DRAFT

NKS(19)3
2019-05-03

Agenda for the board meeting in Copenhagen 4 June 2019

Place:
The Citadel, Kastellet, Kastellet 54, DK-2100 København Ø

Time: 10:00 to 17:00

1 Opening

2 Practical remarks
- Meeting secretary.
- Information from chairman and host.

3 Approval of the agenda

4 Minutes of the last board meeting (Stockholm 17 January 2019)
- See draft minutes NKS(19)1 dated 2019-02-20.
- Review, discussion and decision.

5 Accounts 2018
- See distributed material: Financial Statements 2018, NKS(19)2 and Long-Form Audit Report, both dated 2019-06-04.
- Presentation by the auditor and the secretariat, discussion and decision.

6 Financial status for the current year
- See distributed material: Financial status report and financial programme specification, both dated 2019-05-16.
- Presentation, discussion.

7 News since last board meeting
- Report from the owners' group.
- News from the board members' organisations.
- Administrative news.

8 NKS after 2020

- Presentation by Anneli Hällgren and the chairman.
- Discussion, decision.

9 Research activities in 2020

- Call for Proposals.
- Preliminary budget 2020.
- Funding 2020.
- Discussion, decision.

10 R-part: status

- See material from Christian Linde: status report May 2019.
- Presentation by the programme manager.
- Discussion

11 B-part: status

- See material from Kasper Andersson: status report May 2019.
- Presentation by the programme manager.
- Discussion.

12 NKS R and B seminar

- Presentation of the 2019 seminar survey by the coordination group.
- Seminar 2022.
- Discussion, decision.

13 Information activities

- The website, NewsLetters, NewsFlashes etc.
- Presentation, discussion.

14 Other issues

- Any other business.

15 Next meeting

- Next meeting will be in Helsinki January 2020.

16 End of meeting

DRAFT
NKS(19)1
2019-02-20

Minutes of the board meeting in Stockholm 17 January 2019

Present: Sigurður M. Magnússon (Chair, IRSA), Anneli Hällgren (SSM), Carsten Israelson (DEMA), Jorma Aurela (MEAE), Ole Harbitz (DSA), Annelie Bergman (SSM), Astrid Liland (DSA), Jens-Peter Lynov (DTU), Mette Øhlenschlæger (SIS), Mikael Meister (Vattenfall), Nici Bergroth (Fortum), Ole Reistad (IFE), Petri Kinnunen (VTT), Pia Vesterbacka (STUK), Christian Linde (SSM), Kasper Andersson (DTU) and Finn Physant (meeting secretary, FRIT).
All board members were present.

1 Opening

The Chair opened the meeting and welcomed the participants. Thanks were given to the host Anneli Hällgren and SSM. Special welcomes were given to the new board members Pia Vesterbacka (replacing Tarja Ikäheimonen) and Ole Reistad (replacing Atle Valseth).

2 Practical remarks

Practical remarks about the meeting were given by the Chair. Finn Physant was appointed meeting secretary.

3 Approval of the agenda

The agenda was approved.

4 Minutes of last board meeting (Copenhagen, 28 June 2018)

The minutes were approved. Actions A to H noted in the appendix of the minutes of the last board meeting will be noted in parenthesis in these minutes when handled during this meeting.

5 News since last board meeting

a. Report from the owners' group meeting

The Chair informed about the outcome of the owners' meeting:
Owners had met last night (16 January) and had good discussions regarding the future of NKS, the policy document and the way forward.
The Chair had informed the owners that NKS had provided support to the ICRP Free the Annals Campaign in the order of 1500 EUR and they approved the support. NKS Logo is now on the ICRP website.
Anneli Hällgren had informed that Christian Linde would leave as PC-R at the end of 2019. Finland will provide a new PC-R, probably from STUK.
Jorma Aurela had informed that this will be his last owners/board meeting and that STUK would from this meeting represent Finland in the owners' group.
The owners plan to meet the day before the June board meeting to continue discussions on NKS after 2020.

b. News from board members' organisations

The members informed each other about relevant news.
Especially, Ole Harbitz informed the board about the change of name for the "Norwegian Radiation Protection Authority" to the "Norwegian Radiation and Nuclear Safety Authority". The new website address is www.dsa.no and correspondingly all new e-mail addresses are named x.y@dsa.no
Nici Bergroth informed the board that he in 2018 has joined Fortum with the new e-mail address nici.bergroth@fortum.com

c. Administrative news

Finn Physant informed the board that the policy documents "This is NKS" and the new folder - printed for the 2019 seminar - both have been updated (Action B). The "Handbook for NKS applicants and activity leaders" has been updated to a July 2018 version according to decisions at the last board meeting (Action D). The "NKS Administrative Handbook" has been updated in November 2018 and includes now the fact that NKS formally has been registered as an organisation in Norway in the Brønnøysund Registers.
Furthermore Finn Physant presented a new bank agreement with Danske Bank in Denmark. All board members signed the agreement. Due to the lengthy legitimation process leading to this agreement some board members will have to provide updated personal address ID and full board member legitimation must be obtained from the new member. Finn Physant will contact the board members in question concerning this.
Finally Finn Physant informed the board about the possibilities of signing internet insurances in all NKS' four banks. The conclusion so far is that NKS at the moment only can sign such insurances in Denmark, as NKS is both domiciled and registered in Denmark (Action A).
The board took note of the administrative news.

6 NKS after 2020

The Chair said a few words about the development of the draft policy document before going around the table for general comments from the board members. The general comments were supportive of the draft but underscored very different views within the board regarding nuclear security. Anneli Hällgren presented the draft document paragraph by paragraph. The discussion was constructive and several specific comments were made

both regarding content and editorial issues. Different views on to include nuclear security or not and how in text were presented. There was agreement for continued inclusion of measurement projects related to analytical nuclear forensics in the NKS program.
Anneli Hällgren and the Chair will revise the draft policy document based on the discussions and comments made at the board meeting and send a revised draft to the board for comments no later than **1 February.** Comments requested before **15 February**. The aim is for the board to approve a final draft at the June board meeting.
As to the next steps in the "NKS after 2020" discussion, the aim is to ask owners and board members to give their views on the present organizations of NKS and NKS activities including proposals for improvement/change with rationale, **before 15 March.**
Anneli Hällgren and the Chair will develop a discussion paper based on the proposals received and send to board for comments before **15 April**. Comments and further proposals **before 1 May**. Revised discussion paper on web-site before **15 May.**

7 Financial status

Finn Physant presented the distributed material: Financial status report and financial programme specification, both dated 12 December 2018. At this date the reserve was estimated to approximately 720,000 DKK - in accordance with last year's budget decision of 18 January 2018. The Chair concluded that the financial status was as planned. – The board took note of the financial situation.

8 Agreements

The following four agreements were prepared for the board's decision:
-R-part programme manager 2019 with Strålsäkerhetsmyndigheten
-B-part programme manager 2019 with DTU Nutech
-Secretariat from 1 August 2019 to 31 July 2020 with FRIT and
-Auditing of the accounts for 2018 with Dansk Revision.
All these agreements were approved by the board.

9 R-part: status and new activities

Christian Linde made a presentation of the status of the ongoing R-part activities. Overall the work in NKS-R is progressing according to plan. Five of the seven activities from CfP 2017 are completed and the NKS reports are published. Final reports for the remaining two activities are expected in early 2019. All six activities from CfP 2018 are ongoing - all contracts were signed before the end of March 2018. Workshops have been carried out successfully in the activities FIREBAN and NORDEC. A workshop in the activity SITRON was held on the same day as the board meeting. Travel assistance has been granted to two young scientists.
Christian Linde presented the evaluation results and funding recommendations for CfP 2019. NKS-R received 10 proposals this year (two continued and eight new proposals), with a total funding request of 5519 kDKK. Three funding alternatives were presented based on the evaluations with a total budget equal to 3162 kDKK. After some discussions, the board favoured one of these funding alternatives and agreed to fund the following six activities in 2019 (all amounts in kDKK):

BREDA-RPV	471
SPARC	565
COCOS	565

PROSAFE	471
THEOS	565
TETRA	525

The total budget for these six activities is 3162 kDKK.
Furthermore Christian Linde presented the NKS-R article published in Nuclear Engineering and Technology (accepted 24 November 2018 and published online with full open access).

10 B-part: status and new activities

Kasper Andersson presented a status report for ongoing activities. In an overall view the work in NKS-B is progressing well. There are no delayed activities started before 2018. The activities from 2018 are reported to be carried out on schedule with one small expected delay. Young scientist travel assistance has been granted to two scientists – one more approval has been made. All three NKS-B seminars/workshops have been carried out successfully: AVESOME, GAMMARAY and RADWORKSHOP.
Kasper Andersson presented the evaluation results and funding recommendation for CfP 2019 – a total of 12 (of these 2 are continued) proposals were received. The total amount requested was 4731 kDKK from a budget of 3240 kDKK. After some discussion the board agreed to fund the following 8 activities in 2019 (all amounts in kDKK):

OPTIMETHOD	473
Shieldmorc	335
DTM-DECOM	430
ICP-BIODEC	392
NANOD	229
SLIM	473
ECONORMS	430
RINFOR	478

The total budget for these 8 activities is 3240 kDKK.

11 Budget for 2019

Finn Physant presented the distributed budget proposal of 2 January 2019. - This proposal was approved by the board and it is attached to these minutes in appendix A.
DEMA asked about the deficit in the budget of about DKK 900k. The chairman explained that the 2019 deficit is covered mainly by the reserve available at the end of 2018. DEMA asked, how it is possible that the reserve year after year can cover a budget deficit? The chairman explained that the reserve consists mainly of funds reserved but not used and unclaimed reservations for projects (contracts signed, but invoices not received). The chair reminded that there was a decision many years ago, in consultation with NKS auditor, that if reserved funds have not been claimed three years after a project is completed then the funds are moved to the reserve and used again. DEMA asked if NKS should be more active in reminding organizations, that they have unclaimed funds. The board was of the opinion that this was not necessary.

12 NKS articles

Both articles have been published and they are available on the website. Announcements of the articles have been made in NewsFlashes. The Chair noted that the article work already

had been started after the 2016 seminar and that it had been quite time consuming. The idea was first presented by Kasper Andersson and given green light by the board at the summer meeting 2016. The Chair concluded that it had been a work well done.

13 NKS R and B seminar 2019

The Chair opened the meeting item by asking for any comments about the seminar, which the Chair valued as a good seminar:
Kasper Andersson concluded that good presentations had been obtained with a wide range of topics, which Kasper Andersson was happy about.
- Christian Linde concluded that the seminar had been better than he had expected – with a good team and a good balance.
- Ole Harbitz noted that the timing of all the parts of the seminar always is a problem to be dealt with.
- Annelie Bergman asked if experience from this seminar could be used for instance to give feed-back to presenters already before an upcoming seminar.
- The Chair replied that screening of presentations could be a future possibility. The Chair also noted the use during the seminar of the new term ”sustainable decommissioning”.
- Anneli Hällgren concluded that the seminar had been very well organized.
- Annelie Bergman suggested that for an upcoming seminar it could be a good idea to open registrations for participants for half and/or whole days.
The Chair concluded that the board was quite happy about the outcome of the seminar and the board made a decision in principle for a 4th seminar in 2022.

14 Information activities

Finn Physant informed the board about the website, newsletters etc. – Website visitor statistics were presented concluding that the level of use of the website has been quite normal during the last part of 2018 except from a hacking attack in September. The attack showed more than 11,000 visitors over a few hours via the sign-up button for NKS-news. The button was erased, the attack stopped and a Google Recaptcha solution was installed in order to avoid similar future attacks. Since the last board meeting 8 NewsFlashes have been distributed. These NewsFlashes especially focused on CfP 2019, the 2019 seminar, the two new R- and B-articles, new publications and young scientist travel assistance. Besides this a NewsLetter was distributed 10 January including final call for the 2019 seminar, the R- and B-proposals of the CfP 2019, recent seminars and young scientist travel assistance.
There is a list of more than 540 e-mail addresses, to which NKS electronic letters are distributed.
As mentioned under meeting item 5 the 2017 version of the pamphlet has been updated and published and printed in due time before the R and B seminar in January 2019. Furthermore books of abstracts were also produced for the seminar.

15 Other issues

Many thanks for 17 years’ participation and good cooperation and the best wishes for the future were given by the Chair to Jorma Aurela, who is leaving the board.

16 Next meeting

Next meeting will be held in Copenhagen (in Kastellet) on 4 June 2019. The owners will meet on 3 June – also in Copenhagen. DEMA will host the owners meeting and DTU Nutech will host the board meeting.

17 End of meeting

Thanks for a good meeting were expressed by the Chair.

Sigurður M. Magnússon
Chairman

Finn Physant
Meeting secretary

Appendices:
A: Budget decision for 2019 dated 17 January 2019
B: Actions from the board meeting

Appendix A - NKS budget for 2019 - decision 17 January 2019

Budgets	**Budget for 2019**	**Budget for 2019**	**Budget for 2018**
	EUR	**DKK**	**DKK**
R-part			
Activities	423.446	3.162.000	3.000.000
Fee PC	61.602	460.000	460.000
Travels PC	6.696	50.000	50.000
Coordination/Young scientists' travel	6.696	50.000	50.000
R total	**498.440**	**3.722.000**	**3.560.000**
B-part			
Activities	433.892	3.240.000	3.250.000
Fee PC	61.602	460.000	460.000
Travels PC	6.696	50.000	50.000
Coordination/Young scientists' travel	6.696	50.000	50.000
B total	**508.885**	**3.800.000**	**3.810.000**
Seminar 2019			
Seminar 2019	6.696	50.000	100.000
Seminar 2019 total	**6.696**	**50.000**	**100.000**
Common			
Common various according to specification	26.783	200.000	200.000
The Nordic Society's meeting	5.000	37.337	0
Common total	**31.783**	**237.337**	**200.000**
Others			
Fee Secretariat	87.649	654.500	668.750
Fee Chairman incl. travels	57.584	430.000	430.000
Travels Secretariat	2.009	15.000	15.000
Others total	**147.242**	**1.099.500**	**1.113.750**
TOTAL	**1.193.047**	**8.908.837**	**8.783.750**
Expected incomes according to app. 1	**1.072.676**	**8.009.997**	**8.129.916**
Surplus	**-120.370**	**-898.840**	**-653.834**

Any deficits to be covered by the reserve available for the board, which according to the financial status report of 12 December 2018 is:	719.439,00
Proposed budget for 2019	-898.839,93
Present reserve and surplus/deficit	-179.400,93
Funding reserved for use in 2018, but not used, will amount to ca.:	150.000,00
Gain/Loss due to the development in exchange rates 2018-2019 ca.:	-85.000,00
Cancellation of NKS-B(18)1-NRPA	48.200,00
Cancellation of NKS-R(17)120-8-IFE	122.000,00
Old reservations from before 2016, not claimed, amount to:	557.500,00
Total reserve end of January 2019: ca. DKK:	**613.299,08**
Total reserve end of January 2019: ca. EUR:	**82.131,30**

Specification of ”Common" for 2019

	2019	2019	2018
	EUR	DKK	DKK
Common			
Reports, materials etc.	1.841	13.750	18.750
Postage, fees	1.339	10.000	10.000
Equipment	2.009	15.000	0
Internet	9.374	70.000	70.000
Auditing, consulting	8.202	61.250	61.250
Information material	2.009	15.000	20.000
Various expenses	2.009	15.000	20.000
Common total	**26.783**	**200.000**	**200.000**

Appendix 1 for budget decision for 2019

Pledge for funding in 2019 - Incomes

	Proposal for 2019	Proposal for 2019	Actual for 2018
	EUR	DKK	DKK
SSM	442.734	3.306.030	3.441.165
TEM	350.000	2.613.555	2.605.715
BRS	50.219	375.000	375.000
GR	24.000	179.215	178.678
NRPA	80.211	598.960	605.280
Total EUR / DKK	**947.164**	**7.072.760**	**7.205.838**
SSM contribution SEK	4.550.000		
NRPA contribution NOK	800.000		
BRS contribution DKK	375.000		

	EUR	DKK	DKK
Fortum	27.000	201.617	201.012
TVO	27.000	201.617	201.012
Fennovoima	10.750	80.273	80.033
IFE	12.032	89.844	83.226
Forsmark	13.000	97.075	96.784
Ringhals	13.000	97.075	89.213
OKG	13.000	97.075	97.168
SKB	9.730	72.660	75.630
Total EUR / DKK	**125.512**	**937.236**	**924.078**
Complete EUR / DKK	**1.072.676**	**8.009.997**	**8.129.916**
IFE contribution NOK	120000		
SKB contribution SEK	100000		

Exchange rates 2018/19:

NKS 2019:	
DKK	100,0000
EUR	7,4673
NOK	0,7487
SEK	0,7266
NKS 2018:	
SEK 2018	0,7563
EUR 2018	7,4449
NOK 2018	0,7566

Appendix B

Actions from the board meeting
(if nothing else is mentioned to be taken by the coordination group):

A. Ref. item 5: Due to the lengthy legitimation process leading to this agreement some board members will have to provide updated personal address ID and full board member legitimation must be obtained from the new member. Finn Physant will contact the board members in question concerning this.
B. Ref. item 6: Anneli Hällgren and the Chair will revise the draft policy document based on the discussions and comments made at the board meeting and send a revised draft to the board for comments no later than **1 February.** Comments requested before **15 February**. The aim is for the board to approve a final draft at the June board meeting. As to the next steps in the "NKS after 2020" discussion, the aim is to ask owners and board members to give their views on the present organizations of NKS and NKS activities including proposals for improvement/change with rationale, **before 15 March.** Anneli Hällgren and the Chair will develop a discussion paper based on the proposals received and send to board for comments before **15 April**. Comments and further proposals **before 1 May**. Revised discussion paper on web-site before **15 May.**

The NKS Secretariat

NKS(19)2
2019-06-04

Financial Statements

for

The Nordic Nuclear Safety Research Programme

Central Business Registration no.:
38 64 98 68

2018

04 June 2019
Finn Physant
FRIT

Statement by Management

The Chairman, Sigurður M. Magnússon and the NKS Secretariat have considered and approved the Financial Statements of The Nordic Nuclear Safety Research Programme (in the following referred to as 'NKS') for the financial year 1 January 2018 - 31 December 2018.

In our opinion, the Financial Statements provide a true and fair view of the organisation's assets, liabilities and equity, financial position as at 31 December 2018 and the results of the organisation's activities for the financial year 1 January 2018 - 31 December 2018.

In our opinion, the management's review includes a fair description of the issues dealt with in the management review.

The Management recommend the financial statement for approval by the Group of Owners.

Copenhagen, 4. June 2019

The Management:

Chairman	**NKS Secretariat**
Sigurður M. Magnússon	Finn Physant

We, the signers, as representatives of the owners of NKS hereby approve The Financial Statements for The Nordic Nuclear Safety Research Programme 2018.

Copenhagen, 4. June 2019

Group of Owners:

Sigurður M. Magnússon Iceland, chairman	Carsten Israelson Denmark	Pia Vesterbacka Finland
Ole Harbitz Norway	Anneli Hällgren Sweden	

Independent Auditors' Report

To the group of owners of NKS

Opinion

We have audited the Financial Statements of NKS for the financial year 1 January - 31 December 2018, which comprise income statement, balance sheet, notes and financial programme specification, including a summary of significant accounting policies, for NKS. The Financial Statements are prepared in accordance with the agreements and the accounting policies, which is decided by the Management, and which is described at page 12.

In our opinion, the Financial Statements give a true and fair view of NKS' financial position at 31 December 2018 and of the results of NKS' operations for the financial year 1 January - 31 December 2018 in accordance with the agreements and the accounting policies, which is decided by the Management.

Basis for Opinion

We conducted our audit in accordance with International Standards on Auditing (ISAs) and the additional requirements applicable in Denmark as well as in accordance with generally accepted government auditing standards. Our responsibilities under those standards and requirements are further described in the "Auditor's Responsibilities for the Audit of the Financial Statements" section of our report. We are independent of NKS in accordance with the International Ethics Standards Board for Accountants' Code of Ethics for Professional Accountants (IESBA Code) and the additional requirements applicable in Denmark, and we have fulfilled our other ethical responsibilities in accordance with these rules and requirements. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

The Management's Responsibilities for the Financial Statements

The Management is responsible for the preparation of Financial Statements that give a true and fair view in accordance with the agreements and the accounting policies, which is decided by the Management, and for such internal control as the Management determines is necessary to enable the preparation of Financial Statements that are free from material misstatement, whether due to fraud or error.

In preparing the Financial Statements, the Management is responsible for assessing NKS' ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting in preparing the Financial Statements unless the Management either intends to liquidate NKS or to cease operations, or has no realistic alternative but to do so.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the Financial Statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with ISAs and the additional requirements applicable in Denmark as well as in accordance with generally accepted government auditing standards, will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users of accounting information taken on the basis of these Financial Statements.

