



Annual Report
2021



Opening remarks from FORCE MC Chairman

The main ambition of FORCE 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. There is no doubt of the value being generated by exploration and production of oil and gas on the Norwegian continental shelf and I believe FORCE is playing an important part in that.

FORCE continues to thrive even whilst we have been curtailed by the continued covid-19 situation throughout 2021. The active use of virtual meetings has been very effective, even though it does not replace the networking and collaboration derived from face-2-face meetings, it does have some nice upsides, including the nearly 2900 attendees at 34 webinars and seminars – A new FORCE record year!

Our success is coming from dedicated individuals organizing and running these events, which is highly appreciated, so a big thank you to those. However, this is often the same groups of people and I encourage all companies to support active participation in the Network groups so that the high level of quality events is sustainable, and the efforts are shared across the members of the groups.

As our industry is facing new challenges and changes, we have implemented a change in the FORCE organization with the addition of a third Technical Committee on the topic of Energy Efficiency and Environment, with 3 associated Network Groups: Carbon capture and Storage, Energy Efficient Subsurface and Low Emission Facilities and Environment. The goal of these groups is to utilize the unique collaborative nature of FORCE to further improve our ability to meet the climate challenge and be part of the solution towards a greener future. The group kicked off in the middle of the year and has arranged its first seminar. More to come in 2022. As we now have 3 TC groups and 12 Network groups, going forward we need to ensure we make the most of collaboration between the groups, especially as there can be significant overlap in seminar topics across Network groups. This is a challenge we all need to respond to for efficient use of people's time (a precious commodity) for effective planning and running of events and activities.

One of the main goals of FORCE is generating ideas for and facilitating the start of new JIP's by being a contact point for industry and academia. A key event in this is the Joining Forces Seminar which has taken place every 2-3 years since 2013. The physical event planned for 2020 was postponed due to covid-19 and was not possible during 2021 either. We are happy to see that there are plans for the event in 2022. This is an important opportunity for networking and all to learn more about and match up the desires from industry and the competencies from the academic world.

Thank you to all your contributions and participation in FORCE. I would especially like to thank the NPD Secretariate for the excellent active guidance and support you provide.

There are several events for 2022 already in the calendar and others being planned, so I am looking forward to enjoying another productive year in FORCE with you. Let's hope we can soon get back to having some physical events as well as the webinars.

25th Jan 2022, on behalf of the Management Committee
Tim Austin, ConocoPhillips



About FORCE

FORCE is a cooperating forum for Improved oil and gas recovery (IOGR) , Improved exploration (IE) and Energy efficiency & environment 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.

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

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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.

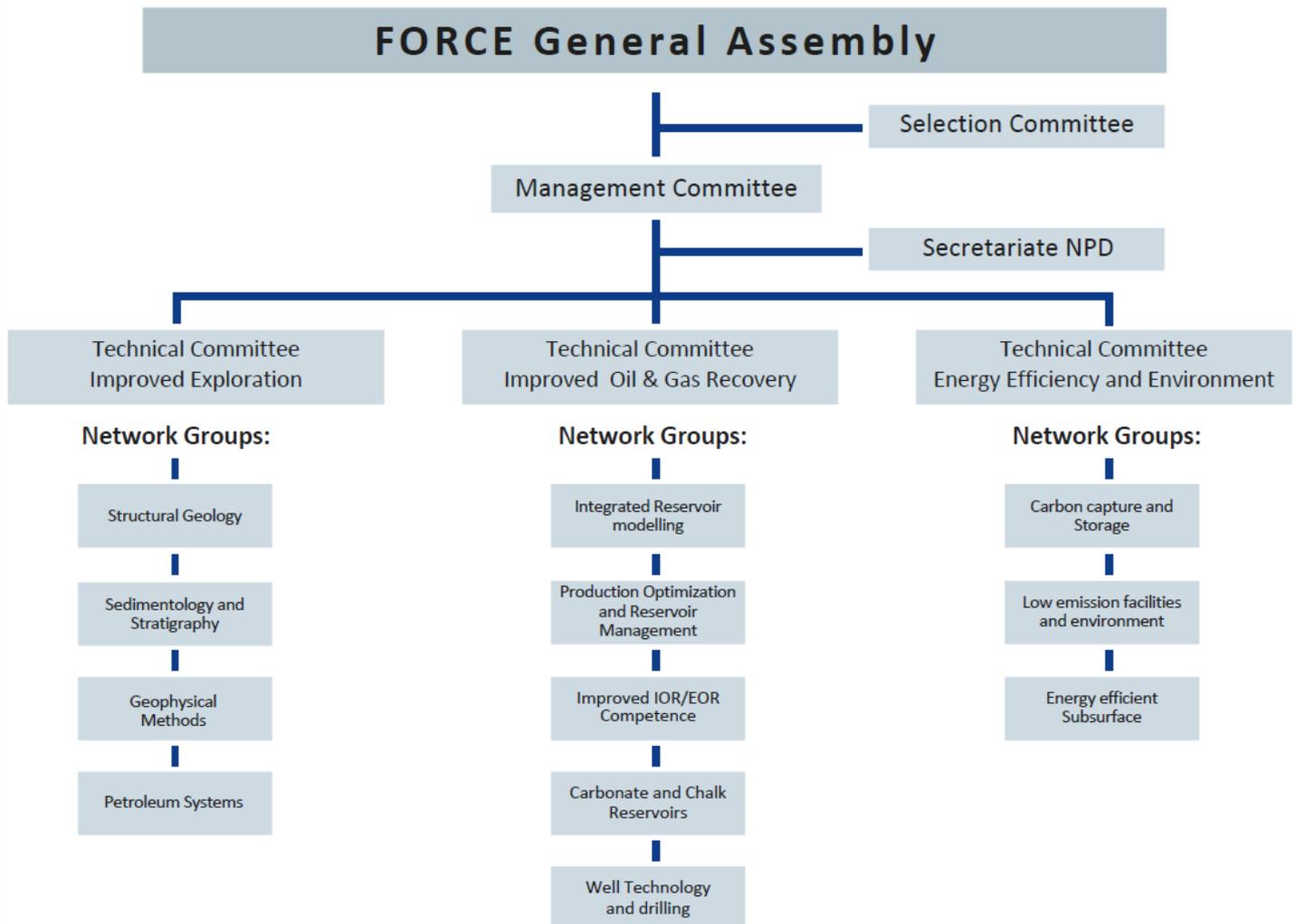
New companies must sign the FORCE Cooperation Agreement. The cost is a given amount divided equally among all members. For 2021 this was NOK 67 143,-.

