>Management committee</b>	<ul style="list-style-type: none"> <li>• (Re-) allocate budget</li> <li>• Synergies between technical groups</li> <li>• External communication</li> <li>• Monitor activities</li> </ul>	<ul style="list-style-type: none"> <li>• Max 8 members</li> </ul>	<ul style="list-style-type: none"> <li>• Quarterly</li> </ul>
<b>Secretariat</b>	<ul style="list-style-type: none"> <li>• Arrange meetings</li> <li>• Support activities</li> <li>• Administration</li> </ul>	<ul style="list-style-type: none"> <li>• NPD</li> </ul>	<ul style="list-style-type: none"> <li>• As required</li> </ul>
<b>Technical committees</b>	<ul style="list-style-type: none"> <li>• Select project proposals</li> <li>• Facilitate project initiation</li> <li>• Manage pre-projects</li> </ul>	<ul style="list-style-type: none"> <li>• Max 8 members</li> <li>• Whereof 3 asset managers</li> </ul>	<ul style="list-style-type: none"> <li>• Quarterly</li> </ul>
<b>Network groups</b>	<ul style="list-style-type: none"> <li>• Share information through workshops</li> <li>• Generate ideas for new projects</li> </ul>	<ul style="list-style-type: none"> <li>• All member companies</li> </ul>	<ul style="list-style-type: none"> <li>• As required</li> </ul>

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## Members

All oil and gas companies with an office in Norway can become FORCE members. Interested parties can apply for membership by contacting the Secretariat. The Management committee, consisting of 8 members, will be consulted.

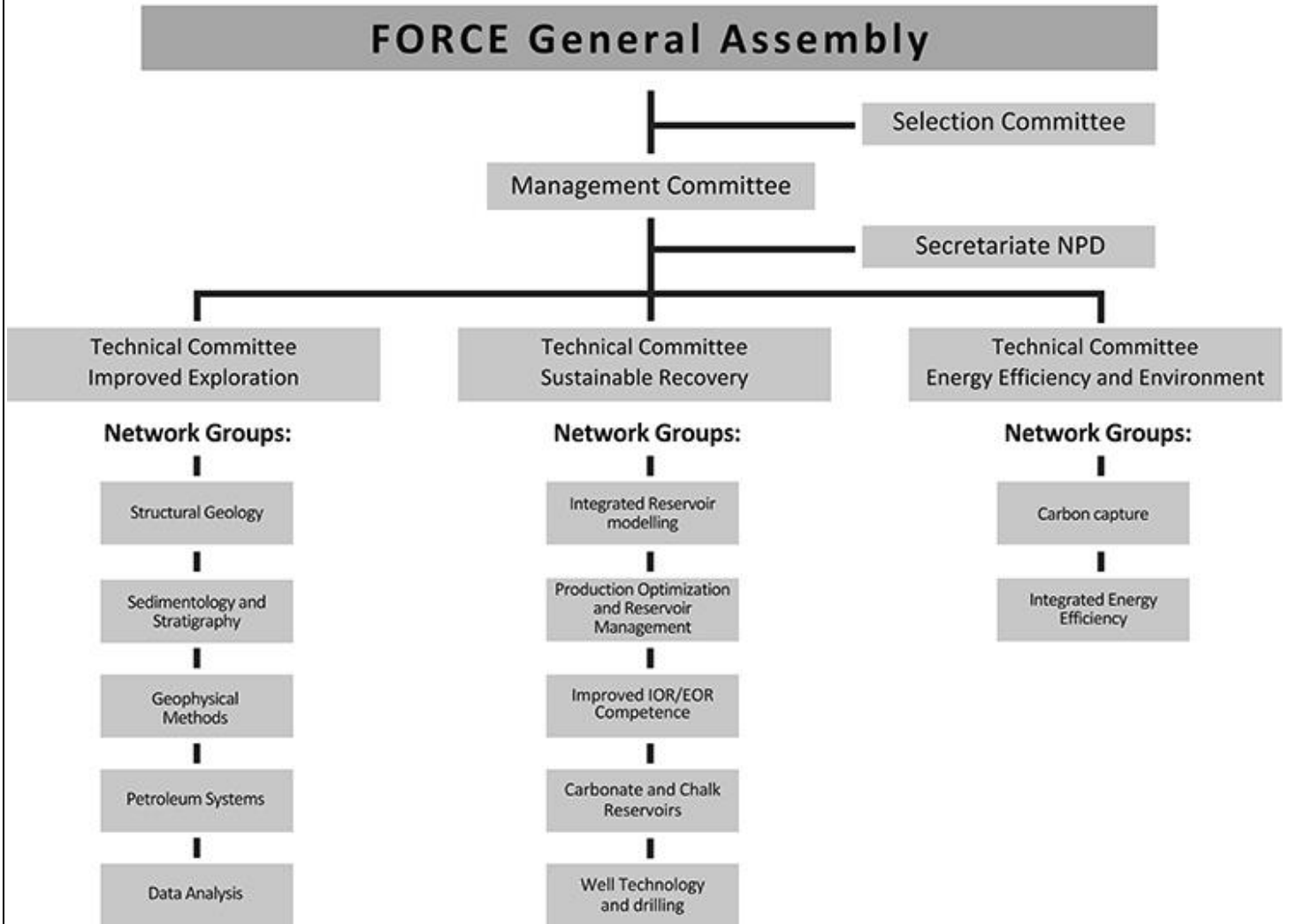
New companies must sign the FORCE Cooperation Agreement. The cost is a given amount divided equally among all members. For 2023 this was NOK 101 852,-.