Independent Auditors' Report

As part of an audit conducted in accordance with ISAs and the additional requirements applicable in Denmark as well as in accordance with generally accepted government auditing standards, we exercise professional judgment and maintain professional scepticism throughout the audit.

We also:

- Identify and assess the risks of material misstatement of the Financial Statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of NKS' internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Management.
- Conclude on the appropriateness of the Management's use of the going concern basis of accounting in preparing the Financial Statements and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on NKS' ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the Financial Statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause NKS to cease to continue as a going concern.
- Evaluate the overall presentation, structure and contents of the Financial Statements, including the disclosures, and whether the Financial Statements represent the underlying transactions and events in a manner that gives a true and fair view.

We communicate with those charged with governance regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Statement on Management's Review

The Management is responsible for Management's Review.

Our opinion on the Financial Statements does not cover Management's Review, and we do not express any form of assurance conclusion thereon.

In connection with our audit of the Financial Statements, our responsibility is to read Management's Review and, in doing so, consider whether Management's Review is materially inconsistent with the Financial Statements or our knowledge obtained during the audit, or otherwise appears to be materially misstated.

Based on the work we have performed, we conclude that Management's Review is in accordance with the Financial Statements. We did not identify any material misstatement of Management's Review.

Independent Auditors' Report

Declaration on compliance with other legislation and other regulations

Opinion on legal-critical audit and performance audit

The Management is responsible for ensuring that the transactions covered by the Financial Statements comply with applicable appropriations, laws and other regulations as well as agreements and standard practice. The Management is also responsible that due financial consideration has been applied to the management of funds and operations of the activities included in the annual accounts. The Management is responsible for establishing systems and processes that support economy thrift, productivity and efficiency.

In conjunction with our audit of the Financial Statements, it is our responsibility to implement both legal-critical audit and performance audit of selected areas in accordance with generally accepted government auditing standards. In our legal-critical auditing, we assess with a high degree of certainty of the selected areas whether the examined transactions covered by the Financial Statements comply with the relevant provisions in appropriations, laws and other regulations as well as agreements and standard practice. In our performance audit, we assess with a high degree of certainty whether the systems, processes or transactions examined support due financial consideration for the management of the funds and operations of the activities included in the Financial Statements.

If we conclude, on the basis of the work we have carried out, that grounds for significant critical comments exist, we are under obligation to report on this in this statement.

We have no critical comments to report in this regard.

Roskilde, 4. June 2019

Dansk Revision Roskilde
Godkendt revisionsaktieselskab, CVR-nr. 14 67 80 93

Palle Sundstrøm
Partner, State-Authorised Public Accountant
Mne nr. : 10012

Management's review

2018 has been characterised by planned work/operation of the R (Reactor)-part and the B (Emergency Preparedness)-part.

In the course of 2018, the currency market for the Norwegian and the Swedish currency has developed in a negative direction, in comparison with the Danish currency and the EURO. The total foreign exchange loss at the end of the year is at DKK 93,869/ EUR 12,571/7,4673.

The Financial Statements are presented in DKK, but the amounts are also stated in EUR in a separate column.

The Financial Statements show a profit of DKK 634,252 / EUR 84,937, which is consistent with decisions taken by the Board.

Subsequently, the equity as at 31 December 2018 constitutes DKK 7,123,333 / EUR 953,937.

In assessing the year's deficit and equity as at 31 December 2018, consideration must be made of the contracts for the R and B parts of DKK 6,229,735 / EUR 834,269, which is calculated at 31 December 2018, where invoices have not yet been received or where the work has not yet been completed.

It may also be noted that NKS in accordance with programme managers' statements has received external funding of around DKK 15.5 mio. / EUR 2.08 mio. in the form of un-charged contributions. The external funding is the work performed in connection with the implementation of activities for which invoices will not be sent.

Unused activity, coordination and travel funds for programmes for the year 2017 are returned to the reserve as are unused common programme costs for a total of DKK 766,748 / EUR 102,681.

Income statement 2018

Grants and interest income				**Kurs 7,4673**
Danish Emergency Management Agency	DKK	375.000,00	EUR	50.218,95
Ministry of Economic Affairs and Employment, FI	DKK	2.605.715,00	EUR	348.950,09
Icelandic Radiation Safety Authority	DKK	178.677,60	EUR	23.928,01
Norwegian Radiation and Nuclear Safety Authority	DKK	605.280,00	EUR	81.057,41
Swedish Radiation Safety Authority	DKK	3.441.165,00	EUR	460.831,22
Additional funding	DKK	927.541,93	EUR	124.213,83
Interest income	DKK	1.634,50	EUR	218,89
Total grants and interest income	**DKK**	**8.135.014,03**	**EUR**	**1.089.418,40**
Expenses				
R-Part	DKK	2.884.064,71	EUR	386.225,91
B-Part	DKK	3.202.371,64	EUR	428.852,68
Seminar 2019	DKK	29.167,30	EUR	3.906,00
Fees	DKK	1.098.750,00	EUR	147.141,54
Common program expenses	DKK	177.657,64	EUR	23.791,42
Travels	DKK	14.882,03	EUR	1.992,96
Exchange adjustments	DKK	93.868,86	EUR	12.570,66
Total expenses for the NKS programme	**DKK**	**7.500.762,18**	**EUR**	**1.004.481,16**
Income - Expenses	**DKK**	**634.251,85**	**EUR**	**84.937,24**

Balance sheet 2018

Assets:				**Kurs 7,4673**
Giro and bank accounts converted to DKK, Note 1				
DK/IS-giro 918-9297	DKK	1.841.786,42	EUR	246.646,90
FI-giro 800015-70837915	DKK	4.132.627,39	EUR	553.429,94
NO-giro 7874.07.06976	DKK	2.038.610,10	EUR	273.004,98
SE-giro 6 64 63-1	DKK	5.029.894,41	EUR	673.589,44
Giro and bank accounts total	DKK	13.042.918,32	EUR	1.746.671,26
Total Assets	**DKK**	**13.042.918,32**	**EUR**	**1.746.671,26**
Liabilities:				
Equity:				
Retained from previous years	DKK	6.489.081,47	EUR	868.999,70
Result of this year	DKK	634.251,85	EUR	84.937,24
Total equity	DKK	7.123.333,32	EUR	953.936,94
Statement for new financial year, Note 2	DKK	5.919.585,00	EUR	792.734,32
Total Liabilities	**DKK**	**13.042.918,32**	**EUR**	**1.746.671,26**

Notes

Note 1: Giro and bank accounts:	Currency		DKK	EUR
DK/IS-giro 918-9297:				
Holding 31.01.2019	**DKK**	1.841.786,42	1.841.786,42	246.646,90
FI-giro 800015-70837915				
Holding 31.01.2019	**EUR**	521.487,76	3.894.105,55	521.487,76
Giro deposits 31.01.2019	**EUR**	31.942,18	238.521,84	31.942,18
NO-giro 7874.07.06976				
Holding 31.01.2019	**NOK**	71.996,42	53.903,72	7.218,64
Giro deposits 31.01.2019	**NOK**	2.650.870,02	1.984.706,38	265.786,35
SE-giro 6 64 63-1:				
Holding 31.01.2019	**SEK**	6.922.508,14	5.029.894,41	673.589,44
Total			**13.042.918,32**	**1.746.671,27**

Exchange rates pr. 31.12.2018

EUR	**746,73**
NOK	**74,87**
SEK	**72,66**

Note 2: Statement for new financial year

Payment in total regarding the new financial acounting year 01.02.19 - 31.01.2020 from:

-The Swedish Radiation Safety Authority SE

-The Ministry of Economic Affairs and Employment FI.

Notes

Financial programme specification - 31 January 2019

	DKK							EURO	7,4673	
Total	Budget from 2017	Returned 2017	Budget 2018	Total budget 2018	Payments made	Contracts signed, but not paid	Rest budget	Payments made	Contracts signed, but not paid	Rest budget
R-Part	2.619.130	-110.277	3.560.000	6.068.853	2.884.065	3.102.152	82.636	386.226	415.432	11.066
B-Part	3.240.681	-634.331	3.810.000	6.416.350	3.202.372	3.127.583	86.395	428.853	418.837	11.570
2019 seminar	0	0	100.000	100.000	29.167	0	70.833	3.906	0	9.486
Fees	7.500	-7.500	1.098.750	1.098.750	1.098.750	0	0	147.142	0	0
Common programme exp.	14.580	-14.580	200.000	200.000	177.658	0	22.342	23.791	0	2.992
Travels	60	-60	15.000	15.000	14.882	0	118	1.993	0	16
	0	0	0	0	-1	0	1	0	0	0
Total	5.881.951	-766.748	8.783.750	13.898.953	7.406.893	6.229.735	262.325	991.910	834.269	35.130
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$

$F - G = H = H_1 + H_2$

Notes

Detailed financial programme specification - 31 January 2019

	DKK							EURO	7,4673	
Specifikation:	Budget from 2017	Returned 2017	Budget 2018	Total budget 2018	Payments made	Contracts signed, but not paid	Rest budget	Payments made	Contracts signed, but not paid	Rest budget
R-Part: Common program.	307.313	-52.313	535.000	790.000	485.000	230.000	75.000	64.950	30.801	10.044
Activities	2.296.853	-43.000	3.000.000	5.253.853	2.381.701	2.872.152	0	318.951	384.631	0
Travel young scientists	14.964	-14.964	25.000	25.000	17.364	0	7.636	2.325	0	1.023
B-Part: Common program.	577.552	-67.552	535.000	1.045.000	510.000	460.000	75.000	68.298	61.602	10.044
Preparedness	1.542.206	-152.457	1.777.000	3.166.749	1.584.687	1.582.062	0	212.217	211.865	0
Measurement	806.371	-298.872	1.182.000	1.689.499	913.080	776.419	0	122.277	103.976	0
Radioecology	224.814	-110.712	291.000	405.102	181.000	224.102	0	24.239	30.011	0
Waste	85.000	0	0	85.000	0	85.000	0	0	11.383	0
Travel young scientists	4.738	-4.738	25.000	25.000	13.605	0	11.395	1.822	0	1.526
2019 seminar	0	0	100.000	100.000	29.167	0	70.833	3.906	0	9.486
Fee Secretariat	7.500	-7.500	668.750	668.750	668.750	0	0	89.557	0	0
Fee Chairman incl. travels	0	0	430.000	430.000	430.000	0	0	57.584	0	0
Reports etc.	5.890	-5.890	18.750	18.750	13.705	0	5.045	1.835	0	676
Postage etc.	-920	920	10.000	10.000	7.423	0	2.577	994	0	345
Equipment	306	-306	0	0	0	0	0	0	0	0
Internet	13.125	-13.125	70.000	70.000	59.075	0	10.925	7.911	0	1.463

Notes

Detailed financial programme specification - 31 January 2019

	DKK							EURO	7,4673	
Specifikation:	Budget from 2017	Returned 2017	Budget 2018	Total budget 2018	Payments made	Contracts signed, but not paid	Rest budget	Payments made	Contracts signed, but not paid	Rest budget
Auditing	-12.500	12.500	61.250	61.250	61.250	0	0	8.202	0	0
Information material	8.014	-8.014	20.000	20.000	14.138	0	5.862	1.893	0	785
Various	665	-665	20.000	20.000	22.067	0	-2.067	2.955	0	-277
Travels Secretariat	60	-60	15.000	15.000	14.882	0	118	1.993	0	16
Diff.	0	0	0	0	-1	0	1	0	0	-1
Total	5.881.951	-766.748	8.783.750	13.898.953	7.406.893	6.229.735	262.325	991.910	834.269	35.130
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$ $F - G = H = H_1 + H_2$

Accounting policies

The Financial Statements is presented in accordance with the agreements and the accounting policies, which is decided by the Management.

The Financial Statements is presented in accordance with the same accounting policies as last year.

Recognition and measurement
The association uses the ”open post”-principle, which means, that all expenses, which is paid in the period 1/2-2018 - 31/1-2019, are included in the financial statements.

Conversion of foreign currencies
Transactions in foreign currencies are in the course of the year translated to the exchange rate at the beginning of the financial year. Giro and bank accounts, receivables and payables in foreign currencies, is translated at the exchange rates at the balance sheet date.

Realised and unrealised exchange differences is recognised in the income statement as financial income or financial expenses.

The income statement

Revenue recognitions
Income include grants for the financial year from the owners and the additional funding.

Expenses
Expenses include paid expenses for the financial year’s approved projects for respectively the R- and the B-part, including common program expenses and travels, activity supports and fees. The association is not taxable for VAT and therefore the expenses of the association is recognized including VAT.

Interest income
Interest income include interest income.

Income taxes
The association is not liable to pay tax.

Balance sheet

Cash and cash equivalents
Cash and cash equivalents include bankdeposit in giro and bank accounts in Denmark, Finland, Norway and Sweden.

Received prepayments
Received prepayments are measured at the exchange rates at the balance sheet date.

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The Nordic Nuclear Safety Research Programme (NKS)

Central Business Registration No.: 38 64 98 68

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

Contents

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

1 Audit of the financial statements

1.1 Introduction

As the appointed auditors for The Nordic Nuclear Safety Research Programme (NKS), we have audited the Financial Statements for the financial year 1 January 2018 - 31 December 2018 prepared by the NKS Secretariat.

The financial statements show the following results, assets and equity:

DKK / EUR	Current year	Last year
Result for the year	634.252 / 84.937	-670.763 / -90.097
Equity	7.123.333 / 953.937	6.489.081 / 871.614

1.2 Conclusion on the executed audit - auditor's report

The audit performed has not given rise to significant remarks to the Financial Statements.

If the Financial Statements are carried in the existing form and if further, significant information does not appear during management's processing, we will provide the Financial Statements for 2018 with an unmodified audit opinion.

The audit has not included the management's review, but we have read the management's review. This has not given rise to remarks. On this background, it is our opinion that the information in the management's review is in accordance with the Financial Statements.

1.3 EU General Data Protection Regulation

EU General Data Protection Regulation came into force on May 25, 2018. The law regulates companies' use and storage of personal data, and stricter requirements for the collection, use, storage, disclosure and deletion of personal data, just like the regulation requires documentation that the regulation is complied with. The Danish Data Protection Agency is the supervisory authority for compliance with the regulation and has the possibility to carry out inspection visits. Failure to comply with the General Data Protection Regulation may result in significant fines.

We have been informed that the board is aware of the regulation and that NKS' Privacy Policy is accessible on NKS's webside.

1.4 Scope and execution of the audit

The purpose, planning and execution of the audit, the auditor's responsibility and reporting as well as the Group of Owners responsibility have remained unchanged, which is why we refer to our letter of engagement dated 30 March 2011.

As preparation for the audit of the Financial Statements for 2018, we have discussed the expectations to the financial development for 2018 with the Management, including risks related to the association's activities. We have, furthermore, discussed risks connected to the presentation of accounts and the initiatives the Group of Owners has initiated for the management hereof.

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

On this background, we have prepared our auditing strategy with a view to targeting our work at significant and areas of risk. We have identified the following items and areas to which, according to our opinion, special risks of significant errors and insufficiencies in the Financial Statements are associated:

- Grants
- Project expenses
- Equity

In other areas, the risk of error in the Financial Statements is assessed as normal and the execution of the audit has therefore had a lesser scope.

The audit was executed with a view to verifying whether the information and amount specifications in the Financial Statements are correct. Analyses, review and assessment of administrative procedures, internal control systems and control procedures have been performed as well as a review and assessment of bookkeeping items and documentation for this.

The audit has also included an assessment of whether the prepared Financial Statements fulfil the auditing regulations of legislation and articles of association. In this regard, we have assessed the selected accounting policy, the Group of Owners accounting opinion as well as, moreover, the information submitted by the Group of Owners.

Furthermore, the audit has been planned and executed in accordance with the international auditing standards as well as generally accepted government auditing standards (legal-critical audit and performance audit) and, in addition to the financial audit, it also includes a review and assessment of whether due financial considerations have been taken with the administration of the funds covered by the accounts.

During the execution of the financial audit, we have checked whether the accounts are without significant errors and insufficiencies. We have also checked the Financial Statements' agreement with the underlying bookkeeping records as well as the Financial Statements' concordance with laws and regulations as well as with commenced agreements and the accounting policies, which is decided by the Management.

The performance audit has been executed as an integrated and parallel part of the financial audit and, among other things, has included random reviews of agreements and contracts, reports, analyses of expense and income items as well as an analysis of budget deviations.

The audit has been executed in connection with the preparation of the Financial Statements.

2 The executed audit

2.1 Legal-critical audit

We have during the execution of the financial audit, not identified terms, that gives us reason to suspect,

- that NKS in its work is not independent, and

- that NKS's funds are not used in accordance with the terms and conditions of NKS.

2.2 Administration

As in previous years, The NKS Secretariat is managed by FRIT ApS.

Agreement has been entered into on an extension of the agreement until 31 July 2020.

It must be noted that the Board has chosen to extend the agreement with Chairman of the Board, Sigurður M. Magnússon, up to and including 2020.

2.3 Attestation procedures

We have performed a follow-up on NKS Secretariat's procedures and internal controls regarding attestation procedures and have found reason to state the following:

Project expenses

We checked on a sample basis whether the supporting documentation is duly approved by the programme manager or by chairman, Sigurður M. Magnússon. This review has not given rise to any comments.

In addition, we have established that the Secretariat regularly sends programme status to the programme managers. The programme status is forwarded approximately every second month and at the latest on 31 January 2019. The programme status includes, for example, a ledger card for project expenses so that the programme manager can see the individual payments on the project for the current year.

Secretariat expenses

Remuneration for the Secretariat is controlled as per agreement and to the minutes of the board meeting. We checked on a sample basis whether the invoices has been approved by Sigurður M. Magnússon. This review has not given rise to remarks.

2.4 Authorisation to sign

The accounts manager, Finn Physant, owner of FRIT ApS, and chairman, Sigurður M. Magnússon, have authority to make withdrawals on NKS' giro and bank accounts jointly or individually together with Claus Rubin, who is a consultant for FRIT ApS.

Our assessment is that the above terms and conditions for authorisation to sign, in consideration of the few staff members, is appropriately organised.

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

2.5 Use of IT

In connection with our audit, we have performed a general review and assessment of the association's administrative use of IT, including of system, data and operation security.

Our assessment is that the association is dependent on IT in the daily business processes. However, the association's use of IT is not assessed as being a risk.

2.6 Non-corrected misstatements

Pursuant to the international auditing standards, we must account for non-corrected misstatements that are not insignificant, to the association's senior management.

We can inform, that we have asked the NKS Secretariat to make one single correction concerning Exchange rate adjustment to the draft for the Financial Statements.

2.7 Discussions with management on fraud

During the audit we have enquired the Management about the risk of fraud and the Management has informed us that according to their assessment, there is no particular risk that the Financial Statements can contain significant erroneous information as a result of fraud.

The Management has, furthermore, reported that they do not have knowledge of fraud or investigations in progress for assumed fraud.

During our audit we have not established conditions that could indicate or arouse suspicion of fraud of significance to the information in the Financial Statements.

3 Comments to the audit and financial statements 2018

For the individual items in the income statement and balance sheet we can supplement the presented Financial Statements for the year 2018 with the following:

3.1 Additional financiers

The additional financiers stated in the income statement may be analysed as follows in DKK:

	2018	2017	2016
Fortum Power and Heat Oy, Finland	201.012	195.153	195.891
TVO, Finland / Teollisuuden Voima Oyj, TVO	201.012	195.153	195.891
Fennovoima Oy, Finland	80.033	74.344	67.162
Forsmarks Kraftgrupp AB, Sweden	96.784	97.762	98.132
OKG Aktiebolag, Sweden	96.784	97.168	97.535
Ringhals AB, Sweden	93.061	89.213	89.550
IFE, Norway	83.226	90.002	92.236
Svensk Kärnbränslehantering AB, Sweden	75.630	0	0
Total financiers	927.542	838.795	836.397

The additional financiers are in accordance with the supporting documentation.

We have found that in 2018, there has been one new additional financier, Svensk Kärnbränslehantering AB, Sweden.

3.2 Insurance of internet banking and giro

We have been informed that in the present situation it is only possible to sign an Insurance of internet banking and giro in Denmark, because NKS is registered and has its address in Denmark.

3.3 Exchange rate adjustments

The exchange rate adjustments are mainly the result of foreign currency amounts being registered at the rate on 31 December 2017 throughout 2018. This gives deviations between the utilised rate and the actual rate.

We can report that the principle used does not affect the overall results, but just the allocation of the individual items in the income statement.

3.4 Budget balances brought forward from one year to the next

In the financial survey for 2018, budget figures for all expenses are specified. In addition, an amount transferred from 2017 of, in total, DKK 5.115.203- cf. the accounts pages 10 to 11, first two columns.

We draw attention to the fact that the remaining budget for joint programme expenses, joint trips and fees similar to previously, have not been transferred from 2017 to 2018 and are thus transferred to NKS' equity (reserve).