By the end of 2021, the number of members had increased from 34 to 36 members where we welcomed three new members and we had one merge between two companies.

These companies were members during 2021 (this is according to invoicing).

A/S Norske Shell	NPD
Aker BP	OKEA AS
Cape Omega	ONE-Dyas
Chrysaor	OMV Norge AS
Concedo AS	Pandion Energy AS
ConocoPhillips Norge	Petoro
DNO Norge AS	Petrolia NOCO AS
Equinor	PGNiG Upstream International AS
Idemitsu Petroleum Norge AS	Repsol Exploration Norge
INPEX	RN Nordic Oil
INEOS E&P Norge AS	Spirit Energy Norge AS
KUFPEC Norway AS	Source Energy
Lime Petroleum	Suncor Energy Norge AS
LOTOS Exploration Production Norge AS	Sval Energi
LUKOIL Overseas North Shelf AS	TotalEnergies
Lundin Norway AS	Vår Energi
Mime Petroleum	Wellesley Petroleum
MOL Norge AS	Wintershall Dea Norge ASA
Neptune E&P	

Organization



Management- and technical committees

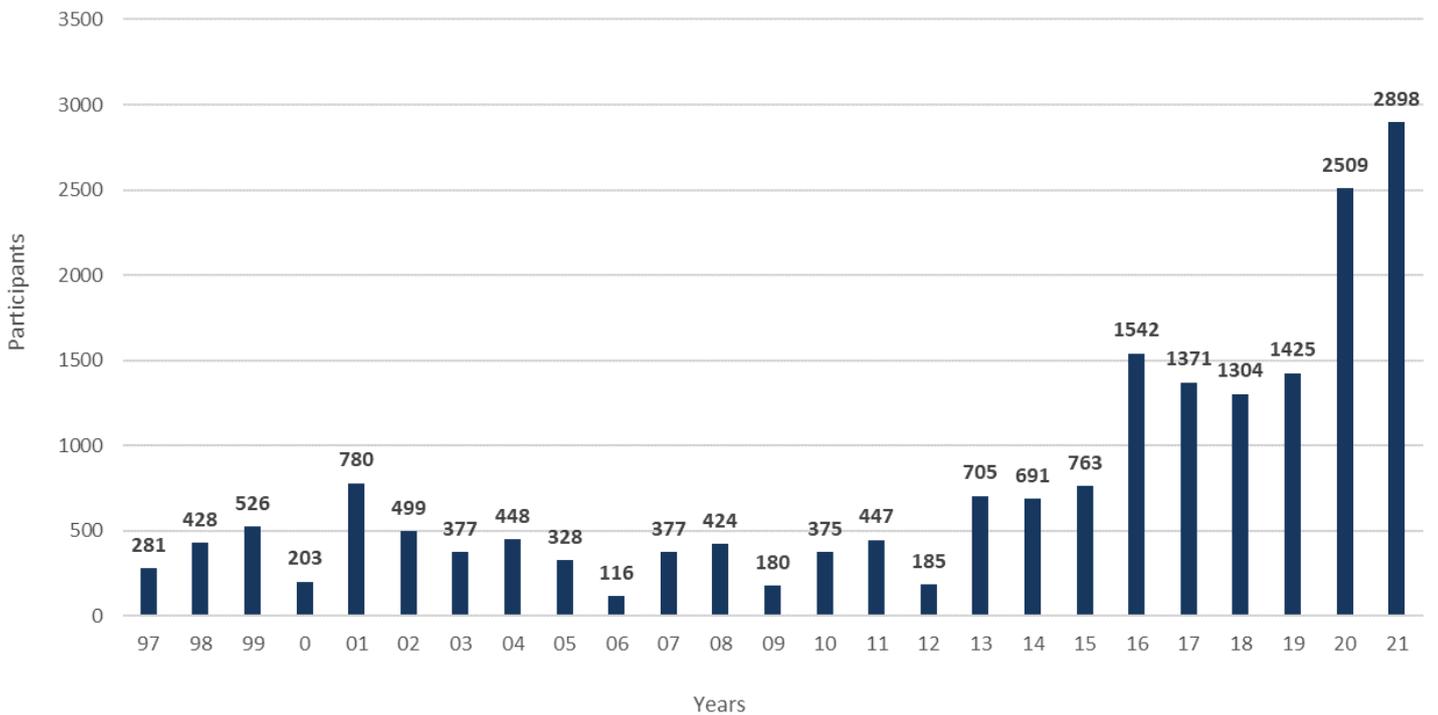
Management Committee	
Tim Austin, Chairman	ConocoPhillips
Grete Block Vagle	Aker BP
Olga Matveenko	TotalEnergies
Søren Andersen	Wintershall Dea
Thomas Gorm Theting	Equinor
Filippos Tsikalas	Vår Energi
Rolando di Primio	Lundin
Claire Richardson	Shell
TC Improved Exploration	
Ingrid E. I. Øxnevad, Chairman	Aker BP
Atle Folkestad	Equinor
Michael Young	ConocoPhillips
Richard Olstad	Pandion
Jon Halvard Pedersen	Lundin
Marli Blumenwitz	Wintershall Dea
Paul Spencer	Vår Energi
Janka Nakken Rom	NPD