By the end of 2023, the number of members had decreased from 36 to 28 members, and one new member, Horisont Energi was welcomed. The reduction in members were mostly because of company merges.

These companies were members during 2023 (this is according to invoicing).

A/S Norske Shell	NPD
Aker BP	OKEA
Cape Omega	OMV Norge
Concedo	Pandion
ConocoPhillips	Petoro
DNO Norge	Petrolia NOCO
Equinor	PGNiG Upstream International
Harbour Energy	Repsol Exploration
Horisont Energi (new in 2023)	Source Energy
INPEX Idemitsu	Sval Energi
KUFPEC Norway	TotalEnergies
Lime Petroleum	Vår Energi
LOTOS Exploration Production Norge	Wellesley Petroleum
Neptune E&P	Wintershall Dea Norge

## Organization



## Management- and technical committees

<b>Management Committee</b>	
Søren Andersen	Wintershall Dea
Helen Haneferd	ConocoPhillips
Grete Block Vagle – temp. Chair	Aker BP
Olga Matveenکو	TotalEnergies
Thomas Gorm Theting	Equinor
Michiel Van Noorden	Vår Energi
Kenneth Høgseth	DNO
Claire Richardson	Shell
<b>TC Improved Exploration</b>	
Eva Maria Traa	Aker BP
Atle Folkestad	Equinor
Sebastien Landru	DNO
Piotr Kabulski	PGNiG
Marli Blumenwitz	Wintershall Dea
Matteo Gennaro	Vår Energi (replaced P. Spencer)
Linda Lerchbaumer	OMV
Stig-Morten Knutsen	NPD
<b>TC Sustainable Recovery</b>	
Johanna Normann Ravnås, Chairman	Wintershall Dea
Bjørn Egil Ludvigsen	Aker BP
Konstantin Monastyrev	Petoro
Teodor Damian	Shell
Robert Moe	ConocoPhillips
Emanuel Teichmann	Shell
Svein Tollefsen	Equinor
Eli Jens Høgnesen	NPD
<b>TC Energy Efficiency and Environment</b>	
Rocio Rivera Atencia	Equinor
Carlo Cavalli	PGNiG
Georgios Samouilidis	Shell
Hans Røstøen	ConocoPhillips
Hege Odden	Petoro
Claire Le Maitre	Neptune
Silje Kommedal	Repsol
Aslaug Eskeland Jansen	NPD