It is furthermore noted that the coordination and travel expenses as well as activity expenses granted to the programme managers for the year 2018 that are not used/allocated similar to previous year will be transferred to equity. Thus, only the allocated activity expenses for R Part and B Part and the balance of seminar 2019, DKK 70,833, will be transferred from one year to the next.

4 Performance audit

In accordance with generally accepted government auditing standards, we checked, for a number of selected areas, whether NKS has established business processes to ensure appropriate management of allocated funds. We performed our audit procedures to obtain limited assurance as to whether the management is conducted in a financially appropriate manner and whether the performance numbers disclosed are documented and adequate to cover NKS' operations in 2018.

According to our information, the grants (except for the grant contributed by TVO) are not earmarked for specific projects but for NKS' programmes as such. Based on this information, our audit was conducted on the basis of NKS' activities as a whole. During our audit, we checked that the grant from TVO have been employed as intended.

Long-form audit report of 4 June 2019 regarding Financial Statements for 2018

During our audit, we established that expenses incurred relate to individual projects and that the supporting documentation is duly approved. We noted that the programme and Secretariat budgets are kept. Finally, we checked on a sample basis whether reports have been prepared for completed projects.

As part of the performance audit, we must check whether the individual projects could be carried out in a more economical manner / efficiency. During our audit, no matters have come to our attention that cause us to believe that this is the case. However, we must state that our lack of technical expertise within nuclear safety means that we do not have the possibility to comment on this.

4.1 Agreement between bookkeeping records and Financial Statements

We noted that there is agreement between the performed bookkeeping and the prepared Financial Statements for the year 2018.

Similar to previous years, all deposits and payments in January 2019 have been included in the accounts as if they were settled before 31 December 2018. This utilised accounting policy does not affect the accounting result. Only the size of the cash available, receivables and debt are affected.

5 Statutory information, etc.

We have ascertained that on all essential areas, the association complies with the Danish Bookkeeping Act, including regulations on the storage of accounting records.

It is our opinion that the requirements of legislation on bookkeeping and storage of accounting records has been complied with. We have furthermore agreed that our archive material will be stored for 7 years after the expiry of the relevant financial year.

6 Economic crime

In accordance with the Danish Act on Approved Auditors and Audit Firms, we are obliged to check whether any management member has committed significant economic crime and under certain circumstances we must report our findings to legislative and enforcing authorities (primarily the Serious Economic Crime Squad and International Crime).

During our audit we have not come across conditions or indications that any management member have committed economic crimes.

7 Other tasks

In this financial year we have provided the following other services to NKS:

- Assistance with the preparation of the Financial Statements

A fee for the audit of the Financial Statements has similar to last year been agreed on, including assistance with the preparation of the Financial Statements, participation in accounting meetings and in board meetings as well as the translation to English of the accounts and long-form audit report, in

the amount of DKK 49,000 excl. VAT. The amount has not been allocated as debt in the presented accounts.

8 Statements in connection with the audit

8.1 The Managements representation letter

As part of the audit of the Financial Statements, we have obtained confirmation from management of the Financial Statements' completeness, including that they contain all information on mortgages, guarantees, related parties, court cases, events after the balance sheet date as well as other complex auditable areas.

Management has further declared that all errors that have been presented to management are rectified in the Financial Statements. We have ascertained that the rectifications are included.

8.2 Auditor's statement

In compliance with the law regarding the approved auditors and audit firms, we state that:

- We comply with the statutory requirements for independence, and
- during the audit carried out, we have received all the information we have requested.

Roskilde, 4 June 2019

Dansk Revision Roskilde
Godkendt revisionsaktieselskab

Palle Sundstrøm
Partner, State-Authorised Public Accountant

Presented at the board meeting on 4 June 2019

Sigurður M. Magnússon
Chairman

Carsten Israelson

Pia Vesterbacka

Ole Harbitz

Anneli Hällgren

Financial status - 16 May 2019

Incomes	DKK	
Expected incomes this year	8.009.996	A = B + C
Received until now	7.337.703	B
Additional payments	672.293	C
Cash balance	8.924.095	D
Available funds	9.596.388	E = C + D

Budget and expenses	DKK	
Total budget incl. transfer from earlier years	14.453.165	F = G + H
Paid until now	5.534.321	G
Rest budget incl. contracts signed, but not paid	8.918.844	H

Available	DKK	
Reserve available for the board	677.544	I = E - H

16-05-2019/bly

Financial programme specification - 16 May 2019

	DKK							EURO	7,4673	
Total	Budget from 18	Returned 18	Budget 19	Total budget 19	Payments made	Contracts signed, but not paid	Rest budget	Payments made	Contracts signed, but not paid	Rest budget
R-Part	3.184.788	-358.136	3.722.000	6.548.652	2.687.877	3.771.527	89.248	359.953	505.072	11.952
B-Part	3.213.978	-518.595	3.799.660	6.495.043	1.860.158	4.570.056	64.829	249.107	612.009	8.682
2019 seminar	70.833	0	50.000	120.833	127.514	0	-6.681	17.076	0	-895
Fees	0	0	1.084.500	1.084.500	760.000	324.500	0	101.777	43.456	0
Common programme exp.	22.342	-22.342	200.000	200.000	95.542	13.750	90.708	12.795	1.841	12.147
Travels	118	-118	15.000	15.000	3.201	0	11.799	429	0	1.580
Diff.	0	0	0	0	1	0	-1	0	0	0
I alt	6.492.059	-899.191	8.871.160	14.464.028	5.534.293	8.679.833	249.902	741.137	1.162.379	33.466
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$
$F - G = H = H_1 + H_2$

Detailed financial programme specification - 16 May 2019

	DKK							EURO	7,4673	
Specifikation:	Budget from 18	Returned 18	Budget 19	Total budget 19	Payments made	Contracts signed, but not paid	Rest budget	Payments made	Contracts signed, but not paid	Rest budget
R-Part: Common program.	305.000	-75.000	535.000	765.000	470.752	230.000	64.248	63.042	30.801	8.604
Activities	2.872.152	-275.500	3.162.000	5.758.652	2.217.125	3.541.527	0	296.911	474.271	0
Travel young scientists	7.636	-7.636	25.000	25.000	0	0	25.000	0	0	3.348
B-Part: Common program.	535.000	-75.000	535.000	995.000	707.700	230.000	57.300	94.773	30.801	7.673
Preparedness	1.582.062	-106.200	1.711.000	3.186.862	627.087	2.559.775	0	83.978	342.798	0
Measurement	776.419	-127.000	1.299.660	1.949.079	371.855	1.577.224	0	49.798	211.217	0
Radioecology	224.102	-114.000	229.000	339.102	136.045	203.057	0	18.219	27.193	0
Waste	85.000	-85.000	0	0	0	0	0	0	0	0
Travel young scientists	11.395	-11.395	25.000	25.000	17.471	0	7.529	2.340	0	1.008
2019 seminar	70.833	0	50.000	120.833	127.514	0	-6.681	17.076	0	-895
Fee Secretariat	0	0	654.500	654.500	330.000	324.500	0	44.193	43.456	0
Fee Chairman incl. travels	0	0	430.000	430.000	430.000	0	0	57.584	0	0
Reports etc.	5.045	-5.045	13.750	13.750	9.063	0	4.687	1.214	0	628
Postage etc.	2.577	-2.577	10.000	10.000	8.104	0	1.896	1.085	0	254
Equipment	0	0	15.000	15.000	0	0	15.000	0	0	2.009
Internet	10.925	-10.925	70.000	70.000	28.850	0	41.150	3.864	0	5.511
Auditing	0	0	61.250	61.250	47.500	13.750	0	6.361	1.841	0
Information material	5.862	-5.862	15.000	15.000	0	0	15.000	0	0	2.009
Various	-2.067	2.067	15.000	15.000	2.025	0	12.975	271	0	1.738
Travels Secretariat	118	-118	15.000	15.000	3.201	0	11.799	429	0	1.580
Diff.	0	0	0	0	1	0	-1	0	0	-1
Total	6.492.059	-899.191	8.871.160	14.464.028	5.534.293	8.679.833	249.902	741.137	1.162.379	33.466
	F_1	F_2	F_3	F	G	H_1	H_2	G	H_1	H_2

$F_1 + F_2 + F3 = F$ F - G = H = $H_1 + H_2$

nks

Nordic nuclear safety research

DENMARK FINLAND ICELAND NORWAY SWEDEN

A COMMON NORDIC VIEW

Nordic problems need Nordic solutions. NKS aims to facilitate a common Nordic view on nuclear safety and radiation protection including emergency preparedness. This requires common understanding of rules, practice and measures, which may vary between countries, as well as with time. The work builds on a foundation of over sixty years of Nordic collaboration on related issues.

ADDRESSING CURRENT SOCIETAL QUESTIONS

NKS keeps an open eye to societal changes and events that might influence requirements and perception of nuclear safety, radiation protection and emergency preparedness in the Nordic countries. For instance the Fukushima accident prompted the arrangement of NKS joint reactor safety and emergency preparedness seminars on lessons learned and future implications for Nordic society.

STRENGTHENING RESPONSE CAPACITIES

By maintaining vital informal networks between Nordic authorities, nuclear power companies, scientists and other stakeholders, the region's potential for a fast, coordinated and targeted response to urgent issues is strengthened. Thereby, problems can be tackled quicker, more efficiently and consistently and at lower cost than if they needed to be addressed on a national scale.

SECURING NORDIC COMPETENCE AND KNOWLEDGE BUILDING

Through collaborative NKS activities, Nordic competence and capabilities are maintained and strengthened, and solutions to Nordic problems are disseminated through a sustained informal network. NKS publications are available cost-free on the internet.
A special effort is made to engage young scientists and students, to ensure knowledge and expertise for the future.

FINANCING OF NKS ACTIVITIES

NKS is mainly financed by Nordic authorities, with additional contributions from Nordic organizations that have an interest in nuclear safety. The budget for NKS in 2018: about 9 million Danish kroner (€ 1.2 million). In addition to the funding sought from NKS, participating organizations are asked to provide a similar amount of in-kind contributions. This may take the form of working hours, travel expenses or laboratory resources. Without these in-kind contributions it would not be possible to carry out NKS activities.

MAIN FINANCIERS:

DANISH EMERGENCY MANAGEMENT AGENCY

Ministry of Economic Affairs and Employment of Finland

GEISLAVARNIR RÍKISINS
ICELANDIC RADIATION SAFETY AUTHORITY

Statens strålevern
Norwegian Radiation Protection Authority

Strål säkerhets myndigheten
Swedish Radiation Safety Authority

CO-FINANCIERS:

FENNO VOIMA

fortum

TVO

IFE

VATTENFALL FORSMARK KRAFTGRUPP AB

okg

VATTENFALL RINGHALS AB

SKB

NKS ACTIVITIES

NKS activities can take the form of research activities, test exercises or information collation/review exercises. Alternatively they can aim to harmonize approaches to common problems or spread and distribute knowledge and results through seminars, workshops and educational/training courses. Common to all NKS activities is that the results should be beneficial and made available to concerned end users in all Nordic countries. Aspects of nuclear safety, radiation protection and emergency preparedness may be combined in one activity.

RESEARCH AREAS

Areas of interest covered by NKS activities fall under two main programmes, NKS-R and NKS-B, which cover the following specified research areas.

NKS-R programme:

- Reactor physics
- Thermal hydraulics
- Severe accidents
- Risk analysis and probabilistic methods
- Organisational issues and safety culture
- Decommissioning and management of reactor waste and spent fuel
- Plant life management and extension.

NKS-B programme:

- Radiological and nuclear emergency preparedness
- Measurement strategy, technology and quality assurance
- Radioecology and environmental assessments.

Do you have suggestions for a nuclear safety or radiation protection related activity?
Contact us via www.nks.org

SOME RECENT EXAMPLES OF NKS ACTIVITIES

NKS-R

Safety Culture in the Nuclear Industry

Good safety culture is essential for ensuring safety in the nuclear industry. The predominant approaches for safety culture are based on the assumption of stable and relatively homogeneous organizations, which often does not apply to contemporary project-oriented and turbulent environments. The work performed within the NKS-R activity SC_AIM has resulted in the development of twelve principles of safety culture change that summarize the essential good practices for leading safety culture change. Guidelines for the implementation of safety culture ambassadors have been developed as a novel method for safety culture improvement (NKS-R activity SC_AIM).

NKS-R

Extraction and Analysis of Reactor Pressure Vessel Material

Irradiation induced ageing of the weld material of the reactor pressure vessel (RPV) is a limiting factor from a long term operation perspective. The closed Barsebäck 2 reactor gives an opportunity to harvest samples from the RPV, which was manufactured and welded with the same technique and high amounts of nickel and manganese as most Nordic RPVs. A test program to analyze the as-aged material properties by mechanical testing and high resolution microscopy is ongoing within the NKS-R activity BREDA-RPV.

NKS-B

Optimisation of analytical methods for simultaneous determination of important alpha emitting radionuclides in nuclear and environmental samples

Due to their high radiation toxicity, a number of alpha emitting radionuclides are important in connection with radiation protection in nuclear facilities (e.g., in decommissioning) and in the environment. The NKS-B OPTIMETHOD activity aims to improve the analytical quality and enhance the competence of the Nordic laboratories for radiochemical analysis of alpha emitting nuclides. An important instrument is here intercomparison exercises (NKS-B activity OPTIMETHOD).

NKS-B

Natural radioactivity in the Nordic diet

Although the dose contribution from natural radioactivity in the diet may be many times higher than the dose contribution resulting from human activities, data on naturally occurring radionuclides in food is scarce. The NKS-B NANOD activity aims to enhance the understanding of the mechanisms determining dose from ingestion of natural radionuclides. Contents of 210Pb, 210Po, 226Ra and 228Ra in fish and shellfish have been shown to be highly important (NKS-B activity NANOD).

HOW TO APPLY

Nordic companies, authorities, organizations and researchers can submit proposals for NKS activities under the NKS-R and NKS-B programmes. Usually at least three of the five Nordic countries should participate in an activity. Activities submitted under annual calls for proposals are assessed according to criteria important to the objectives of NKS, with final funding decisions made by the NKS board. NKS funding of Non-Nordic organisations is not possible, but their participation is allowed under certain circumstances. Contact the NKS secretariat for details.

THE NKS WEBSITE

On the NKS website (www.nks.org) information is available on funding opportunities, travel support for young scientists, current activities and upcoming seminars. Presentations from seminars held are available for download as are reports from all completed NKS activities. It is also possible to discover more information on NKS and the history of Nordic co-operation in nuclear safety.

For funding: www.nks.org/handbook

For reports: www.nks.org/reports

NKS EMAIL LIST

NKS sends out newsflashes and newsletters throughout the year providing information on call for proposals, upcoming seminars and published reports. If you wish to join the NKS email list please sign up via the NKS website.

SCAN THE CODE TO VISIT WEBSITE

NKS ON LINKEDIN

Follow NKS on LinkedIn at
https://www.linkedin.com/company/nks---nordic-nuclear-safety-research/

Photo: Lift of Top Shield Plug in 2014 from Danish Reactor 3

Source: Danish Decommissioning

CONTACT

If you wish to learn more about NKS and NKS activities visit our website or contact the NKS secretariat.

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NKS-B programme manager
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Technical University of Denmark, Risø

nks
Nordic nuclear safety research

This is NKS

Nordic Cooperation Forum

NKS (Nordic Nuclear Safety Research) is a forum for Nordic cooperation and competence in nuclear safety, including emergency preparedness, serving as an umbrella for Nordic initiatives and interests. It runs joint activities of interest to financing organisations and other end users producing seminars, exercises, scientific articles, technical reports and other types of reference material. The work is financed and supported by Nordic authorities, companies and other organisations. The results which should be practical and directly applicable are used by participating organisations in their decision making processes and information activities.

The Nordic Approach

The Nordic region comprises five countries, i.e., Denmark (including the Faroe Islands and Greenland), Finland, Iceland, Norway and Sweden. Building on the foundation of a common cultural and historical heritage and a long tradition of collaboration, NKS aims to facilitate a common Nordic view on nuclear and radiation safety. A common understanding of rules, practice and measures, and national differences in this context, is an essential requirement. Through collaborative efforts problems may be tackled quicker, more efficiently, more consistently, and at a lower cost.

Why Nordic Cooperation on Nuclear and Radiological issues?

One reason to maintain this collaboration between the Nordic countries is the common challenges in relation to nuclear installations. While nuclear power plants are in operation in Finland and Sweden, research reactors have been operated in Denmark, Finland, Norway and Sweden. Clearly, exchange of operational expertise and new ideas can be beneficial. Some of the Nordic research reactors have been closed down and the experience gained in subsequent decommissioning may be useful in connection with the planned decommissioning of Swedish nuclear power reactors. Also knowledge exchange between Sweden's nuclear fuel production plant and other Nordic nuclear installations may be beneficial. The Fukushima accident highlighted the need for an effective operational emergency preparedness for accidents at nuclear installations. By continuously improving detection, response and decision aiding tools while maintaining an informal collaborative network between relevant stakeholders in the Nordic countries, the capacity and capability to respond optimally to an emergency is enhanced. Experience has shown that nuclear and radiological challenges to society are far from static, and the response systems require continuous development. Radiological issues need to be addressed coherently and effectively in the Nordic countries, and some of these are on the NKS agenda. They range from exposure to naturally occurring radioactive material in the environment to the threat of malicious use of radioactive material. In addition to the NKS cooperation there is an extensive co-operation between the Nordic radiation safety authorities regarding general radiation safety issues.

Nordic and International Benefits

NKS with its program for nuclear safety including emergency preparedness is of common benefit for all five Nordic countries. The hallmark of NKS is a spirit of sharing – all results are available free of charge on the NKS web site (www.nks.org), not only to the NKS family but also worldwide providing an international benefit of the NKS work. When quoting NKS material, a reference to the source will be appreciated.

Two Program Areas

NKS activities are divided into two program areas:
NKS-R: Reactor safety; Nuclear power plant life management and extension; Decommissioning and handling of generated waste; Organisational issues.
NKS-B: Nuclear and radiological emergency preparedness; Measurement strategy, technology and quality assurance; Radioecology and environmental assessments; Management of radioactive waste and discharges.

Owners and Financiers of NKS

The owners and main financiers are:
Danish Emergency Management Agency (DEMA, Denmark)
Ministry of Employment and the Economy (TEM, Finland)
Icelandic Radiation Safety Authority (GR, Iceland)
Norwegian Radiation Protection Authority (NRPA, Norway)
Swedish Radiation Safety Authority (SSM, Sweden)

The co-financiers are:
Fennovoima Oy (Finland)
Fortum Power and Heat Ltd. (Finland)
TVO (Finland)
Institute for Energy Technology (IFE, Norway)
Forsmark Kraftgrupp AB (Sweden)
OKG AB (Sweden)
Ringhals AB (Sweden)
SKB AB (Sweden)

Financial Contribution

In 2018 the contributions of the owners and additional financiers were more than 8 million Danish crowns (approximately 1.1 million euros). To this should be added contributions in kind by participating organizations, worth approximately the same amount, without which this program would not be possible.

Nordic nuclear safety research

NKS(18)5
2018-07-06

HANDBOOK FOR NKS APPLICANTS AND ACTIVITY LEADERS

July 2018

TABLE OF CONTENTS

1 INFORMATION FOR APPLICANTS

1.1 Subscribe to NKS News

Ensure that you will not miss any important information (regarding e.g. call for proposals) by subscribing to NKS News at: www.nks.org.

1.2 Who can apply?

Organisations such as universities, research centres, institutes and companies in the Nordic countries can apply for NKS funding for research activities. The activity budget should distribute the NKS funding between participant organisations from at least 3 Nordic countries (in some special cases, involvement of only 2 Nordic countries has been accepted in the NKS-R programme). Non-Nordic participation in NKS activities is possible, but NKS funding of Non-Nordic organisations is not possible. The activity leader must come from a Nordic country (i.e. work for a Nordic organisation).

1.3 What kind of work would be funded?

NKS funds work related to nuclear safety, including emergency preparedness, radioecology, measurement strategies and waste management, considered to be of importance to the Nordic community. The work should be of interest to the owners and financing organisations of NKS. The results must be of relevance, e.g., practical and directly applicable. The work can be in the form of scientific research, including experimental work, or joint activities producing seminars, workshops, courses, exercises, scientific articles, technical reports and other type of reference material. Examples of research topics can be found in the framework documents for NKS-R (http://www.nks.org/en/nksr/call_for_proposals/nks-r_framework_2015.htm) and NKS-B http://www.nks.org/en/nksb/call_for_proposals/nks-b_framework_2014.htm.