TC Improved Oil & Gas Recovery	
Johanna Normann Ravnås, Chairman	Wintershall Dea
Roar M. Kjelstadli, Chairman	Aker BP
Erik Søndena	Petoro
Teodor Damian	Shell
Robert Moe	ConocoPhillips
Rune Boge	Spirit Energy
Svein Tollefsen	Equinor
Eli Jens Høgnesen	NPD
TC Energy Efficiency and Environment	
Ola Tarjeson Miljeteig	Equinor
Silje Kommedal	Repsol
Carlo Cavalli	PGNiG
Hans Røstøen	ConocoPhillips
Georgios Samouilidis	Shell
Siri Nesbø	Spirit Energy
Britt Bjelland	Petoro
Aslaug Eskeland Jansen	NPD

Activity reports

2021 has proven to be an amazing year for FORCE. We are still affected by the pandemic, but once again, the network groups has risen to the occasion. With 32 webinars, two lunch & learns and one seminar, the number of attendees came up to 2898! We are so proud of all of our members and the incredible job they have done in 2021. We would like to highlight the 2-day webinar Fault Compartments from the Structural Geology group with 237 participants. In addition, the Sed/Strat group held the first 3-day webinar with Mind the Gap and was proven to be very successful. They also organized the virtual field trip with Andrew Hurst from the University of Aberdeen. Great work! The network group, Improved EOR/IOR competence, held an impressive 5 webinars in 2021.

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

FORCE SEMINARS 1997 - 2021



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Webinars, lunch&learns and seminars 2021