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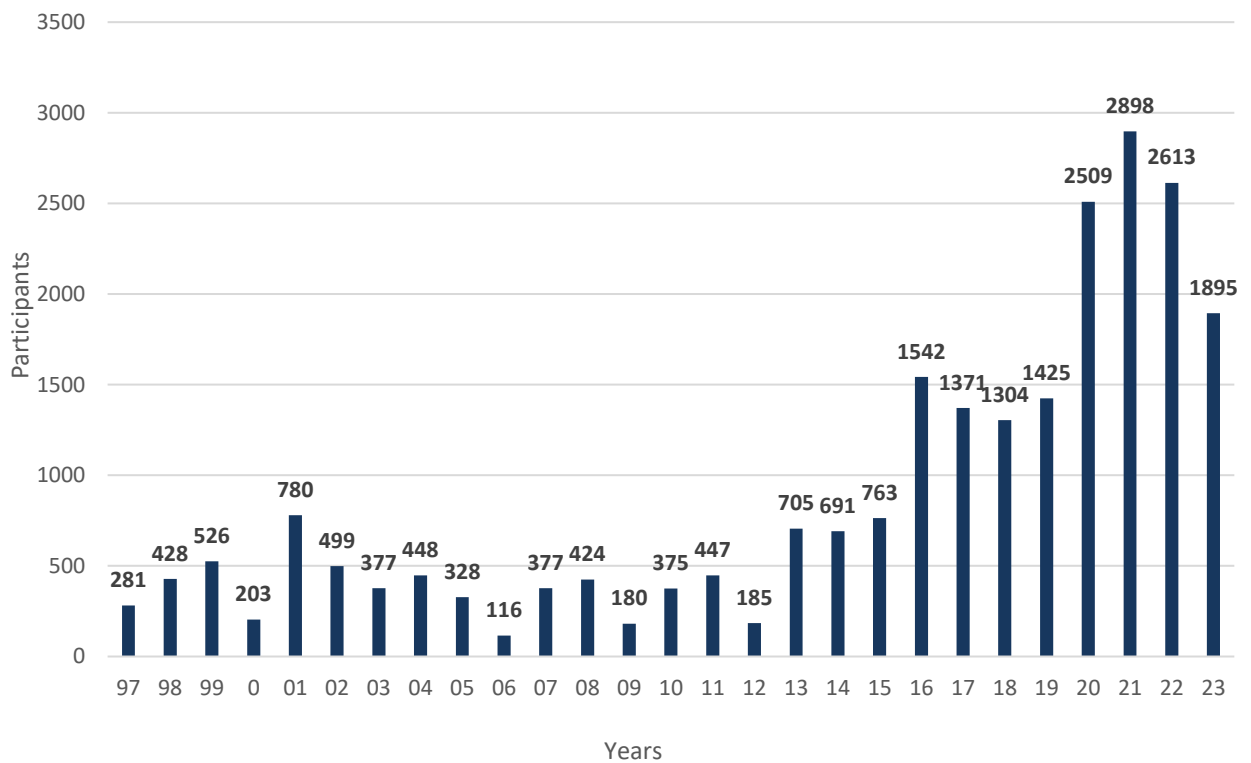
## Activity reports

2023 turned out to be another great year for FORCE. Once again, the FORCE members have impressed us.

FORCE has hosted 36 events, with a combination of in-person and webinars, with an increasing number of in-person seminars. It is good to see that people are meeting each other again and networking before, after and between sessions. A total of 1895 participants took the time to join in on our wide range of topics. “An Introduction to Supervised Machine Learning” was the most popular event, attracting 129 participants. We also hosted another “Language modelling Hackathon 2023”. The TC-IE group held the very successful “Cross Border seminar”, with a fully booked TOR auditorium. The topic was borderless exploration and petroleum plays. We see that the interest in both arranging and attending events are staying at a constant high level. The low threshold, combined with good topics is a large contribution to that.

The diagram below illustrates number of attendees at the seminars and workshops through time.

### FORCE SEMINARS 1997 - 2023





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## Webinars, lunch&learns and seminars in 2023