1.4 Requirements for NKS activities

The proposal shall fulfil the following requirements:

- Demonstrated compatibility with the current framework program
- NKS funded participation of organisations in at least three Nordic countries in all major activities (occasionally, two countries may be acceptable)
- Results of NKS activities are publicly available for free
- 50 % of the funding from own contribution

1.5 Criteria for NKS activities

The entire NKS program as well as the various activities is evaluated against the following criteria:

1. *Added Nordic value*
   Will the proposed activity lead to an increase in Nordic competence and/or building of informal networks within a relevant NKS-R framework area and how will this be achieved?
2. *Technical and/or scientific standard*
   How does the proposed activity demonstrate a suitable technical and/or scientific standard?
3. *Distinct and measurable goals*

What will the proposed activity deliver as a result of the proposed work programme in the year for which funding is applied for? It is important to ensure that it is clear to the evaluators what the proposed activity will set out to achieve.

4. *Relevance to NKS end-users*
   Is the proposed activity relevant to NKS end-users and which NKS end-users is the proposed activity targeting? It will strengthen the proposal if the interest of relevant end users is clearly demonstrated and not only assumed.
5. *Participation of young scientists*
   Participation of young scientists is an important criterion in funding decisions. Explain how the proposed activity will include young scientists. In this context, those studying towards a masters degree or a PhD and those in their first 4 years of their professional career after obtaining an academic degree would be considered as 'young scientists'
6. *Links to other national/international programmes*
   Does the proposed activity have a link to ongoing or past research programmes or activities? In particular, it should be clear where a proposed activity builds upon previously funded NKS activities.

1.6 What do I have to do in return for the money

The activity partners are expected to report the work carried out each year. The most common type of output is a scientific report at the end of the year. A report with clear results is requested even if the activity continues the next year. Other forms of reporting can be for example presentations and proceedings from a seminar. All material produced must be available for publishing on the NKS webpage, where they are free to be downloaded by anyone.

1.7 NKS financing

The NKS funding is granted for one year at a time. Generally, an activity will not receive more than 600 kDKK per year from NKS. The first 50% of the contribution is paid when an activity is started and the rest 50% when the final results of one year's work are available. The first part of the funding can be invoiced when a contract has been made between NKS and the activity leader.

1.8 Working language

The main working language in NKS is English. Applications for NKS funding as well as final reports and other material should be submitted in English. However, each working group determines its own language for meetings.

1.9 How do I apply?

It is up to the applicants themselves to find collaboration partners in the Nordic countries. The programme managers can help with getting into contact with Nordic organisations. NKS seminars are good places for networking. More information on ongoing research and all the published reports are available on the NKS website.

NKS funding is announced in the annual Call for Proposals. It is usually organised in September - October. All the necessary information, material and instructions are distributed on the NKS website. The Call for Proposals is also announced in the NKS electronic newsletter. The applicant is requested to fill in an application form. A voluntary annexe with further details about the proposal may also be handed in. Detailed instructions on how to fill in the application form will be available when the Call for Proposal opens. The applicant is encouraged to read these instructions carefully.

The applicants are expected to demonstrate that at least half of the necessary funding of the activity in question will be supplied by the participating organisations. In other words, the participants are expected to put in the same amount of money in the project as they are applying from NKS. These contributions may be work hours, travel expenses, etc. and should be clearly specified in the proposal form.

Please note that all funding by NKS includes possible VAT

1.12 What happens next

Proposals received before deadline are evaluated against the requirements by the NKS programme managers. Projects fulfilling these requirements are then evaluated against the criteria in section 1.5by the NKS board members. The board members have the right to use the help of external experts in the evaluation process if needed. Each proposal will be given marks based on how well the proposal fulfils the NKS criteria. Based on the evaluation results and the available budget, the programme managers make a suggestion for the next year's NKS-R and NKS-B programme. The suggestions are discussed at the January board meeting and the final decision of successful applicants is made by the board. The programme managers inform the applicants of the outcome as soon as possible after the board meeting.

1.13 Useful links for applicants

NKS webpage
Information about NKS
Owners and supporting financiers of NKS
The NKS-B programme
The NKS-R programme
Information about the Call for Proposals, NKS-B programme
Information about the Call for Proposals, NKS-R programme
NKS Seminars
NKS Reports
Travel support for young scientists: NKS-B, NKS-R

2 INFORMATION FOR ACTIVITY LEADERS

2.1 Contract

The Activity Leader will shortly after the Board's grant decision receive a contract template from the manager of the relevant NKS Programme, which is to be filled in with information on the activity deliverables or stages of work to be done, *always* including the submission of a final activity report (normally by the end of the funding year). In the contract template, the Activity Leader must also include a budget for each of the various activity partners, in line with the Board's decision. The contract is valid when signed by an authorised representative of the Activity Leader's organisation and by the Programme Manager. The NKS Programme Manager will have provided the contract template with a reference number (format: AFT/{R or B}({year}) {serial number}). This reference number is the identifier of the activity, and must be stated in all official management documents concerning the project (contracts, invoices, etc.). Contracts are generally for one year's work, and further continuation of activities is subject to submission and approval of a new proposal.

2.2 Invoices

When the contract is duly signed by both parties, the Activity Leader should inform the participants that they can invoice NKS for 50 % of their total contractual amount. When the work has been completed and the final report of the activity has been approved by the Programme Manager, the Activity Leader should inform the participants that NKS can be invoiced for the remaining 50 % of the amount. All invoices are to be addressed to the NKS Secretariat, but mailed to the relevant Programme Manager (NKS-R or NKS-B).

2.3 Activity progress reporting and communication

If deviations are foreseen from the agreed activity work schedule, the Activity Leader must immediately notify the Programme Manager so that any problems may be solved and contingency plans implemented if necessary. On request, the Activity Leader is also obliged to inform the Programme Manager of the state of progress at various stages of the activity.

2.4 Progress documentation if applying for continued funding

If participants in an activity wish to apply for funding for continuation of the activity, they need to document significant progress with the ongoing work (e.g., in relation to declared milestones and deliverables) in connection with the application for continuation.

2.5 Advertisement of dissemination activities

Events like seminars, workshops, courses and exercises connected to NKS activities need to be advertised timely and efficiently to be successful. NKS Programme Managers can help Activity Leaders in advertising these, e.g., through NewsFlashes sent to subscriber lists and posted on the NKS internet site http://www.nks.org/en/news/subscribe_to_our_newsletter/. It is however the responsibility of the Activity Leader and partners to plan and execute all aspects of the activities. Seminars should generally be open and not held exclusively for a closed circle of participants.

2.6 Travel support for dissemination activities

NKS particularly encourages participation of young scientists in NKS events to maintain a high level of competence in the longer perspective, and can offer travel support for this purpose

(http://www.nks.org/en/nksr/travel_assistance/). All other costs for NKS in connection with NKS activities are to be covered by the amount approved in the contract.

2.7 Final reporting of the activity

All NKS activities, regardless of their nature, must produce a final report that should be in the standardised NKS report format (see template/instructions: report template). All material reported by an activity in each year is to be contained in **one final report**.
Please note, that where an activity is anticipated to continue for more than one year, a final report is expected to be delivered after each year of the activity as funding cannot be guaranteed for continuing activities.
Note that Activity Leaders must also supply a filled-in bibliographic datasheet (http://www.nks.org/en/this_is_nks/administration/) together with the final report.

Final reports from research activities or exercises aimed at filling knowledge gaps or developing methodologies should be in line with standards expected for scientific publications. Final reports from exercise activities in the form of intercomparisons or proficiency tests should seek to address any discrepancies or problems highlighted by the exercise, to increase knowledge and competencies where necessary. Final reports from seminar or workshop activities should contain extended abstracts from each presenter as well as a final overview of any discussions and conclusions. Presentation slides should not be presented in final reports. Final reports for educational and training courses should contain all course documents presented as well as feedback from participants. The conclusion of any NKS activity (and thus the final payment) is subject to the approval of the final report by the Programme Manager. In addition to the final report, activity participants are urged to disseminate activity results (with due credit to NKS) in scientific journal articles as well as at conferences, seminars and workshops. The Programme Manager in charge of the activity should be notified of any dissemination efforts.

The final report can be a paper and electronic report, or only an electronic one, but in both cases the report will be formally registered at the NKS and through the international library network. Printing costs of modest paper reports can be covered centrally by NKS (there is no need to use the activity funding for this), but printing of more sophisticated reports (e.g. thick reports using colour figures) may need to be included in the budget of the activity. Information about possible printing costs can be obtained from the NKS Secretariat.

2.8 Internet hosting of NKS activity material

All final reports of NKS activities are hosted on the NKS internet site (http://www.nks.org/en/nks_reports/). In connection with NKS events like seminars and workshops it is encouraged that the Activity Leader seeks the permission of the participants to publish presentations (slides) on the NKS internet site (http://www.nks.org/en/seminars/presentations/presentations.htm). Also information on other available software (e.g., as downloads) or hardware generated by NKS activities can be hosted on the NKS internet site (http://www.nks.org/en/nksb/supporting_material/). For further information contact the relevant Programme Manager.

KUNDEAFTALE
DANSKE BUSINESS ONE

Udskrevet den
16. april 2019

NKS- FORENINGEN NORDISK KERNESIKKERHEDSFORSKNING 0038649868 (Kunden) har indgået en aftale med Danske Bank A/S (Banken) om følgende:

Danske Business One

☒ Jeg/Vi ønsker konto 9189297 ændret til en Danske Business One konto

Det er et vilkår for Danske Business One, at Netbank Erhverv og Erhverv Direkte automatisk følger med kontoen. Jeg/Vi kan derfor ikke opsige aftalerne for disse produkter enkeltvis. Opsiger jeg/vi en eller flere af aftalerne, opsiger jeg/vi derfor samtidig alle aftalerne for Danske Business One. Hvis Danske Bank vælger at opsige en af aftalerne, kan banken samtidig vælge at opsige alle aftalerne for Danske Business One.

Kontoen er en betalingskonto og er dermed omfattet af lov om betalinger.

NemKonto

☒ Jeg/Vi ønsker at registrere min/vores eksisterende konto 9189297 som Nemkonto.

Det betyder, at alle udbetalinger fra det offentlige (fx refusion af dagpenge, overskydende moms og skat, landbrugsstøtte eller lignende) indbetales på denne konto.

Danske Netbank Erhverv

☒ Jeg/Vi bestiller hermed Danske Netbank Erhverv med nedenstående bruger.

Danske Netbank Erhverv fungerer med sikkerhedsløsningen NemID som log-on.
- Har brugeren allerede et NemID bruges dette til at logge på Danske Netbank Erhverv.
- Har brugeren ikke et NemID, i forvejen bestilles dette automatisk sammen med Danske Netbank Erhverv.

Bruger:
Navn: Finn Christensen Physant CPR-nr.: 2906580295

Brugeren kan forespørge og disponere på Aftalehavers nuværende og fremtidige konti og depoter i banken, der separat er eller bliver givet fuldmagt til.

For aftalen gælder:
- Betingelser for Danske Netbank Erhverv
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- Almindelige forretningsbetingelser
- Priser og vilkår for udenlandske overførsler til og fra Danmark samt overførsler i fremmed valuta end DKK i Danmark - erhverv
- Betingelser for handel med værdipapirer
- Oplysninger om handel med værdipapirer
- Betingelser for depoter
- Politik for udførelse af ordrer om værdipapirer
- Prisliste
- Provisioner på investeringsområdet
- Regler for betalingstilladelse inklusive Generelle regler for debitorer i Betalingsservice

Aftalehaver og bruger tiltræder, at Danske Netbank Erhverv udelukkende må bruges erhvervsmæssigt.

12055P 2008.08

Aftalehaver og bruger accepterer, at lov om betalinger er fraveget i det omfang, som det fremgår af Betingelser for Danske Netbank Erhverv.

Hvis aftalehaver ikke har e-Boks, tiltræder aftalehaver, at banken sender alle de dokumenter (post), som udsendes elektronisk af banken, til den elektroniske postmappe i Danske Netbank Erhverv. Brugeren har adgang til den elektroniske postmappe. Aftalehaver vil således ikke længere modtage disse dokumenter som almindelig post på papir fra banken.

Aftalehaver tiltræder endvidere, at bruger på aftalehavers vegne løbende kan framelde og tilmelde modtagelse af elektroniske dokumenter fra banken.

Aftalehaver og bruger erklærer at have gjort sig bekendt med de for aftalen gældende betingelser m.v. og accepterer, at de er gældende for aftalen.

Aftalehaver erklærer at være blevet orienteret om muligheden for at tegne en forsikring, der dækker virksomhedens tab som følge af tredjemands netbankindbrud/hacking i virksomhedens computersystemer.

Dato:

Brugers underskrift:

Danske Netbank Erhverv

[X] Jeg/Vi bestiller hermed Danske Netbank Erhverv med nedenstående bruger.

Danske Netbank Erhverv fungerer med sikkerhedsløsningen NemID som log-on.
- Har brugeren allerede et NemID bruges dette til at logge på Danske Netbank Erhverv.
- Har brugeren ikke et NemID, i forvejen bestilles dette automatisk sammen med Danske Netbank Erhverv.

Bruger:
Navn: Claus Rubin CPR-nr.: 1306461261

Brugeren kan forespørge og disponere på Aftalehavers nuværende og fremtidige konti og depoter i banken, der separat er eller bliver givet fuldmagt til.

For aftalen gælder:
- Betingelser for Danske Netbank Erhverv
- Regler for NemID til netbank og offentlig digital signatur
- Almindelige forretningsbetingelser
- Priser og vilkår for udenlandske overførsler til og fra Danmark samt overførsler i fremmed valuta end DKK i Danmark - erhverv
- Betingelser for handel med værdipapirer
- Oplysninger om handel med værdipapirer
- Betingelser for depoter
- Politik for udførelse af ordrer om værdipapirer
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Dato:

Brugers underskrift:

e-Boks

☒ Jeg/Vi ønsker, at banken på virksomhedens vegne opretter en e-Boks

Banken sender herefter anmodning om at oprette en e-Boks videre til e-Boks A/S. Det betyder, at virksomheden accepterer at modtage alle de typer af dokumenter, som banken nu og fremover sender som elektroniske dokumenter, i e-Boks.

Aftalevilkårene er beskrevet i:

- Vilkår for modtagelse af elektroniske dokumenter i e-Boks
- Vilkår for brugen af e-Boks
- Generelle regler for debitorer i Betalingsservice - se punkt 6 "Særligt om elektronisk betalingsinformation"

Erhverv Direkte

☒ Jeg/vi indgår aftale om betjening og rådgivning af min/vores virksomhed via Erhverv Direkte.

Erhverv Direkte kan rådgive virksomheden om alt fra almindelige transaktioner og betalingsformidling til investering, realkredit, leasing, udlandsforretninger og meget mere. Telefonnummeret er 70 13 30 00.

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Betalingsservice and Danske Giro

☒ Jeg/Vi giver hermed banken tilladelse til at udføre konto-til-konto overførsel og betale indbetalingskort, der er modtaget i banken og udstedt i mit/vores navn på disse vilkår.

Banken er forpligtet til

- at gennemføre mundtlige eller skriftlige aftaler om betaling og overførsel på den anførte betalingsdag, indtil disse mundtligt eller skriftligt tilbagekaldes. Indbetalingskort, hvor den anførte betalingsdag er lørdag, søn- og helligdage, dagen efter Kristi himmelfartsdag, grundlovsdag, juleaftensdag eller nytårsaftensdag, hvor banken er lukket for ekspedition, betales den følgende bankdag. Hvis betalingsdagen ikke er anført, gennemføres betalingen senest 3 bankdage efter, at indbetalingskortet er modtaget.
- at udskrive og udlevere en oversigt over samtlige betalingsaftaler på nævnte kundenummer, når jeg/vi beder om det.

Jeg/Vi er forpligtet til

- at indlevere de indbetalingskort m.v., som ikke er omadresseret til banken, udfyldt, underskrevet og påført den af mine konti, hvor beløbet skal hæves i forbindelse med betaling. Indbetalingskort til ekspedition via Danske Giro indleveres i de særlige Danske Giro kuverter inden for den indleveringsfrist, som er anført bag på Danske Giro kuverten.
- at foretage eventuel tilbagekaldelse af en anmodning om betaling senest 1 bankdag før den betalingsdag, der er anført på indbetalingskortet. Tilbagekaldelse skal ske til den afdeling af banken, som er anført ovenfor.

☒ Indleverede indbetalingskort, der skal betales gennem Danske Giro, tilmeldes Betalingsservice.

Vilkårene står i Regler for betalingstilladelse.

Foreningserklæring

Jeg/Vi erklærer med min/vores underskrift på denne aftale, at virksomheden er enten en erhvervsdrivende forening, dvs. hovedsagelig beskæftiger sig med drift af erhvervsvirksomhed eller en ikke-erhvervsdrivende fond med en formue under 1 mio. kr.

Generelt

☒ Jeg/Vi accepterer selv at hente de for aftalen gældende vilkår, herunder prislister, på www.danskebank.dk/da-dk/Erhverv/Vilkaar, og at indholdet af vilkårene er gældende for aftalen.

Hvis jeg/vi accepterer at hente vilkårene, herunder prislister, på hjemmeside, kan jeg/vi til enhver tid anmode banken om at fremsende vilkårene i en papirudgave efter bankens regler herom.

☐ Jeg/Vi har fået udleveret vilkår, der er gældende for produkterne i denne bestilling.

Jeg/Vi accepterer, at bankens Almindelige forretningsbetingelser gælder for mit/virksomhedens kundeforhold med banken.

Min/Vores underskrift vedrører de punkter, der er krydset af i det ovenstående.

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Underskrift(er)

Sted og dato	Sted og dato
Underskrift af godkendt underskriver	Underskrift af godkendt underskriver
Navn (med blokbogstaver)	Navn (med blokbogstaver)

Fuldmagt

Der skal underskrives en fuldmagtsblanket for hver fuldmagtshaver.

Fuldmagtsgiver
Virksomhedens navn og adresse
NKS- FORENINGEN NORDISK KERNESIKKERHEDSFORSKNING
FREDERIKSBORGVEJ 399
4000 ROSKILDE
Kundenummer
0038649868
CVR-nr. (kun hvis det er forskelligt fra kundenummer)

bemyndiger

CPR-nr.	Navn
2906580295	Finn Christensen Physant

Oplysningerne bruges til administration af det fuldmagtsforhold, der er mellem virksomheden og bruger. Virksomheden har indhentet brugers samtykke til, at brugers CPR-nr. må videregives til banken.

til ved

☒ Alene-fuldmagt ☐ A-fuldmagt ☐ B-fuldmagt ☐ C-fuldmagt
sammen med én anden fuldmagtshaver

at disponere på mine/vores vegne, som angivet nedenfor.

Fuldmagten gælder for

☒ alle nuværende og fremtidige konti i indenlandske afdelinger af Danske Bank. Det vil sige, at fuldmagten gælder for alle konti, der måtte være eller blive oprettet i indenlandske afdelinger af banken.

☐ følgende konti	Kontonr.		Kontonr.		Kontonr.		
	Kontonr.		Kontonr.		Kontonr.		
☐ følgende depoter	Depotnr.		Depotnr.		Depotnr.		
☐ følgende bokse	Boksnr.	i reg.nr.	Boksnr.	i reg.nr.	Boksnr.	i reg.nr.	

Forhold om fuldmagtens omfang og fuldmagtstyper er nærmere beskrevet på næste side.

Fuldmagten er gyldig, indtil banken har modtaget en skriftlig tilbagekaldelse. Tilbagekaldelse kan kun ske ved samtidig tilbagelevering af eventuelt id-kort, dankort, Visa/Dankort og hævekort, der er udleveret til fuldmagtshaver.

Samtidig med min/vores udstedelse af ny konto-, depot- eller boksfuldmagt til nævnte fuldmagtshaver, tilbagekaldes tidligere afgivne konto-, depot- og boksfuldmagter til fuldmagtshaveren.

Dato

Virksomhedens underskrift (underskrives af tegningsberettigede)

Her kan du læse, hvad de forskellige typer fuldmagter giver lov til.

Kontofuldmagt
Med en kontofuldmagt får fuldmagtshaver adgang til

- at spørge om og disponere over de nævnte konti - det gælder f.eks. også ved check, dankort, Visa/Dankort, hævekort, ordrer afgivet via Danske Bank Business Online, Danske Bank Business PC, Telefonservice, Danske Netbank eller på anden måde.
- at bruge Danske Bank Business Online, Danske Bank Business PC, Telefonservice og Danske Netbank i det omfang, der er adgang til disse systemer.
- at bestille, genbestille og kvittere for dankort, Visa/Dankort og hævekort, der udstedes til fuldmagtshaver.

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Depotfuldmagt
Med en depotfuldmagt får fuldmagtshaver adgang til

- at forespørge om de værdier, der til enhver tid er i de nævnte depoter,
- at afgive salgsordrer vedrørende de værdipapirer, der til enhver tid er i de nævnte depoter
- at skrive under på transportpåtegninger for de værdipapirer, der er i de nævnte depoter
- at bemyndige Danske Bank til at skrive under på transportpåtegninger for de værdipapirer, der er i de nævnte depoter
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Afregningsprovenu fra solgte værdipapirer bliver sat ind på en af fuldmagtsgivers konti i Danske Bank eller en anden afkastkonto, som fuldmagtsgiver har anvist.