Date	Title	Type	Participants
27.01.2021	Upscaling of Near-Miscible WAG in Heterogeneous Reservoirs	Webinar	31
28.01.2021	Microbial life in small water droplets enclosed in oil	Webinar	54
11.02.2021	Summary and results from the Force 2020 Machine Learning Contest	Webinar	109
17.02.2021	Immiscible WAG modelling	Webinar	32
18.02.2021	How can we deliver 4000 m MD wells in 10 days on NCS?	Webinar	90
16.03.2021	Let's learn to treat our faults better	Webinar	59
24.03.2021	Recent Development of Near Miscible WAG	Webinar	21
08.04.2021	Well Clean-up and Well Test to Production Facility	Webinar	59
09.04.2021	Mind the Gap #1	Webinar	140
14-15.04.2021	Fault Compartments	Webinar	237
16.04.2021	Mind the Gap #2	Webinar	99
23.04.2021	Mind the Gap #3	Webinar	63
28.04.2021	Post Force competition Symposium, where the contestants will showcase their working methods and results	Webinar	106
30.04.2021	Mind the Gap #4	Webinar	89
20.05.2021	Understanding in-situ polymer rheology from laboratory studies	Webinar	19
01.06.2021	Workflows for Handling Uncertainty: Are ensembles really the answer?	Webinar	207
11.06.2021	Improved understanding of seepage in and around well locations	Webinar	129
24.06.2021	Variability in the geometry of segmented normal fault surfaces	Webinar	48
30.06.2021	Along-strike stratigraphic response to normal fault growth: sediment sources, stacking and surfaces	Webinar	135
17.08.2021	Injectites Virtual Field Trip	Webinar	184
21.09.2021	Water shut-off via bullheading a DPR fluid – General status and the Alveim example	Webinar	52
23.09.2021	Interrelation between surface and basement heat flow in sedimentary basins	Webinar	49
22.10.2021	Ephemeral fluvial systems – application to Triassic and Permian reservoirs in the North Sea	Webinar	153
20.10.2021	Retrofit MLT – cost effective improved recovery	L&L	27
25.10.2021	Geophysical Methods- Dual Seminars on Full Waveform Inversion #1	Webinar	102
28.10.2021	Regional Structure and Basin Development of the mid-Norwegian Volcanic Passive Margin	Webinar	72
26-28.10.2021	Multiproxy biostratigraphy: Recent and future advances in the application and technologies	Webinar	111
28.10.2021	Regional Structure and Basin Development of the mid-Norwegian Volcanic Passive Margin	Webinar	72
01.11.2021	Dual Seminars on Full Waveform Inversion: Impressions of FWI	Webinar	80
16.11.2021	Integrated geomodelling for construction and civil engineering projects	L&L	13
17-18.11.2021	Technology of Petroleum Systems	2-day seminar	20
23.11.2021	Structural characterization and across-fault seal assessment of the Aurora CO2 storage site, northern North Sea	Webinar	72
02.12.2021	Evolution of Vitrinite Reflectance Models	Webinar	39
07.12.2021	Overview of subsurface research activities for carbon storage on the NCS	Webinar	125

Total: 2898!

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Budget and annual accounts 2021

Budget 2021			Result 2021	
	Income	Expenses	Income	Expenses
Transferred from 2020	1 599 554		1 599 554	
Pre-projects TC group		200 000		
Payment (seminar fees)	400 000		32 250	
Sponsors				
Seminar expenses		380 000		68 036
Accessories for seminars		20 000		
Seminar buffer		300 000		
Lunch&Learn	10 000	35 000	35 500	10 980
Invited speakers-EE&E		200 000		
Invited speakers - IE		200 000		20 000
Invited speakers - IOGR		200 000		
Membership fees	1 940 000		1 940 000	
Admin cost NPD		1 640 000		1 640 000
New members			201 429	
Secretariat expenses NPD		300 000		128 475
Extra funding web development		0		
<i>Service at meetings</i>	<i>Incl. secretariat ex.</i>	<i>30 000</i>		<i>4 232</i>
<i>Marketing</i>	<i>Incl. secretariat ex.</i>	<i>30 000</i>		
<i>Web page</i>	<i>Incl. secretariat ex.</i>	<i>195 000</i>		<i>90 020</i>
<i>PayEx fee (monthly)</i>	<i>Incl. secretariat ex.</i>	<i>5 000</i>		<i>3 334</i>
<i>Div/travel expenses</i>	<i>Incl. secretariat ex.</i>	<i>40 000</i>		<i>30 889</i>
Total	3 949 554	3 475 000	3 808 733	1 867 491
Estimated balance 31.12.2021	474 554		Balance now	1 941 242

Result		Budget/balance	
Transferred from 2020	1 599 554	Balance 2021	1 941 242
Outgoing balance	1 941 242	Budget/balance 2021	474 554
			1 466 688
Profit 2021	341 688		
		Seed funds/Pre-projects	200 000
Result seminar	-35 786	Seminars	-35 786
New members	201 429	Seminar buffer	300 000
Lunch & learn	24 520	Lunch & Learn	49 520
Invited speakers	-20 000	Invited speakers	580 000
Membership fee (income)	1 940 000	Admin fee and secretariat	171 525
Admin cost (NPD)	-1 640 000	New members	201 429
Secretariat	-128 475		
Sum	341 688		1 466 688