Date	Type	Name	Part.
19.01.	Field trip	Site visit to the Fluid Flow Rig at University Museum of Bergen	37
08.02.	Webinar	Injection-induced earthquake activity in West Texas	71
14.02.	Webinar	Field trip to Brent	37
23.03.	Webinar	Organic chemostratigraphy of Lower–Upper Triassic organic-rich mudstones in Svalbard	43
28.03.	In-person	Tidal Systems	74
28.03.	Webinar	The Role of Geoscience in the Critical Evaluation of Subsurface Carbon Storage Sites	98
12.04.	Webinar	Salt structure and strain development in the eastern Mediterranean, and Kurdistan Oil Field trapping mechanisms	52
13.04.	In-person	IRM network group presents Cake & Discuss	20
18.-19.04.	In-person	Diagensis Seminar	51
26.04.	In-person	Curbing Optimism and Overconfidence Bias in Forecasting	43
10.05.	In-person	IRM network group presents Aquifer Models	53
11.05.	In-person	Unravelling the Valhall Chalk Dense Zone Conundrum – Traditional vs. Innovative Interpretation	27
23.05.	In-person	A look back on 40 years of Reservoir Simulation (from the man who knows)	52
24.05.	Webinar	An Introduction to Supervised Machine Learning	129
31.05-01.06	In-person	Faults from seismic interpretation to geo-model and flow simulator	50
12.06.	Hybrid	Machine Learning for Time Series and Anomaly Detection	99
22.06.	In-person	JIP proposal- Mercury to understand the origin and ensure improved measurement and removal	55
07.08.	In-person	Computer Vision	28
22.08.	In-person	Cake & Discuss – Practical Geomodelling Part 2: Practical Geomodelling	29
14.09.	Webinar	Subsurface Databasing in the modern energy environment: one location with multiple applications	58
19.09.	Webinar	CCS activities in OMV	67
20.09.	Webinar	Discrete-Element Modelling (DEM) using “cdem” from expert-user HPC code to a desktop application	23
25.09.	In-person	JIP proposal- Recovery Factor Benchmarking Phase 2	11
02.10.	Hybrid	Natural Language Processing and Large Language Models	77
24.10.	Webinar	LINCCS Project	35
25.-26.10.	In-person	Cross Border Seminar	62
07.11.	In-person	Cake and discuss: practical geomodelling part 3: the property model	21
09.11.	Webinar	Production from low permeability reservoir and hydraulic fracturing	112
14.11.	Webinar	Benchmarking in US Onshore: Foster competition and continuous improvement	27
16.11.	Webinar	Capillary Seals and Petroleum Migration: Theory, Observation, Modeling, and Risking	106
21.11.	Webinar	NCCS and gigaCCS Projects	42
22.11.	In-person	Tight Reservoirs – Reservoir Appraisal and Development	20

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30.11-01.12.	In-person	Language modelling Hackathon 2023	52
06.12.	Webinar	Digital work instructions - interface between onshore and offshore organizations	34
14.12.	Webinar	Interaction of stratigraphy with faults at pressure cell boundaries within the Jurassic to Triassic reservoir sequences	39
14.12.	Webinar	NPD's use of seep studies on the NCS	61

## FORCE annual report 2023

### Budget and annual accounts 2023

Budget 2023			Result 2023	
	Income	Expenses	Income	Expenses
Transferred from 2022	1 844 119		1 844 119	
Pre-projects TC group		300 000		100 000
Payment (seminar fees)	600 000		308 200	
Sponsors			140 000	
Seminars Expenses		600 000		448 200
Seminar buffer		300 000		70 393
Lunch&Learn	30 000	50 000	18 600	62 596
Invited speakers-EE&E		200 000		
Invited speakers - IE		200 000		100 000
Invited speakers - IOGR		200 000		
Membership fees	2 260 000		2 260 000	
Administration fee NPD		1 960 000		1 960 000
New members			101 852	
Secretariat expenses NPD		310 000		140 870
Extra funding web development		0		
Service at meetings		50 000		37 022
Accessories for seminars		10 000		
EpiServer + Basecamp + SurveyMonkey		100 000		78 164
PayEx fee/Swedbank (monthly)		100 000		9 304
Div/travel expenses		50 000		16 380
<b>Total</b>	<b>4 734 119</b>	<b>4 120 000</b>	<b>4 672 771</b>	<b>2 882 059</b>
Estimated balance 31.12.2023	614 119		<b>Balance now</b>	<b>1 790 712</b>

Result	
Transferred from 2022	1 844 119
Outgoing balance	1 790 712
<b>Result</b>	<b>-53 407</b>
Result seminar	0
Seminar buffer	-70 393
Pre-projects	-100 000
Invited speakers	-100 000
Lunch & learn	-43 996
New members	101 852
Membership fee (income)	2 260 000
Admin cost (NPD)	-1 960 000
Secretariat	-140 870
<b>Sum</b>	<b>-53 407</b>

Budget/balance	
Balance 2023	1 790 712
Budget/balance 2023	614 119
	<b>1 176 593</b>
Seed funds/Pre-projects	200 000
Seminars	0
Seminar buffer	229 607
Lunch & Learn	-23 996
Invited speakers	500 000
New members	101 852
Member- and admin fee	0
Secretariat	169 130
	<b>1 176 593</b>