Fuldmagten giver ikke fuldmagtshaver adgang til at flytte de nævnte depoter helt eller delvist til et eller flere andre depoter, medmindre det modtagende depot tilhører fuldmagtsgiver og føres i Danske Bank.

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Med en boksfuldmagt får fuldmagtshaver adgang til de nævnte bokse, herunder til at fjerne effekter, der ligger i boksene.

Opdelingen af fuldmagter i typerne Alene-, A-, B- og C-fuldmagt giver fuldmagtsgiver mulighed for at fastlægge forskellige disponeringsadgange for de enkelte fuldmagtshavere.

Alene-fuldmagt
Indehaveren af en Alene-fuldmagt kan disponere både alene og sammen med indehavere af de øvrige fuldmagtstyper.

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C-fuldmagt
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På en måde minder C-fuldmagten om B-fuldmagten, men C-fuldmagten kan desuden bruges, når der er behov for, at en fuldmagtshaver ikke er placeret i samme afdeling, som den/de person/personer, han/hun skal disponere sammen med.

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FREDERIKSBORGVEJ 399
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Kundenummer
0038649868
CVR-nr. (kun hvis det er forskelligt fra kundenummer)

bemyndiger

CPR-nr.	Navn
1306461261	Claus Rubin

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	Kontonr.		Kontonr.		Kontonr.		
☐ følgende depoter	Depotnr.		Depotnr.		Depotnr.		
☐ følgende bokse	Boksnr.	i reg.nr.	Boksnr.	i reg.nr.	Boksnr.	i reg.nr.	

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12055P 2008.08

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12055P 2008.08

Brugerfuldmagt til Danske Netbank Erhverv og Telefonservice

Undertegnede virksomhed (fuldmagtsgiver)
Virksomhedens navn og adresse
NKS- FORENINGEN NORDISK KERNESIKKERHEDSFORSKNING
FREDERIKSBORGVEJ 399
4000 ROSKILDE
Kundenummer
0038649868

giver

CPR-nr.	Navn
1306461261	Claus Rubin

fuldmagt til

☐ via Danske Netbank Erhverv at se alle vores nuværende og fremtidige konti og depoter i Danske Bank.
via Telefonservice at spørge på alle vores nuværende og fremtidige konti i Danske Bank.

☒ via Danske Netbank Erhverv at se alle vores nuværende og fremtidige konti og depoter i Danske Bank.
via Telefonservice at spørge på alle vores nuværende og fremtidige konti i Danske Bank.

Derudover giver vi adgang til, at fuldmagtshaver via Danske Netbank Erhverv og Telefonservice kan disponere på konti, hvor vi allerede har givet, eller fremover giver, fuldmagtshaver en kontofuldmagt til at disponere alene.

Vi giver endvidere adgang til, at fuldmagtshaver via Danske Netbank Erhverv kan købe og sælge værdipapirer til og fra vores depoter i det omfang, vi allerede har givet, eller fremover giver, fuldmagtshaver fuldmagt hertil.

☐ via D anske Netbank Erhverv og Telefonservice både at spørge på og disponere på vores nuværende og fremtidige konti i Danske Bank. Det drejer sig om konti, hvor vi allerede har givet, eller fremover giver, fuldmagtshaver en kontofuldmagt til at spørge og disponere alene.

Som fuldmagtsgiver er vi indforstået med, at vi er ansvarlige for og hæfter for alle dispositioner, hvor fuldmagthavers personlige, hemmelige kode til systemerne er anvendt. Banken er berettiget til at betragte alle sådanne dispositioner, som om de er foretaget skriftligt af os selv.

Fuldmagten er gyldig, indtil banken har modtaget udtrykkelig skriftlig tilbagekaldelse.

Dato

Virksomhedens underskrift (underskrives af tegningsberettigede)

Brugerfuldmagt til Danske Netbank Erhverv og Telefonservice

Undertegnede virksomhed (fuldmagtsgiver)
Virksomhedens navn og adresse
NKS- FORENINGEN NORDISK KERNESIKKERHEDSFORSKNING
FREDERIKSBORGVEJ 399
4000 ROSKILDE
Kundenummer
0038649868

giver

CPR-nr.	Navn
2906580295	Finn Christensen Physant

fuldmagt til

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Fuldmagten er gyldig, indtil banken har modtaget udtrykkelig skriftlig tilbagekaldelse.

Dato

Virksomhedens underskrift (underskrives af tegningsberettigede)

Reflections on the structure and organizations of NKS after 2020.

-Discussion paper based on views expressed by the NKS board.

Anneli Hällgren, SSM

Sigurður M Magnússon, IRSA

This discussion paper consists of an introduction, providing background on NKS policy discussions since June 2017, summary of views expressed by NKS board members and their views in full.

Introduction.

The policy discussion on the future structure and direction of NKS (NKS after 2020) began at the **NKS owners and board meetings on 7 and 8 June 2017**.

In February 2017 Eva Simic had distributed the SSM report ”Evaluation of the Swedish participation in the Nordic Nuclear Safety Research (NKS) collaboration” by Oxford Research to the board members.

At the NKS board meeting on 8 June 2017 Hjalmar Eriksson from Oxford Research gave comprehensive presentation on the evaluation of the added value for Sweden from participating in NKS.

The report by Oxford, the presentation by Hjalmar and the discussion that followed was the starting point for the discussion on the future structure and direction of NKS in the NKS board.

At the meeting there was also a decision to establish a working group to review and revise the role of the PC´s with a deadline for report before the January 2018 board meeting. Nici Bergroth was the chair the working group.

For more information see:
http://www.nks.org/download/styrelsesmoeder/Board_meeting_170608/nks-17-05-minutes_board_meeting_20170703_final.pdf

At the **January 2018 meetings** there were comprehensive agreements at the owners meeting regarding the finances and chair of NKS for the next three years (end of 2020). These agreements provide stability in NKS for the next three years ensuring ample time for a thorough discussion and implementation of NKS future strategy and direction.

There was an extensive discussion on the report from the working group to review and revise the role of the PC´s at the board meeting.

The owners and board members had been asked for their reflections on the future of NKS prior to the meeting. On basis of their reflections a discussion document ”Proposals and suggestions from reflections over NKS future directions by owners and board members” dated 17 January 2018 had been developed. All proposals and suggestions concerning policy and content of the NKS program in the document were discussed and preliminary conclusions reached for all except three that required more work. The outcome “Conclusions – NKS Board 18 January” was an appendix to the minutes of the meeting.

The remaining three were

Length, number and funding of projects:

Conclusion: *Discussion reflected different views within the NKS Board. PC´s to develop a discussion paper based on the discussion in consultation with the Chair. Draft paper to be circulated to board for comments in good time before June meeting. Decision at June meeting.*

Prioritized areas:

Conclusions: *The discussion reflected different views in the Board and that "prioritized areas" are implicit in our evaluation i.e. relevance for end users and mean ranking as well in final ranking. PC´s, in consultation with the Chair, to develop a discussion paper taking into account the discussion at the board meeting. Draft paper to be circulated to board for comments in good time before June meeting.*

Division between NKS B and NKS R.

Conclusions: *The discussion confirmed the growing importance of decommissioning and management of radioactive waste. PC´s to develop this issue further before June board meeting.*

For more information see:
http://www.nks.org/download/styrelsesmoeder/Board_meeting_180118/nks-18-01-minutes_board_meeting_20180307_rev2.pdf

At the **June 2018** meeting the discussion continued. At the owners meeting 27 June there was a decision to develop a policy document "NKS after 2020".

The discussion at the board meeting on 28 June focused on the preliminary conclusions of the discussions on NKS future direction at the January 2018 board meeting and the remaining three issues. There was a conclusion on all issues.

For more information see:
http://www.nks.org/download/styrelsesmoeder/Board_meeting_180628/nks-18-04-minutes_board_meeting_20180814_final.pdf

At the **January 2019** meeting the discussion focused on the draft policy paper that had been circulated prior to the meeting. On basis of the discussion the draft was revised and circulated to board members for comments. A final draft is expected to be approved at the 2019 June meeting.

There was a decision that the next steps in the discussion on "NKS after 2020" would be to ask owners and board members to give their views on the present structure and organization of NKS and NKS activities including proposals for improvement/change.

This discussion paper is based on the views expressed by board memebers (p.3-5) and is an input to the discussions at the meeting of the NKS owners on 3 June 2019 and the NKS board on 4 June 2019. The full text of the views from NKS board members is in an appendix to this discussion paper, p. 6-12.

In general there is broad support to continue the present structure and organization of NKS. The main proposals for change address the composition and role of the board as well as to establish an Advisory Group.

Summary of views expressed by board members.

NKS Board.

It is proposed that the owners of NKS, appoint one member each to the NKS board. The NKS board is responsible for the NKS business's framework including strategies, budget, finances etc. The NKS board approves the research projects to be funded, based on the recommendation of the PC´s after evaluation of applications by the NKS advisory group.

Advisory Group.

There is a proposal to establish an Advisory Group consistsing of one member for each program area nominated by each of the NKS owners and one member for one program area nominated by each of the co-financing organizations. The role of the Advisory Groups is to evaluate proposals for research projects and advise the board on the research program. The chair of NKS is also the chair of the Advisory Group.

Coordination Group

There is strong support for continuation of the coordination group, consisting of PCs, secretariat and chairman, for continued efficiency and progress in the work of NKS.

Secretariat

There is strong support for the NKS Secretariat to continue, in an efficient way, to take care of the administrative issues, including financial issues and the website.

Program Coordinators

The function of Program Coordinators (PCs) is considered to be important and that the function is still needed at an approximate half-time (of a full position) per program. Thus PCs are able to read through and quality assure the project results. The fact that the quality assurance takes place at PCs guarantees a consistent quality. Having the same PC for both NKS-R and NKS-B is not feasible given the broad and at the same time deep expertise that a person would then need to possess. It would also make NKS too vulnerable to changes in staffing.

Time limits:

Time limit for Chai

The issue of time limit for the Chair was raised and it was suggested to discuss if there should be a time limit of 4 +2 years or 4 + 4 years for the Chair and a rotation between the Owners.

Time limit for PC´s

The issue of time limits for PC's appointment was raised with a suggestion is to express more clearly the expectation that a PC should stay for three years, and also - to promote rotation and competence building - say that the position can be held for the longest time for five years.

It was also raised that it could be good to discuss how the PC role could be shifted between the countries on a regular basis. The four countries which do not fill the chairman role, could have a schedule how to shift the PC roles between them. For example, the PC-R could alternate between

two of the countries and the PC-B between the other two. Or, there could be a ”waiting list” for each of the roles.

Regular meetings:

Flexibility and form of meetings:

Flexibility is recommended so that meetings can be planned in an optimal way.

For all meetings there is a recommendation to consider if the meeting can be a video meeting rather than a face to face meeting.

The NKS board and Advisory Group.

The regular meeting schedule can be as follows:

January

In January there is a board meeting with participation of the Advisory Group, the secretariat and the PC´s.

In the joint session the PC´s present status of ongoing projects and their recommendations for funding based on evaluation of the proposed projects by the Advisory Group. The board makes a decision following a discussion with the PC´s and the Advisory Group. Other topics on the agenda for the joint session may include strategic issues, impact of and future needs of research, emerging technologies and competence building, possible changes in policy documents and the research program for next year, the evaluation process, as well as other issues the participants wish to raise.

Following the joint session the board meets with the Secretariat and the PC´s to decide the annual budget and address other financial issues as well as contracts with PC’s, chairman and secretariat and other issues the participants wish to raise.

The PCs distribute a status report of ongoing projects and a report with funding recommendations no later than two weeks before the board meeting.

The Secretariat distributes a budget proposal, status of the financial situation and draft contracts no later than two weeks before the board meeting.

Other documents to be addressed need to be distributed two weeks before the meeting.

June

In June, the Board, the PCs and the Secretariat meet to review the annual report, monitor the economy and ongoing projects. Other issues on the agenda may include strategic issues, budget for next year and any other issue raised by board members or issues raised by members of the Advisory Group prior to the meeting.

The PCs distribute to the board and Advisory Group a status report of ongoing projects no later than two weeks before the board meeting. Members of the Advisory Group are invited to send their comments regarding status of ongoing projects before the board meeting and to raise other issues within their remit.

The Secretariat distributes all financial documents to be addressed no later than two weeks before the board meeting.

The coordination group.

The coordination group meets 4 – 6 weeks before a board meeting.

Other meetings.

The NKS chair, in consultation with the NKS board, can call for other meetings as needed.

Other issues.

Rules of procedure:

It is suggested that it could be good to develop a procedure document that clarifies the roles of the various actors, and describes the criteria for their participation – that is, how many participants from each country, from each utility, from each authority etc.

Public governance.

The importance of NKS living up to the standards for good public governance and transparency that apply to public sector in the Nordic countries, demonstrating that funds are spend correctly (i.e. on nuclear safety research) and efficiently (i.e. avoiding excessive costs) is raised as an issue for the NKS board to address since good public governance is included in recently agreed NKS policy

NKS Workshop.

There is a strong recommendation for continuation of the NKS workshops every third year.

Call for proposals.

The process for call for proposals is considered to function well and there is no need for changes.

The evaluation process.

It was commented that researchers *(SMM: no information on how many or how often)* have commented that the evaluation of the proposals appear to vary strongly between evaluators, even on relatively objective criteria like for instance the contributions from young scientists.

It is therefore suggested to review the evaluation process and possibly provide guidance to the evaluators on how the various criteria should be evaluated."

Appendix: Views from NKS board members

Anneli Hällgren SSM

NKS owners have asked for their views on NKS organization - is there a need to change? The Swedish Radiation Safety Authority has gathered relevant employees for discussion . The most urgent point made is about the board's unclear role. Below are suggestions aimed at clarifying the roles and cooperation of the various actors.

Roles

Board of Directors

The owner group - one representative from each country's most influential authority - becomes the new board with responsibility for the business's framework including strategies, budget, finances etc, and which decision-making rights of course also includes the research projects.

Evaluation panel

Today's board becomes the evaluation panel regarding the research projects and proposes the upcoming research plan to the board. The owner representatives that belongs to the new board do not participate, but are replaced by other owner representatives. There are uncertainties about the number of participants, which actors should be represented and the number of evaluators per country. Here, a discussion and clarification are needed.

Coordination Group

The coordination group, consisting of PCs, secretariat and chairman, continues their coordinating work as today, for continued efficiency and progress in the business.

Secretariat

We appreciate that there is a secretariat to, in an efficient way, ensure the logistics around for example meetings and website. We have experience of other working groups where attempts have been made to cut down the administrative function, with the result that the logistics work poorly and meetings are inefficient.

Program Coordinators

We find the function of Program Coordinators (PCs) important and believe that the function is still needed at an approximate half-time per program. Thus PCs are able to read through and quality assure the project results. The fact that the quality assurance takes place at PCs guarantees a consistent quality. Having the same PC for both NKS-R and NKS-B is not feasible given the broad and at the same time deep expertise that a person would then need to possess. It would also make NKS too vulnerable to changes in staffing.

The year’s meeting schedule

January

In January, the board, the coordination group and the evaluation panel meet. The PC:s present the proposal for financing research projects for the coming year, which is based on the input from the evaluation panel, and the board makes decisions. Other topics on the agenda may include strategic

issues that need to be discussed and anchored, uncertainties regarding the evaluation process, etc. The PCs distribute a status report and a report with funding recommendations before the meeting.

June

In June, the Board and the secretariat meets to review the annual report and monitor the economy. Other issues on the agenda might be strategy, budget, overall activities etc as well as a situation update regarding the projects from PCs.

September

In September, the coordination group and maybe the evaluation panel meet before the autumn's calls. The PCs provide and update on ongoing activities. The board receives a written report from the PCs on the progress of the research projects so far.

November

The coordination group meets to prepare for the January board meeting, which includes producing a summary of the input from the evaluation panel and having discussions on preliminary funding recommendations.

Other thoughts

Thoughts that were also aired were the following:

Rules of procedure

Regardless of how the work with the NKS organisation continues, it would be good to develop a procedure document that clarifies the roles of the various actors, and describes the criteria for their participation. Today it is not clear what is the responsibility for NKS for those board members that are not in the owners' group (and are thus not signing any papers). Also, it is not clear which decisions that are made by the board and which decisions are made by the owners' group. If we go for a new structure, we need to discuss for example, which actors are to be represented in the board or in the evaluation panel, and how many from each actor.

Limitations in PC's ordinances

Should there be time limits for PC's appointment? One suggestion is to express more clearly the expectation that a PC should stay for three years, and also - to promote rotation and competence building - say that the position can be held for the longest time for five years. It would also be good to discuss how the PC role could be shifted between the countries on a regular basis. The four countries which do not fill the chairman role, could have a schedule how to shift the PC roles between them. For example, the PC-R could alternate between two of the countries and the PC-B between the other two. Or, there could be a ”waiting list” for each of the roles. For consideration of the length of the PC role, we propose such discussions to be held in the owners' group, or at least not on the board as long as the PCs are part of the meeting.

External quality assurance

Do we want to secure the quality by also inviting representatives from European, relevant universities to the evaluation panel?

Secretariat

For consideration of the NKS secretary, we propose that discussions on reductions of the NKS secretariat be held in the owner group, or at least not on the board as long as the secretary is part of the meeting.

Petri Kinnunen VTT

As a contribution to the request made by Sigurdur, I put here my views on the organization and activities:

- the basic organization of the programmes and projects is good. The PCs are good in their work and make good summaries about what is going on.
- now the future organization of the MB is more balanced when the Ministry in Finland gives their role to STUK. According to my understanding now each country has a representative from the authority, industry and research (right?)

    ➔ I do not see any big changes needed for the organization of the NKS activities.

Then about the activities:

- The seminar is needed every other year. It was also good this time.
- We spend quite a lot time in the MB discussing about the economics of NKS. In my opinion this discussion could be decreased, e.g. from the summer meeting.
- I would like that we discuss more about the impact of the research. As you know in Finland the NKS research is strongly linked to SAFIR and KYT programmes. But we should also get to know how much the NKS benefits from that work or how much the Finnish programmes benefit from the NKS connection. And the same in other countries with their own connections.
- Another topic, that I would like us to discuss, is the future needs for research. E.g. the Halden reactor situation in Norway has recently changed the Norwegian needs (I think). In Finland we talk a lot about SMRs, lot about OL3 (which seems to be starting soon eventually),… I know that this discussion may not be appealing to all Nordic countries because of the way the politics towards nuclear have been set, but if we want to discuss about future aspects for the NKS, I think we cannot reject these topics but to see what they may mean to the NKS.
- Thirdly, very many of us are connected to different European forums and platforms. Related to the previous point, understanding the activities in those other forums, even briefly, might be helpful for us to consider our own future in the NKS. So perhaps worth discussing?

These are my thoughts at the moment. In any case the ultimate goal for the NKS is to keep it active and up-to-date.

Mikael Meisner - Vattenfall:

Some general thoughts on organization and activities which also are in line with previous declared positions from the Swedish industry.

The aim of NKS to facilitate and improve Nordic networking in nuclear and radiation safety areas is in line with the expectations of the four supporting organisations (Ringhals, Forsmark, Orskarshamn and SKB) in Sweden. Additional benefits from participating in the NKS network is learning from from specialists in certain areas, that are mainly to be found outside of Sweden. The Swedish industry do not have any major objections to how the executive part of NKS is organised today and are satisifed with the way the owners are handling the management, and is further fine with following the lead of SSM in these matters.

Further, regarding the organizational structure, having two programs (R&B) and a manager for each provides a critical mass of the executive part of NKS. The setup also has the advantage of redundancy, i.e. if one of the program managers suddenly would have to leave, the risk of being left with a non-functional organisation is smaller. We are supportive of keeping the distribution between the R- and the B-program as it is (50/50).

The present process of Call for proposals to decision to fund is sufficiently applicable as is. However, it might be appropriate to make comparisons/benchmarking with the [yearly]research plans of each national authority, in order to understand in what direction each nation is heading towards. I don‘t know whether this has been the case previous years, but one way of doing this is allowing each authority to make a short summary during the June meeting on present, needed and prioritized research areas taken from each national research plan respectively. The outcome of subsequent discussions during the same meeting could then, if possible, be reflected in the Call for proposals. I guess that such a benchmarking (i.e. having a direct link and coupling between national needs and NKS activities) would also be mutual beneficent for authorities and NKS.

The current model with one-year projects/contracts is fine. Single exceptions might possibly be justified if there is a clear reason to.

If manageable, the current arrangement with a joint NKS-R/B seminar every second year should be continued.

Finally to conclude, we do not see needs for major organizational changes of NKS, but looking forward to continued discussion

Mette Øhlenschlæger SIS:

Brief comments on NKS after 2020 from The Danish Health Authority (DHA) – non-owner and non-funding organization (ikke-tillægsfinansierer)

- NKS is a well-established and important player in Nordic research in the nuclear area.
- In the opinion of the DHA, the basic organization: the secretariat and the PCs - is well functioning. The function of the PCs is important and they are doing a tremendous job.
- DHA supports a continuation of the present arrangement with a permanent secretariat, ensuring a harmonized and consistent handling of the tasks laid out by the Owners Group and the NKS Board.

- DHA recommends careful consideration of the present structure and representation within the two fora: the Owners Group and the NKS Board.
- DHA recommends restructuring the NKS into two fora: The Owners Group and a separate Advisory Board.
- DHA strongly advocates for a decision on the participation and role of non-owners as well as non-funders - like the DHA in the NKS-Board (or an established Advisory Board).
- In the opinion of the DHA, discussions and reports on NKS-economy should be limited to the Owners Group and discussions on research programs, future needs etc. would be the logical task of an Advisory Board.

Pia Vesterbacka - STUK:

Here are some general thoughts mainly on activities of NKS. Since I am new member I do not have experience on organization and its functioning so much yet.

I have found regularly arranged NKS seminars very useful and good way to keep compact co-operation between Nordic countries and share the common knowledge.

I was very happy that radiation safety was added in the policy paper. Now the area of NKS research covers more wide range of issues and I think is more useful for all Nordic countries. I am personally worried about deep know-how about the radiation protection. This is important area and its deep know-how is needed especially in case of emergency preparedness.

In the last meeting one of the college from Sweden raised up criteria's in evaluation process and comparison between various research projects. I think this is important issue to discuss and if NKS evaluation board has clear criteria's it would be good.

We also discuss about the themes. Would it be useful to emphasise themes in different years. This could be useful if NKS wants to point out issues which are key issues in certain years. Shows also agility of NKS.

Since I have not been evolved in NKS work, I was wondering has NKS research been evaluated regularly, like every five years. During evaluation NKS could get knowledge about the impressiveness of the NKS research. Has NKS SRA (strategic research agenda) or has NKS though that it would need such?

I think Finland do not see needs for big changes in NKS organization.

Anne Liv Rudjord - DSA

"*The administrative procedures and management works smoothly. There are no specific comments to the process with the calls for proposals.*

However, researchers have commented that the evaluation of the proposals appear to vary strongly between evaluators, even on relatively objective criteria like for instance the contributions from young scientists.

It is therefore suggested to review the evaluation process and possibly provide guidance to the evaluators on how the various criteria should be evaluated."

Carsten Israelson – DEMA

The input from DEMA falls in three parts:

NKS activities

We agree with most board members that the NKS seminars every 3rd year are a success and that we should continue with this activity, so that we plan for the next seminar in 2022.

We also find it relevant to have a broader discussion of future research subjects and the impact of the research from NKS. VTT has mentioned an interest in Finland for SMR and in Denmark there are several small groups working with molten salt reactors. We see a way to broaden the scoop of NKS by adding a new subject which could be called: “Emerging technologies”. Furthermore, several board members has mentioned “competence building” (or something similar), which is another wording that we could consider to have more focus on in the future.

However, we should be aware not to move to far away from the original focus of NKS, which is safety research, and thereby possibly scaring away the main funders of the program. Looking at national research focus is an idea that we can support but still with the focus of the NKS main scope: Safety research.

In general, DEMA finds it important that NKS strives to obtain as many relevant applications for projects as possible. This years’ relatively small amount of applications is worrisome and we should take steps to ensure more awareness about NKS. Too few applications and hence less competition among the applicants brings a risk of not being able to maintain a high enough scientific standard of NKS projects. A somewhat broader scoop will hopefully bring in more applications and thereby aid to maintain the high level of research. All board members are encouraged to look for new research groups and organization that can submit quality applications for NKS projects.

NKS organization

DEMA agrees with SSM that the roles and division of responsibilities between the owners and the board could be clearer. We support the suggestions by SSM, DSA and DHA with some minor adjustments. A future organization of NKS could look like this:

- The Owner Group (or Board of Directors), one representative from each governmental funding organization, which is DSA, GR, STUK, SSM and DEMA . The Owner Group is responsible for the NKS strategies, budget, finances, contracts with PC’s, chairman and secretariat, etc.

- The Evaluation Panel (DEMA has previously suggested the name, Advisory Group) should evaluate proposals and propose research plans. The Panel should consist of what today is called The Board. Owner Group member should, however, also be allowed to serve in the Evaluation Panel. All members of the Evaluation Panel should be approved by The Owner Group. As DSA, we see no need for new members to this group (from outside the Nordic Countries).

- The Coordination Group. More or less as suggested by SSM.

The meeting schedule for the owners and coordinators can be agreed between the members of these groups. Given the relatively few members, video conferencing is effective for smaller meeting, and helps to keep down travel expenses.

The Evaluation Panel probably only needs to meet at the January meeting, when the project proposals are discussed. However, a seminar on evaluation criteria in September 2019 or 2020 could be relevant.

DEMA is also positive towards the proposal by SSM and DSA about fixed term appointment for chairman and PC's. We find that a reasonable amount of rotation is good for the organization and that it should apply for all positions within The Coordination Group.

Standards and practices for NKS administration

We find it paramount that NKS lives up to the standards for good public governance and transparency that apply to public sector institutions in our various countries. Consequently, NKS must, in our view, put in place practices that enables it to demonstrate that funds are spend correctly (i.e. on nuclear safety research) and efficiently (i.e. avoiding excess costs). In this context, we recently agreed that good public governance is part of NKS policy, and DEMA encourage that we follow up on this within The Owner Group.

Final draft 01.05.2019

Policy for Nordic Nuclear Safety Research (NKS)

This is NKS

NKS is a Nordic forum for research, competence building, experience exchange and networking in nuclear and radiation safety with focus on reactor safety, including decommissioning, and emergency preparedness. This is achieved by joint activities of interest to the financing organisations and other end users resulting in scientific articles and technical reports. The results are used by the participating organisations in their competence building, decision making processes and information activities. All NKS results are available free of charge not only for the NKS family but also internationally providing an international benefit of NKS work.

Within NKS, valuable networks are built: between younger and more senior researchers; between industry, universities and authorities; between neighbouring countries. Important links are also created between those who need to cooperate in case of a nuclear accident, within the NKS countries or elsewhere in the world. As NKS makes people connect, problems are tackled quicker, more efficiently, more consistently, and at a lower cost than if acting alone – with benefits for both humans and the environment.

NKS is committed to good public governance, including transparency, efficiency, and sound financial planning. Decisions concerning strategic aspects of NKS economy are made by the owners, while a board consisting of owners and co-financiers make decisions on e.g. projects eligible for funding.

The purpose of NKS

The purpose of NKS is to facilitate a common Nordic view on nuclear and radiation safety and at the same time creating networks that are easily activated, e.g. in the case of a nuclear accident. The co-operation builds on the foundation of a common cultural and historical heritage and a long tradition of collaboration between the five Nordic countries: Denmark (also the Faroe Islands and Greenland), Finland, Iceland, Norway and Sweden.

The challenges addressed by NKS

The Nordic countries face common challenges in relation to Nordic nuclear installations as well as those in neighbouring countries. While nuclear power plants are in operation in Finland and Sweden, research reactors are in operation or have been operated in Denmark, Finland, Norway and Sweden. In Finland new reactors are being built, whereas for Sweden, Denmark and Norway decommissioning of research reactors and of the oldest nuclear power plants is on the agenda.

By exchanging experiences, a common understanding of rules, practice and measures, and how they might differ between the neighbouring countries, can be achieved. By building competence together, each country benefits and has the opportunity of financing both more and bigger research projects since co-operation creates synergy and new approaches.

Nuclear accidents have highlighted the need for effective emergency preparedness. By continuously improving detection, response and decision aiding tools while maintaining an informal collaborative network between relevant stakeholders in the Nordic countries, the capacity and capability to respond optimally to an emergency is enhanced. Experience has shown that nuclear challenges to society are far from static, and the response systems require continuous development.

The activities of NKS

NKS activities are divided into two program areas:

NKS-R: The NKS-R program is focusing on the area of reactor safety throughout the lifecycle of a nuclear installation. The program covers the topics thermal hydraulics, severe accidents, reactor physics, risk analysis and probabilistic methods, organisational issues and safety culture, and plant life management and extension. Decommissioning of nuclear power plants and other nuclear installations/facilities and management of nuclear waste and spent fuel is also included in the NKS-R program, whereas measurements related to these topics are covered by the NKS-B program. Activities within NKS-R typically involve experimental and computational studies of phenomena related to reactor safety, model development for risk and uncertainty assessments, analysis of human and organisational factors, or development of new methods for surveillance and enhancement of safety in daily and long-term reactor operation or within decommissioning and waste management.

NKS-B: The NKS-B program is focusing on nuclear and radiological emergency preparedness, radioecology and environmental assessments and measurement strategies, technologies and quality assurance. The key area of interest in the context of emergency preparedness is the impact on society (humans and the environment). Radio ecological studies provide information on the fate, transport and effects of radionuclides and other influencing contaminants in the environment. Measurements are an integral part of both emergency management and radioecology, and also needed to secure compliance with standards and regulations concerning radioactive material, for example in decommissioning and reactor waste management. All such measurement issues are included in the NKS-B program as are measurement projects related to lost sources.

Owners and Financiers of NKS

The owners and main financiers are:

Danish Emergency Management Agency (DEMA, Denmark)
The Ministry of Economic Affairs and Employment (TEM, Finland)
Icelandic Radiation Safety Authority (GR, Iceland)
Norwegian Radiation and Nuclear Safety Authority (DSA, Norway)Swedish Radiation Safety Authority (SSM, Sweden)

The co-financiers are:

Fennovoima Oy (Finland)
Fortum Power and Heat Ltd. (Finland)
TVO (Finland)
Institute for Energy Technology (IFE, Norway)
Forsmark Kraftgrupp AB (Sweden)
OKG AB (Sweden)
Ringhals AB (Sweden)
SKB (Sweden)

NKS-R Status

May 2019

Christian Linde
NKS-R Programme Manager

NKS Board meeting
Copenhagen, 4 June 2019

Summary

Overall the work in NKS-R is progressing according to plan

- Status for the activities from CfP 2019:
  - Contracts signed for all 6 activities (one contract from KTH for THEOS not signed yet)
  - No major delays reported
  - Fortum & TVO support agreements submitted on 25 April
- Status for the activities from CfP 2018:
  - 4 out of 6 activities from 2018 completed and reports published on website
  - 1 draft report received (FIREBAN)
  - 1 activity to be completed (SPARC)
- Status for the activities from CfP 2017:
  - 1 draft report received (FIREBAN)
  - 1 activity to be completed (WRANC)

Funded activities from CfP 2019

	Acronym	Full name	Research area
Cont.	BREDA-RPV	*Barsebäck RPV trepan studies*	Plant life management and extension
	SPARC	*Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics*	Severe accidents
New	COCOS	*Corrosion of copper in sulphide containing environment: the role and properties of sulphide films*	Decommissioning[a]
	PROSAFE	*Prolonged time windows and safe states*	Risk analysis & probabilistic methods
	TETRA	*Tellurium transport in the primary circuit of nuclear power plant*	Severe accidents
	THEOS	*Thermal Hydraulics of the Suppression Pool*	Thermal hydraulics

a) 'Decommissioning and management of reactor waste and spent fuel'

Status for activities from CfP 2019

Nordic nuclear safety research

Table 5. NKS-R 2019 activities

Activity	Title	Lead	Partners	Funding [kDKK]	Total [kDKK]
BREDA-RPV	*Barsebäck RPV trepan studies*	KTH	KTH	47	471
			VTT	212	
			CTH	212	
COCOS	*Corrosion of copper in sulphide containing environment: the role and properties of sulphide films*	VTT	VTT	318	565
			KTH	247	
PROSAFE	*Prolonged time windows and safe states*	Risk Pilot	Risk Pilot	117,75	471
			LRC	117,75	
			VTT	117,75	
			IFE	117,75	
SPARC	*Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics*	KTH	KTH	297	565
			VTT	268	
TETRA	*Tellurium transport in the primary circuit of nuclear power plant*	CTH	CTH	175	525
			VTT	245	
			UIO	105	
THEOS	*Thermal Hydraulics of the Suppression Pool*	KTH	KTH	189	565
			LUT	188	
			VTT	188	

All partners accepted the funding reduction of ca 6 %.

Contract from KTH for THEOS has not arrived yet.

New NKS-R reports published on website

NORDEC

- NKS-417: *Challenges and opportunities for improving Nordic nuclear decommissioning* (Feb 2019)

BREDA-RPV

- NKS-418: *Barsebäck as a Research and Development Platform, Extraction and Analysis of Service-aged and Irradiated Reactor Pressure Vessel Material* (Feb 2019)

SITRON

- NKS-419: *Site risk analysis for nuclear installations* (Feb 2019)

SYNTAGMA

- NKS-424: *Synthetic ground motions to support the Fennoscandian GMPEs* (Apr 2019)

Status for delayed activities from CfP 2017 and 2018

Nordic nuclear safety research

SPARC 2018
– Final report for 2018 ”will be submitted in June 2019” (11 Feb)

FIREBAN 2017 and FIREBAN 2018
– One combined final report for 2017 and 2018 was received on May 6.
Final editing is ongoing.

WRANC 2017
– Experimental work completed. Final report ”done in May/June” (2 May).

Planned seminars/conferences/publications

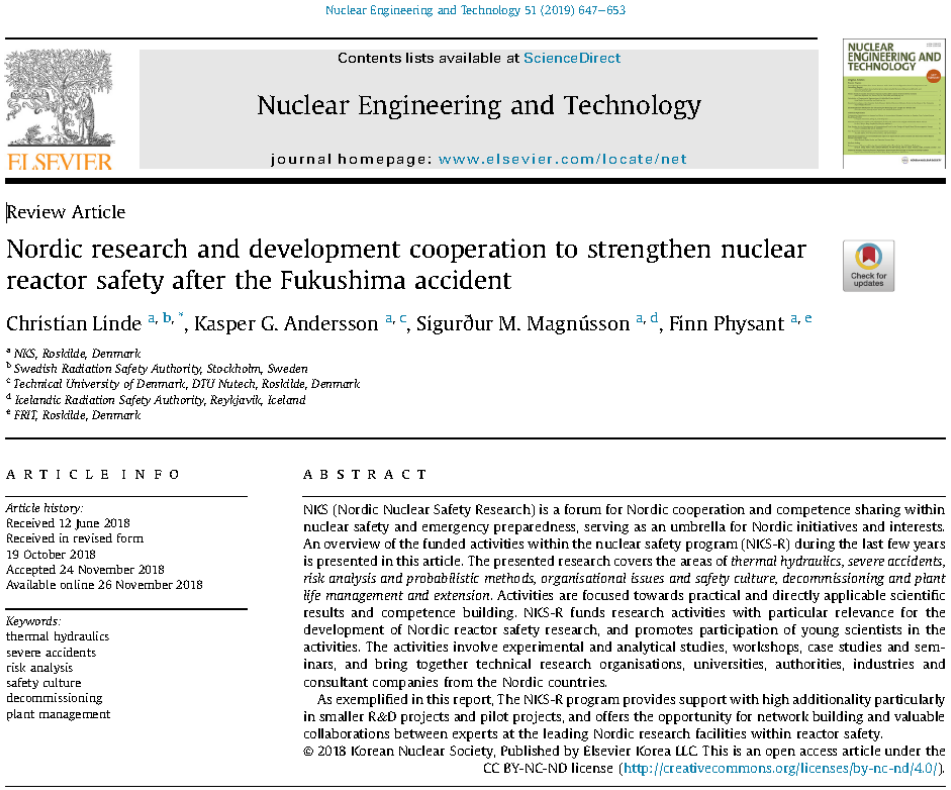
- PROSAFE:
  - Interim workshop in December 2019

Travel assistance for young scientists

No requests have been received in 2019 so far.

NKS-R article

The NKS-R article is now published in the June issue of *Nuclear Engineering and Technology* (Volume 51, Issue 3, pp. 647-653, https://doi.org/10.1016/j.net.2018.11.013 .



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Review Article

Nordic research and development cooperation to strengthen nuclear reactor safety after the Fukushima accident

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ABSTRACT

NKS (Nordic Nuclear Safety Research) is a forum for Nordic cooperation and competence sharing within nuclear safety and emergency preparedness, serving as an umbrella for Nordic initiatives and interests. An overview of the funded activities within the nuclear safety program (NKS-R) during the last few years is presented in this article. The presented research covers the areas of *thermal hydraulics, severe accidents, risk analysis and probabilistic methods, organisational issues and safety culture, decommissioning and plant life management and extension*. Activities are focused towards practical and directly applicable scientific results and competence building. NKS-R funds research activities with particular relevance for the development of Nordic reactor safety research, and promotes participation of young scientists in the activities. The activities involve experimental and analytical studies, workshops, case studies and seminars, and bring together technical research organisations, universities, authorities, industries and consultant companies from the Nordic countries.

As exemplified in this report, The NKS-R program provides support with high additionality particularly in smaller R&D projects and pilot projects, and offers the opportunity for network building and valuable collaborations between experts at the leading Nordic research facilities within reactor safety.

NKS-R STATUS REPORT

Christian Linde
NKS-R Programme Manager
May 2019

Table of contents

Abbreviations

AAU	Aalto University	Fi
CT	Clay Technology AB	Sw
CTH	Chalmers University of Technology	Sw
DSA	Norwegian Radiation and Nuclear Safety Authority	No
DBI	Danish Institute of Fire and Security Technology	Dk
DTU	Technical University of Denmark, Risö	Dk
FCR	Firma Carl Rollenhagen	Sw
FKA	Forsmarks Kraftgrupp AB	Sw
GEUS	Geological Survey of Denmark and Greenland	Dk
IFE	Institutt for Energiteknikk, OECD Halden	No
LC	Lilikoi Consulting (Teemu Reiman)	Fi
LRC	Lloyds Register Consulting	Sw
LU	Lund University	Sw
LUT	Lappeenranta University of Technology	Fi
NRPA	Norwegian Radiation Protection Authority	No
NTNU	Norwegian University of Science and Technology	No
PWC	PricewaterhouseCoopers	No/Sw
RAB	Ringhals AB	Sw
SAFIR	The Finnish Research Programme on Nuclear Power Plant Safety	Fi
SEI	University of Helsinki, Institute of Seismology	Fi
SINTEF	Stiftelsen for industriell og teknisk forskning	No
SIS	Danish Health Authority, Denmark	Dk
SSM	Swedish Radiation Safety Authority	Sw
STUK	Finnish Radiation and Nuclear Safety Authority	Fi
UIO	University of Oslo	No
UU	Uppsala University	Sw
VTT	VTT Technical Research Center of Finland	Fi
VYR	State Nuclear Waste Management Fund	Fi
ÅFC	ÅF-Consult	Sw

1 Overall status summary

This report provides a short overview of the status of the NKS-R programme.

Four of the six activities from the Call for Proposals in 2018 (CfP 2018) are completed and the NKS reports have been published. A preliminary report has been received from FIREBAN, which covers the activities in 2017 and 2018. WRANC, which was initiated in 2017, is expected to deliver a final report in June 2019. The status of these activities are presented in Chaper 2 together with summaries of the finalized activities.

All six activities from CfP 2019 are ongoing. All contracts except one has been signed. The contract for THEOS from KTH is expected in June 2019. Summaries and status reports for the 2019 activities are found in Chapter 3.

1.1 Published NKS-R reports

The reports listed in Table 1 have been published within the NKS reports series since the last board meeting in January 2019. All four reports cover work from activities that were initiated in 2018.

Table 1. Published NKS-R reports in 2018.

Report nr	Activity	Report title	Published
NKS-417	NORDEC	*Challenges and opportunities for improving Nordic nuclear decommissioning*	6 Feb -19
NKS-418	BREDA-RPV	*Barsebäck as a Research and Development Platform, Extraction and Analysis of Service-aged and Irradiated Reactor Pressure Vessel Material*	6 Feb -19
NKS-419	SITRON	*Phenomena Threatening Containment Integrity and Evaluating Source Term Characteristics*	13 Feb -19
NKS-424	SYNTAGMA	*Synthetic ground motions to support the Fennoscandian GMPEs*	11 Apr -19

1.2 Seminars

One of the ongoing activities from CfP2019 contain seminar arrangements, see Table 2.

Table 2. Upcoming seminars

Project	Seminar title
PROSAFE	*Interim workshop* – December 2019

1.3 Young scientist travel support

No requests for travel support have been received until May 2019.

2 Summary and status of activities initiated in 2018 and earlier

Six activities were initiated in 2018, see Table 3. Four activities are completed and the NKS reports have been published. Two activities are expected to deliver reports in June 2019. Two activities initiated in 2017 remain to be completed, see Table 4. Status summaries of the activities are presented in the sections below.

Table 3. NKS-R 2018 activities

Acronym	Activity title	Report number	Status
BREDA-RPV	*Containment Pressure Suppression Systems Analysis for Boiling Water Reactors*	NKS-418	Done
FIREBAN[a]	*Determination of fire barriers's reliability for fire risk assessment in NPP*		Prel. report received
NORDEC	*Challenges and opportunities for improving Nordic nuclear decommissioning*	NKS-417	Done
SITRON	*Development of hybrid neutron transport methods and data visualization tools*	NKS-419	Done
SPARC	*Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics*		Expected June 2019
SYNTAGMA	*Synthetic ground motions to support the Fennoscandian GMPEs*	NKS-424	Done

a) One combined final draft report for 2017 and 2018 was delivered on May 6. See Section 2.2 for status details.

Table 4. NKS-R 2017 remaining activities

Acronym	Activity title	Report number	Status
FIREBAN	*Determination of fire barriers's reliability for fire risk assessment in NPP*		See Table 3
WRANC	*Warm Pre-Stressing – Validation of the relevance of the main mechanisms behind Warm Pre-Stressing in assessment of nuclear components*		Expected June 2019

2.1 BREDA-RPV

Barsebäck RPV trepan studies

Summary: As part of the NKS-R program, VTT, Chalmers and KTH are collaborating within a program regarding the effect of irradiation on reactor pressure vessel materials, BREDA-RPV. Irradiation induced ageing of the weld material of the reactor pressure vessel (RPV) is a limiting factor from a long-term operation perspective. The closed Barsebäck 2 reactor gives an opportunity to harvest samples from the RPV, which was manufactured and welded with the same technique and high amounts of nickel and manganese as most Nordic RPVs.

Research Area: Plant Life Management and Extension
Activity leader: Pål Efsing, KTH
Funded organizations: KTH, VTT, CTH
Funding: 500 kDKK

2.1.1 Final report NKS-418

Report Title: *Barsebäck as a Research and Development Platform, Extraction and Analysis of Service-aged and Irradiated Reactor Pressure Vessel Material*
Authors: Pål Efsing, Magnus Boåsen, Ulla Ehrnstén, Sebastian Lindqvist, Mattias Thuvander, Kristina Lindgren, Jenny Roudén

Abstract: As part of the NKS-R program, VTT, Chalmers University of Technology and KTH has performed a baseline study to analyze the as-aged material properties of the retired reactor pressure vessel, RPV, from Barsebäck unit 2. The current phase included the actual extraction of samples from the RPV of Barsebäck 2, formulation of a preliminary test matrix and continued work to set the scope for future R&D activities related to fracture mechanical testing and microstructural evaluation of aged low alloy steel typical of the operating nuclear power plants in the Nordic countries. Due to the nature of the work, the NKS-project is connected to a number of adjacent activities, including support from the Finnish Nuclear Safety Program, the SAFIR-program, the Swedish Radiation Safety Authority SSM and Swedish Centre for Nuclear Technology, SKC and Energiforsk. In 2018, base-line microstructural work was finalized of using Light Optical, Scanning Electron and Transmission Electron methodologies to complement the previous high resolution Atom Probe Tomography work. Further the preparation of the mechanical testing of the retrieved samples have proceeded. A literature review of constraint effects on fracture mechanical testing and a suggested preliminary test matrix has also been presented. Kristina Lindgren, Chalmers University of Technology successfully defended her Ph.D. thesis performed with-in the scope of the project in December 2018.

Keywords: Low alloy steel, irradiation effects, fracture toughness, ductile to brittle transition temperature, constraint effects, high resolution microscopy, microstructural characterization
Publication date: 6 Feb 2019
ISBN 978-87-7893-507-6

2.2 FIREBAN

Determination of fire barriers' reliability for fire risk assessment in NPP

Summary: The scope of the project is to investigate and assess the reliability of fire barriers in NPP during realistic fire scenarios to support the plant-scale risk assessment.The objective is to establish data and methods to determine the conditional probabilities for failure of fire barrier. The methods used are statistics, literature review, calculation and specific unique designed fire tests.

The scientific merit of the activity is the establishment of a link between exisiting data on fire barriers and and probablistic fire design in NPP. The technical merit of the project is the possibility to allow users to better determine the overall probability of loss of compartmentation between redundant systems in case of different fire scenarios. This is an important risk analysis for nuclear power plants, as it has been shown that the loss of compartmentation has severe consequences for a safe reactor shut down process.

Research Area: Risk Analysis & Probabilistic Methods
Activity leader: Patrick van Hees, Lund University
Funded organizations: LU, VTT, AAU, DBI, RAB
Funding: 450 kDKK (2018) and 393 kDKK (2017)

2.2.1 Status update

A draft report received on May 6 has been reviewed and is now undergoing final editing by the authors.

Report Title: *Determination of Fire Barriers reliability for fire risk assessment of Nuclear Power Plants (FIREBAN) – Final Report*
Authors: Patrick van Hees, Simo Hostikka, Topi Sikanen, Dan Lauridsen, Sebastian Levin

Abstract: Fires in nuclear power plants can be an important hazard for the overall safety of the facility. An important factor in reducing the spread of the fire is the use of fire barriers. However, it is important to be able to quantify the uncertainty of the result of the fire resistance of a fire barrier for fire risk assessment of nuclear power plants. The final report summarises the activities of the project at the different partners which means reliability of fire barriers by calculation tools, determination of uncertainty and sensitivity of input parameters with modelling of fire resistance of fire barriers.

Keywords: Fire, nuclear power plants, fire barriers, modelling, uncertainty

2.3 NORDEC

Challenges and opportunities for improving Nordic nuclear decommissioning

Summary: In this project a study is conducted on how decommissioning is regulated, planned and performed in the Nordic countries, identify where the main challenges lie, collect best practices and share experiences between the Nordic participants. The contributions for this project comes from regulators, operators and contractors, thus having a wide span of stakeholder involvement. The Norwegian Radiation Protection Authority (NRPA), Swedish Radiation Safety Authority (SSM), Danish Health Authority (SIS), Finnish Radiation and Nuclear Safety Authority (STUK), the energy companies Fortum and Vattenfall, the consulting firm ÅF of Sweden, VTT Technical Research Center of Finland, and Institute For Energy Technology (IFE) in Norway are participating in the project. The project involves collecting experiences from completed and ongoing decommissioning-related activities in Sweden, Finland, Denmark and Norway. The experiences' evaluation aims to identify possible improvements in processes, methods and tools. The project is fostering collaboration among Nordic stakeholders through sharing of challenges and best practices.

Research Area: Decommissioning
Activity leader: István Szőke, Institute for Energy Technology
Funded organizations: IFE, NRPA, SSM, STUK, SIS, VTT, Vattenfall AB, Fortum, ÅF
Funding: 524 kDKK
Status: Complete

2.3.1 Final report NKS-417

Report Title: *Challenges and opportunities for improving Nordic nuclear decommissioning*
Authors: István Szőke, Réka Szőke, Grete Rindahl, Joachim Bratteli

Abstract: The overall goal of the NorDec project has been to explore challenges related to how decommissioning regulation is applied, and how projects are planned and performed in the Nordic countries, as well as collect best practices and share experiences between the Nordic stakeholders and the international community of experts. The contributions for this project came from a wide range of international stakeholders, including regulators, operators and contractors, and via the use of questionnaires, interviews, workshop presentations (including questions and answers during and/or after the presentations), and break-out group discussions. This second phase of the project mainly focused on organization of a large scale workshop with the project participants and international experts to discuss the outcomes of the first (2017) phase of this project as well as challenges, innovation opportunities and experience in general related to nuclear decommissioning. The workshop has been co-organized with the International Atomic Energy Agency (IAEA), the Nuclear Energy Agency (NAE) and the Electric Power Research Institute (EPRI). In addition, the workshop has also been supported by the Norwegian Research Council. This report combines all the outcome material from the workshop. Additional material and information is available at www.ife.no/digidecom2018.

Keywords: Decommissioning, research needs, digitisation, Nordic cooperation
Publication date: 6 Feb 2019
ISBN 978-87-7893-506-9

2.4 SITRON

SITe Risk Of Nuclear installations

Summary: The importance of multi-unit Probabilistic Safety Assessment (PSA) has increased after the Fukushima Daiichi accident in March 2011. The major part of nuclear power sites house more than one nuclear power plant unit (NPP) and other nuclear facilities such as a spent fuel pool storage. Currently, multi-unit risks have not been accounted for adequately in risk assessments, but the multi-unit PSA is intensively discussed internationally.

The objective of the project is to search feasible approaches to assess the site level risk. This objective concerns with safety goals, risk criteria and PSA applications for a multi-unit site. Multi-unit risk assessment is not only limited to reactors but also other relevant sources for radioactive release such as spent fuel pools and storages. The second objective with the project is to develop methods to assess the risk for multi-unit scenarios. This objective concerns with analysis methods to consider the dependencies between the units. Pilot studies will be carried out to test and to demonstrate the proposed approach. The third objective is to develop applications for site risk analysis. In this respect, SITRON will study the role of Technical Support Centre (TSC) in multi-unit scenarios. The project will also follow the international development in this field.

Research Area: Risk Analysis & Probabilistic Methods
Activity leader: Jan-Erik Holmberg, Risk Pilot Finland
Funded organizations: Risk Pilot (Fi), LRC, VTT, IFE
Funding: 600 kDKK

2.4.1 Final report NKS-419

Report Title: *Site risk analysis for nuclear installations*
Authors: Jan-Erik Holmberg, Stefan Authén, Kim Björkman, Ola Bäckström, Xuhong He, Salvatore Massaiu, Tero Tyrväinen

Abstract: Currently, multi-unit risks have not typically been adequately accounted for in risk assessments, since the licensing is based on unit-specific probabilistic safety assessment (PSA) with focus on a reactor accident. NKS-R project SITRON (SITe Risk Of Nuclear installations) has searched for practical approaches for Nordic utilities to assess the site level risk. Starting point of SITRON work has been the fact that the Nordic utilities already have good unit-specific PSAs. Therefore, the question is what additional efforts are needed to obtain a site level risk assessment. Practically, it means two tasks: 1) to identify relevant inter-unit dependences, and 2) to quantify the site level risk. Inter-unit dependences consist of multi-unit initiating events, shared systems, structures and components, dependences in human actions, inter-unit common cause failures, and plant operating state combinations. SITRON provides guidance how to perform the identification of dependences and how to select relevant dependences for quantification (screening). Quantification of site risk can be performed quite straightforwardly, given that the quality of the single-unit PSAs is sufficient. SITRON project has also included a survey on the role of Emergency Response Organisation (ERO), often referred to as the Technical Support Centre (TSC) in accident management. Based on responses from four plants in Finland and Sweden, SITRON has investigated different implementations of EROs with respect to possible impact on operational decisions in severe accident and multi-unit scenarios. The human role in severe accidents differs markedly: new decision makers (ERO and TSC rather than main control room); different instructions (guidelines rather than procedures); different decisions (involving trade-offs, novel

actions, and strategies contrary to conventional knowledge); inter-unit influences; unreliability of instrumentation; and long time windows for actions.

Keywords: Probabilistic safety assessment, nuclear power plant, site risk, multi-unit risk, technical support centre
Publication date: 13 Feb 2019
ISBN 978-87-7893-508-3

2.5 SPARC

Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics

Summary: This project is intended to produce data and to develop approaches for addressing severe accident scenarios and phenomena which are important to assess risk of containment failure and radioactivity release in a postulated severe accident of Nordic nuclear power plants.

KTH, VTT and LRC have been active in addressing phenomenological and scenario uncertainties in severe accidents in the framework of national programs such as APRI-MSWI, SAFIR, NPSAG, NKS-DECOSE and NKS-DPSA, European FP7 and Horizon2020 projects SARNET, SAFEST, CESAM, IVMR and in direct collaboration with nuclear power utilities and regulators.

Activity leader: Weimin Ma, KTH
Funded organizations: KTH, VTT, LRC
Funding: 600 kDKK

2.5.1 Status update

In summary, the planned work scope of SPARC 2018 has been fulfilled, with involvement and contributions of many researchers at KTH, VTT and LRC, including young students and engineers. ***The final report will be delivered in June 2019****.*

2.6 SYNTAGMA

Synthetic ground motions to support the Fennoscandian GMPEs

Summary: In recent years earthquake source modelling methods have been developed, partly in NKS projects, to substantiate the expected earthquake ground motion in the ranges where empirical observations are not available in Fennoscandia. These ranges are, at the higher end of observed magnitudes and higher (Mw>4.0) and at distances closer than those available from instrumental recordings (0<d<40km). These ranges are very important contributor to the hazard, with de-aggregation showing well above 50% of the seismic hazard contribution from this interval.

The benchmark model results obtained in the NKS project AddGROUND highlighted shortcomings of the currently used Fennoscandian ground motion models (GMPEs) in probabilistic seismic hazard assessment (PSHA), and triggered the need to update these GMPEs. The update is proposed to be carried out in the Finnish Research Programme on Nuclear Power Plant Safety (SAFIR 2018). As a complementary activity to the GMPE update in the SAFIR program, we propose that in the NKS framework we use the previously developed modelling method (Fülöp et al, 2017) to generate larger data set of synthetic ground motions. This is the logical extension of the earlier work, resulting in a practically usable synthetic data set. The two proposed studies reinforce each other – the analysis of measurement data in the SAFIR project is extended by the synthetic data generated

in the NKS project, which in turn is validated by the measurements. In addition to the technical outcome, this project also aims to establish and maintain a network of experts focused on diffuse seismicity areas of the Nordic Countries and further enhance the cooperation between VTT and Uppsala University in the area of earthquake source modelling. The project outcomes will support STUK and SSM, providing background information for the safety assessments of nuclear plants. The activity proposed here would be paired with the EVOGY project in SAFIR 2018 and be supervised from within that Ad-Hoc group, with participation from STUK, SSM, TVO, FORTUM and FENNOVOIMA.

Research Area: Risk Analysis & Probabilistic Methods
Activity leader: Ludovic Fülöp, VTT
Funded organizations: VTT, GEUS, UU, CTH
Funding: 600 kDKK

2.6.1 Final report NKS-424

Report Title: *Synthetic ground motions to support the Fennoscandian GMPEs*
Authors: Ludovic Fülöp, Vilho Jussila, Billy Fälth, Peter Voss, Björn Lund

Abstract: The relevance of near-field earthquakes to the safety of nuclear power plants (NPPs) in Fennoscandia is very high. De-aggregation from probabilistic seismic hazard assessment (PSHA) studies indicates that the prevailing source of hazard from ground accelerations of engineering interest is from mid-magnitude earthquakes at less than 50 km distance from the NPPs. Unfortunately, there are very few recordings of Fennoscandian earthquakes in the range of distances of this highest interest. We have developed a method to generate synthetic ground motions by physics-based modeling. Since the ground motion prediction (GMPE) is an essential part of PSHA computation we verify the simulation results with the G-16 GMPE (Graizer) developed for hard rock sites. The agreement between G-16 and our results is good at distances up to 30 km.

Keywords: Earthquake modeling, synthetic ground motions, probabilistic hazard assesment
Publication date: 11 Apr 2019
ISBN 978-87-7893-514-4

2.7 WRANC

Warm Pre-Stressing – Validation of the relevance of the main mechanisms behind Warm Pre-Stressing in assessment of nuclear components

Summary: The embrittlement of the RPV due to extended operation can lead to difficulties in demonstrating safe operation beyond 40 years when using traditional assessment methods. Therefore, utilizing the beneficial WPS (Warm Pre-Stressing) effect in assessments is an important possibility for demonstrating continued safe operation beyond 40 years of the RPV.

The WPS effect is the increase of the apparent brittle fracture toughness for a ferritic component when pre-loaded at a temperature in the ductile upper shelf region and then cooled to the brittle lower shelf region of the material fracture toughness transition curve. The WPS effect can be attributed to four main mechanisms. These mechanisms have different impact, depending on the pre-load level and load path. All the mechanisms are related to plastic straining at pre-load.

Research Area: Plant Life Management and Extension
Activity leader: Tobias Bolinder, Kiwa-Inspecta
Funded organizations: Kiwa-Inspecta, KTH, SINTEF
Funding: 393 kDKK (2017)

2.7.1 Status update

Final measurements at SINTEF have been completed. Writing of final report is ongoing, waiting for the contribution from SINTEF. ***Estimated delivery in May/June****.*

Completed tasks:

- *Design of experimental program*
- *Acquired material for testing (RPV steel 18MnD5) from EDF France.*
- *Numerical modelling*
- *Numerical investigation (Master thesis)*
- *Manufactured test specimens for experimental program*
- *All tests in the experimental program*
- *Analyse the results from the experimental program*
- *Results from the experimental program have been presented at Kärnteknikdagarna 2017 in Stockholm*
- *The specimens selected for fractographical examination have been examined by SINTEF*
- *Analyse of the results completed from the fractographical examination*

A master thesis has been conducted within the project. The master thesis focused on two of the mechanisms in the warm pre-stressing phenomenon. By the use of a probabilisticmodel for evaluating cleavage fracture the two mechanisms have been evaluated and compared.

Remaining tasks:

- *Write final report (awaiting the contribution from SINTEF)*

3 Summary and status of activities initiated in 2019

An overview of the 2019 NKS-R activities is presented below in Table 5. Six activities were approved funding in CfP 2018. All contracts were signed before the end of March. All activities except NORDEC were approved the requested amount of funding.

A request for status updates of ongoing activities were sent to the Activity Leaders on November 2. The updates are included in the activity summaries below. Overall, the work in NKS-R is progressing according to plan. No delays are reported for the 2018 activities.

Table 5. NKS-R 2019 activities

Activity	Title	Lead	Partners	Funding [kDKK]	Total [kDKK]
BREDA-RPV	*Barsebäck RPV trepan studies*	KTH	KTH	47	471
			VTT	212	
			CTH	212	
COCOS	*Corrosion of copper in sulphide containing environment: the role and properties of sulphide films*	VTT	VTT	318	565
			KTH	247	
PROSAFE	*Prolonged time windows and safe states*	Risk Pilot	Risk Pilot	117,75	471
			LRC	117,75	
			VTT	117,75	
			IFE	117,75	
SPARC	*Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics*	KTH	KTH	297	565
			VTT	268	
TETRA	*Tellurium transport in the primary circuit of nuclear power plant*	CTH	CTH	175	525
			VTT	245	
			UIO	105	
THEOS	*Thermal Hydraulics of the Suppression Pool*	KTH	KTH	189	565
			LUT	188	
			VTT	188	

3.1 BREDA-RPV

Barsebäck RPV trepan studies

Summary: As part of the NKS-R program, VTT, Chalmers and KTH are collaborating within a program regarding the effect of irradiation on reactor pressure vessel materials, BREDA-RPV. The program is part of a larger project involving the Swedish and Finnish Utility companies, Fortum, Uniper/OKG, TVO, Ringhals and Forsmark, and the regulatory bodies of Sweden and Finland, direct and indirect. The aim of the study is to lay a foundation for safe long-term operation of the Nordic power plants by understanding the combined effect of irradiation and long-term thermal ageing on the mechanical properties of the materials used in the pressure vessel, specifically the specific weld metal used in all RPVs manufactured by Uddcomb in Sweden. A further goal is to study the effect of constraint (stress tri-axiality) on the fracture toughness properties of aged components to enhance the knowledge on structural integrity assessment of the reactor pressure vessel RPVs.

The means of performing the work is to combine high resolution microstructural characterization (VTT and Chalmers) and mechanical testing (VTT and KTH) to understand the evolution and compare material that has been aged/irradiated in both surveillance type environment, and the actual pressure vessel.

During 2019, further microscopy work will be performed to map the microstructure of the reactor vessel material as well as the samples retrieved from the surveillance program of Barsebäck 2. This work will be performed at VTT and CTH encompassing methods from Light Optical Microscopy, LOM, to high resolution nanoscopic analysis with Atom Probe Tomography, APT. Mechanical testing of small sized speciemens will commence at VTT of the material retrieved from the accelerated surveillance capsule. In addition to this, development of the test methods applied in BREDA will contiue at VTT.

The trepan cut-outs will be transported to VTT for further machining in order to prepare samples for mechanical and microstructural testing. Finite Element models allowing for parametrical studies of samples and test methods to support the mechanical testing will continue at KTH. Testing of material with the objective to study the influence of constraint of the aged material will start during the next program year.

Research Area: Plant Life Management and Extension
Activity leader: Pål Efsing, KTH
Funded organizations: KTH, VTT, CTH
Funding: 471 kDKK

Milestones

Tasks, milestones and deliverables	Date
APT characterization of material from the Barsebäck 2 RPV	2019-11-30
Factor affecting the comparison of fracture toughness of the surveillance material and actual RPV.	2019-12-31
Influence of thermal ageing on constraint effects on fracture mechanical testing.	2019-12-31

Status update

Work is progressing according to plan (May 21)

The material that was harvested from the RPV of Barsebäck 2 (B2) was transported from the Barsebäck site to Ringhals in early fall 2018. The stainless steel cladding was thereafter removed in an effort to minimize the radiation from the samples during the continued handling. The work package "Harvesting and transport", headed by Ringhals in the parallel project under the Energiforsk-platform also include the actual transport from Ringhals to VTT for the mechanical testing. The first such transport of material harvested from the RPV head took place in the beginning of 2019. Thus the thermally aged trepans are available at VTT for testing. The irradiated samples are foreseen to be shipped in the fall of 2019, given that acceptance can be achieved from SSM and STUK. One main reason for the separation in time is that there are restrictions on the length of time that the samples can reside in Finland before the irradiated samples need to be shipped back. The harvesting of the trepans and some of the high level planning ideas will be presented at the up-coming workshop on Irradiation Damage Mechanisms in Nagoya, Japan in the middle of May 2019.

Sample from the Barsebäck RPV and RPV head has been sent to Chalmers and sample preparation has started but is not finished. These preparations will allow for the final step of the high resolution characterization to be performed by Chalmers during the coming year.

Preparatory work to validate the methodology for the future handling of the activated material has been executed at VTT. In this context, the RPV head is a good test due to their limited contamination. A pre-test of drop-weight tests have been performed but not reported.

The first deliverable of 2019 regarding a novel methodology to produce short pre-cracks in 3-point bend specimens, produced by KTH, has been finalized but not yet transmitted to NKS for approval.

A licentiate thesis has been published by KTH:
Magnus Boåsen "Modeling framework for ageing of alloy steel", KTH 2019, ISBN: 978-91-7873-118-3.

3.2 COCOS

Corrosion of copper in sulphide containing environment: the role and properties of sulphide films

Summary: Safety of radioactive waste management is a major driving force of the project. Decommissioning and disposal of spent fuel and the long-term integrity of the barrier system are the most critical safety risks related to nuclear energy. Among Nordic countries, Finland and Sweden have disposal facilities for nuclear waste, with the planned start of the disposal in 2020's. The date may be further delayed due to uncertainties.

Indeed, more research is still needed to verify the system. In both countries, the waste disposal concept (called KBS-3) is the same: the spent nuclear fuel is first sited in a cast iron container, which is then sealed in a copper canister. The copper canisters are placed in holes drilled into deep bedrock, which are finally filled with bentonite clay. The bentonite clay is expected to provide a favourable environment for the copper canisters to retain their integrity for at least 100 000 years. Safety of facilities for radioactive waste management must be appropriately assured during their

lifetime. Despite the extensive research of the concept, there are still areas which need more research effort in order to minimise the safety and environmental risks of nuclear waste disposal.

One of key questions is the behaviour of copper in sulphide containing environments, as recently brought into attention by the statement of The Land and Environment Court in Sweden. Indeed, Fennoscandian bedrock is very sulphidic and it is likely that at some point during the repository time scale the copper canister comes into direct contact with a sulphide containing environment. The topic is timely also in Norway, as Halden nuclear power plant will be permanently closed and the focus will be shifted to nuclear waste management issues. Internationally, also Canada considers nuclear waste disposal concept based on the external copper barrier.

The ultimate goal of this research project is to provide such mechanistic and kinetic information on the behaviour of copper in the expected repository conditions that is of importance for the lifetime prediction of copper canisters and for the design of proper monitoring activities to be applied during the repository, e.g., evaluate the probability of localised corrosion and provide average and instantaneous corrosion rate data during the experiments. The experimental work will involve both short-term and longer-term, up to 12 months, experiments that are supplemented by computational modelling.

In addition to the technical outcome, the proposed project aims to establish and maintain a Nordic network of experts focusing on challenging corrosion issues, which cannot be resolved only by national efforts. The project provides an excellent framework for international visibility through high-quality research articles and presentations. The proposed activity is linked with Finnish Research Program for Nuclear Waste Management (KYT) and with the research funded by Swedish Science Council.

Research Area: Decommissioning incl. Spent Fuel
Activity leader: Elisa Isotahdon, VTT Technical Research Centre of Finland Ltd
Funded organizations: VTT, KTH
Funding: 565 kDKK

Milestones

Tasks, milestones and deliverables	Date
MS1: Design and initiation of first set of longer term experiment, finish of 4m experiment (VTT), Review of previous data and start of sulphide film initiation	2019-12-31
Annual report: Description of test set-up and results from 4 month test (VTT), Review report first results from electrochemical and in-situ AFM measurements (KTH)	2019-12-31

Status update

Work is progressing according to plan (May 17)

Project was initiated in February 2019. Until now, most of the work made is focused on the development and preparation of measurement systems suitable to produce data that could answer the research questions stated. Teleconference meeting between partners, VTT and KTH, was

arranged. In this meeting, the background of each organisation and relevant studies and finding were shared and ideas changed about the co-operation possibilities. At VTT, a first four-month anoxic immersion experiment is now being prepared. Measurements will be done in simulated groundwater environment with the variable sulphide content. Electrochemical measurements will be performed on-line, whereas gravimetric measurements and characterisation of exposed specimens and their surface films will be done after the test. KTH has state-of-the-art surface characterisation facilities. Therefore, extra samples will be inserted in VTT's 4 month test that will be send to KTH immediately after the test in autumn. The first 4 month test will be initiated in late May or in the beginning of June. After completing this test, the longer (1 year) test will be initiated. Parameters for 1 year test are adjusted based on the experiences and observations achieved in 4 month test.

Project have followed the schedule as planned. A huge part of the work done in VTT so far has been designing work for the 4 month and 1 year tests. On the second year, more focus will be put on the role of other ions present in the disposal environment and on the last year, sulphide films formed at different temperatures are emphasized. Modelling work will be initiated in 2020, as planned, when the datasets from first longer-term experiments are available. At KTH, the literature survey has been started, including collection of early publications and research reports from both VTT and KTH, and a search of open literature on corrosion of copper in sulphide containing environments focusing on oxygen free conditions. Moreover, synchrotron hard X-ray diffraction test measurements of copper and stainless steel samples were performed at PETRA III in DESY (Hamburg) during May 3-6, 2019, to detect surface changes due to hydrogen charging, mechanical loading and gamma radiation. The test results show the feasibility to detect such changes with a very high sensitivity. This world-class technique will be used to study the interaction between corrosive species and the copper surface. We have obtained a new official beam time in this autumn and will apply for further beamtime to analyse the copper samples with and without exposure to H2S (from VTT).

3.3 PROSAFE

Prolonged time windows and safe states

Summary: The objective of the project is to improve the quality of probabilistic and deterministic safety assessment methods with respect to safe and stable state definition, assessment of long time windows, including human reliability analysis in long time window scenarios, crediting repair and modelling different time windows. The work is divided into five work packages (WPs).

WP1 Information collection

The questions raised in the request for a project proposal are all related to the fundamental issue that safety demonstration, both probabilistic and deterministic, is model-based, and models mean simplifications of the real world. For instance, the definition for safe state is a critical issue for safety analyses but it is difficult to define unanimously. To specify the objectives and scope of the project and to position the research questions in the overall DSA&PSA framework, it is necessary to initiate the project with a WP that collects information from the stakeholders and literature and synthesizes the results into a problem formulation that provides boundary conditions for the further project. The stakeholders' questionnaire and literature study cover the topics safe state, acceptance criteria, success criteria, mission time, HRA methods (especially regarding long time window), crediting recoveries and repairs. One aim is also to collect examples of cases which are considered problematic from the safety assessment point of view.

The result of WP1 is a deliverable that compiles results of the survey and provides a problem formulation and examples for other tasks of the project. WP1 will also result in a decision regarding the scope of model developments in 2019 and 2020.

WP2 Safe, stable end state
WP2 is devoted to the finding agreeable definition of safe and stable end state, which is applicable for various safety assessment contexts in nuclear safety management. Results of the survey of WP1 will be first compiled to a proposal for the definition (2019 task) that is submitted to stakeholders for commenting and that is applied in PSA method developments (WP3) and tested in pilot studies (WP4). In 2020, based on feedback from stakeholders and preliminary experience from pilot studies, the definition will be revised.

WP3 PSA methods
WP3 is mainly divided into two parts:

- HRA – how to account for long available time
- PSA – In which way can/should the PSA be adjusted to account for safe state definition

The parts of the project are related, but not fully. The human error probability (HEP) estimation has already been identified as an issue with current time windows considered in the PSA. The PSA related part is mainly related to what is defined as a safe state.
The method development should cover the definition of long time window considering the required time, available time and their ratio. In general the probability of a human failure event (its included cognitive part and/or execution part) will be lower when the available time is much longer. It is also foreseen that some sort of limiting HEPs should be defined, considering the uncertainties. When there are much longer available times, the potential new human actions should also be discussed, e.g. recovery actions, repair actions and their dependencies with existing actions.
The PSA part will follow the safe state definition, but it is expected that the project will investigate and develop methods to cope with different mission times in different scenarios. In case of longer mission times the conservatism in the analysis may increase, and therefore it is expected that it may be relevant to consider repair. Another issue is that success criteria can change in time, e.g. from 2-out-of-4 to 1-out-of-4. Fuel pool cooling analysis is an example where it is expected that longer mission times would be relevant. It may also be expected that external events could challenge the normal mission time in PSA. In addition, it can be worth considering shorter than 24 h mission time for some safety functions. The HRA and PSA method developments should be pilot study driven, to focus the method development and discussion on the relevant areas.

WP4 PSA pilot studies
The purpose of the pilot studies is to evaluate the feasibility of the proposed methods in WP3. Pilot studies will be started early in the project. Real case studies can point out significant issues for the method development work of WP3. Pilot studies are carried out in close cooperation with the utilities, which are the owners of PSA models.
WP4 will report publicly general results from pilot studies. Details such as numerical results will not be reported publicly.

WP5 Meetings, dissemination and management
WP5 is responsible for the overall management of the project including coordination of the activities, progress reporting, arrangement of meetings, and preparation of plans.

Research Area: Risk Analysis & Probabilistic Methods
Activity leader: Stefan Authén, Risk Pilot AB
Funded organizations: Risk Pilot AB, LRC, VTT, IFE
Funding: 471 kDKK

Milestones

Tasks, milestones and deliverables	Date
Project kick-off meeting with stakeholders	2019/05
Report on information collection and problem formulation	2019/09
Interim workshop	2019/12
Interim report	2020/01

Status update

Work progressing according to plan (15 May)

The PROSAFE project started on the 5:th of march with a web kick-off meeting for the participating organization and has since progressed according to the project plan. So far expected amount of work have been put into WP1, information collection and questionnaire, where the work report is completed to an estimated 60%.

Within WP1 a questionnaire has also been produced covering different aspects of long time windows in PSA. The questionnaire covers 9 different areas of interest and a total of 70 questions. The purpose of the questionnaire is to get the Nordic utilities and regulating authorities input on which areas they find most important with regard to long time windows, which in turn will decide the focus areas of WP2, WP3 and WP4 of PROSAFE.

The questionnaire was sent 2019-05-03 to the Nordic utilities and regulating authorities and answers are due to 2019-06-15. The answers will be collected and summarized to 2019-07-05, and proposals on focus areas of WP2-WP4 will be completed in late August. Decision on focus areas will be taken together with the financiers early September, whereafter WP2-WP4 activities will be started. The work report of WP1 is set to be completed to 2019-09-31 due to deadline for SAFIR reporting.

So far, 5 web-based project meetings and 1 workshop for the Nordic utilities and regulating authorities have been held. A web-based Stakeholder workshop will be organized in September with the main objective of deciding on focus areas for WP2-WP4. It is also planned to organize a project seminar in January 2020, probably on the 21:st or the 23:rd, with the objective to present progress and findings of PROSAFE 2019 and to discuss project plans for 2020.
The project plan with progress of WP1 will be presented at the NPSAG Summer Seminar in Helsinki May 22 this year.

The project has received orders from all financiers.

3.4 SPARC

Scenarios and Phenomena Affecting Risk of Containment Failure and Release Characteristics

Summary: A robust severe accident management strategy is paramount for minimizing the environmental impact in the case of a severe accident involving melting of a reactor core. Both physical phenomena (deterministic) and accident scenarios (stochastic) are sources of uncertainties in the assessment of effectiveness of the accident mitigation. Adequate approaches are necessary in order to address both deterministic (epistemic) and stochastic (aleatory) sources of uncertainty in a consistent manner.

The goal of the project is to develop approaches and data for addressing the effects of scenarios and phenomena on the risk of containment failure and characteristics of release in case of a severe accident. There are 4 work packages that provide tightly coupled with each other activities;

- WP1: Development and application of risk oriented accident analysis framework (ROAAM+) for prediction of conditional containment failure probability for a Nordic type BWR (KTH).
- WP2: Development of the methods for coupling of Integrated Deterministic Probabilistic Safety Analysis tools such as ROAAM+ developed by KTH with PSA in general and PSA-L2 in particular (LRC).
- WP3: Deterministic modelling of core degradation, melt relocation, vessel failure, debris spreading, coolability and threats for the containment integrity (VTT).
- WP4: Analysis of the factors that affect the energy (temperature), altitude and probability of the release in PSA-L2 (VTT). The input is from KTH, LRC and VTT analysis in WP1, WP2 and WP3.

Research Area: Severe Accidents
Activity leader: Weimin Ma, KTH
Funded organizations: KTH, VTT
Funding: 565 kDKK

Milestones

Tasks, milestones and deliverables	Date
Status report on experiments and modelling developments for analysis of severe accidents	2019-07-31
Status report on safety analysis of nuclear power plants	2019-07-31
Final report	2020-01-31

Status update

Work progressing according to plan (May 21)

*In summary, the work scope of this project planned for 2019 has been **fulfilled by more than 40%**, with involvement and contributions of many researchers at KTH and VTT, including young students and engineers. The remaining work should be accomplished by the end of the year and **final report will be delivered in January 2020**.*

1. Project objectives

This project is to produce data and to develop approaches for addressing severe accident scenarios and phenomena which are important to assess risk of containment failure and radioactivity release in a postulated severe accident of Nordic nuclear power plants.

2. Outcomes

WP1: Experimental study of severe accident phenomena and modelling development
This work-package is led by KTH. The progresses of its four tasks are as follows.

Task 1.1 In-vessel debris/molten pool behavior and RPV failure

Based on the previous REMCOD experimental study on remelting phenomena of debris beds, a new test facility, named MRSPOD (Multicomponent Remelting, relocation, and Solidification in POrous Debris, was built in a vertical tube furnace to minimize the wall effects and have better control on the temperature inside the porous debris bed. The tube furnace has three independent heating zones for better control of the boundary conditions. As the first commissioning test, REMCOD2-E15-C1 test conditions (i.e. temperature gradient, melt pool depth, debris height, etc.) were replicated in the new cylindrical geometry. By reducing the wall effect in the new setup, four zones were identified in the porous debris bed as the final configuration of the test section which were not observed in the previous setup: Zone 1: melt free area of debris particles; Zone 2: solid cake zone (melt has welded the particles together); Zone 3: area of the connected channels; Zone 4: central channel infiltration.

The design of SIMECO-2 facility is under construction, which was designed to investigate heat and mass transfer of molten pool. More pre-test simulation was performed. The main components of the facility have been manufactured and delivered to KTH, which include slice vessel, high-frequency induction generator with inductors, Fiber Bragg Gratings (FBG) temperature probes having up to 23 measurements points, etc.

For analysis of RPV failure modes, the thermo-mechanical behavior of a RPV wall was simulated to investigate the influences of ablation, pressure and thermal boundary. Tree scenarios (ablated wall thickness=4mm,8mm,16mm) are calculated.

Task 1.2 Ex-vessel debris bed coolability

The coolability of ex-vessel multi-dimensional particle debris bed in a deep water pool was analyzed by using a mechanistic simulation tool □ the COCOMO code. Based on the database generated by the COCOMO code, a computationally affordable surrogate model was developed to efficiently and accurately predict the dryout power of a two-dimensional (2D) debris bed. Currently, five parameters are identified as input parameters for the surrogate model to predict the dryout power of a 2D debris bed, including: bed height, slope angle, porosity, particle diameter and pool ambient pressure. The surrogate model was proven to predict the dryout power of a debris bed instantly and adequately, compared with the prediction of the COCOMO code. The accuracy of the surrogate model has also been improved by introducing adaptive mesh to the COCOMO code and by using a well-developed surrogate modeling method of Kriging.

Task 1.3 FCI and steam explosion

An innovative idea of having floating objects (solid balls/particles) in the water pool was investigated to enhance the fragmentation of melt jet arriving in the pool and to suppress steam explosion risk.

The DEFOR experimental facility was modified to perform the experimental study, with variations of floating balls, melt material, jet diameter, superheat and water subcooling. Hollow stainless steel balls were used as floating objects in water pool. Tin was first used as a molten melt to be poured in water pool. Tests without floating balls are also carried out in order to have the fair comparison with the cases of floating balls. The initial two scoping tests have been carried and the results are under examination.

MISTEE facility has been upgraded to perform experiments of single droplet fuel coolant interaction (FCI). The recent efforts were focused on facility improvements for tests of Zr and Zr-Fe droplets falling in a water pool. A subsystem was added to physically collect hydrogen which is produced from metallic melt oxidation. The hydrogen collecting system has been demonstrated to be able to measure the total volume of hydrogen generation. A new design of furnace with double crucibles was proposed for preparation of Zr-Fe droplets. The external crucible is made of graphite, whereas the internal crucible was checked with BN, SiC, Al2O3 or MgO.
Task 1.4 Modelling development for deterministic analysis

In the late-phase of the in-vessel progression of a hypothetical severe accident, core materials could relocate into the lower head and form a molten pool which would threaten the integrity of the RPV. The main heat transfer mechanisms in a two-layer melt pool configuration for IVR analysis are the internally heated turbulent natural convection and Rayleigh-Bernard convection. The traditional 0~2 equation RANS models normally assume isotropic turbulence transport and have shown deficiency in modelling such natural convection. Since the algebraic turbulent heat transfer model (AHFM) is an alternative to model the turbulent heat flux term in an anisotropic way, we implemented this model into ANSYS Fluent for a hope of better prediction of molten pool heat transfer.

During the past 6 months, the implementation of AHFM based on the k-ε model as its original form is completed. Preliminary assessments have been performed with testing cases (Rayleigh-Bernard convection and Internally heated layer cases). Compared with DNS data, appealing results have been obtained. Moreover, the combination of the AHFM with the k-ω SST model (which combines the k-ε and k-ω models and shows more robust in industrial usage) was realized. Ongoing activity is focused on validation of the new modeling approach against experiments.

WP2: Severe accident safety analysis for nuclear power plants
This work-package is led by VTT. The progresses of its two tasks are as follows.
Task 2.1 Analysis of Fukushima accidents using the MELCOR code
Updating the Unit 2 MELCOR model from the year 2015 was started, based on detailed design drawings that were obtained in December 2016. The models of the reactor core, the pressure vessel, and the steam lines and recirculation loops were updated, and steady-state calculation at a full power was performed. Most of the updates were related to geometries and masses of different components. The biggest change was a notable decrease in the lower head wall thickness. In addition, a model for the lower head penetrations was added. All model updates have been documented. Next, the containment and reactor building models will be updated.

Task 2.2 CFD analyses of heat transfer in debris/melt pool
Selected SIMECO-2 experiments will be modelled with a selected CFD-based tool focusing on the behaviour of the volumetrically heated pool inside the vessel. This task includes a thorough

literature review to find the suitable heat transfer models for this configuration taking into account the necessary phenomena and also testing the models to find the best ones. The objective is to train a new expert to analyse heat transfer in melt pools and to receive new in-depth information via utilizing CFD in the analyses.

3.5 TETRA

Tellurium transport in the primary circuit of nuclear power plant

Summary: The proposed work focuses on the transport and chemistry of tellurium in the primary circuit of nuclear power plant during a severe accident. VTT Technical Research Centre of Finland Ltd has a wide background on nuclear safety related studies considering the behavior of fission products in a NPP accident. Chalmers University of Technology is highly experienced in the chemistry of fission products. Thus, it is natural that these individual organizations now try to merge their research activities to create added value. As a third partner, the Nuclear Chemistry Group at the University of Oslo will participate in this work offering their expertise in supporting the analysis of experiments by taking care of the neutron activation of the samples. They will either use their neutron generator (offering 108 n/s) or the JEEP-II reactor (offering 1013 n/s) at the Institute of Energy Technology at Kjeller to enable later analysis of accurate amounts of elements transported. The proposed experiments will determine the behavior of tellurium under oxidizing and non-oxidizing atmospheres at dry and humid conditions. These experiments will verify the previous observations on tellurium transport and also serve as reference data points in the next phase. The second aim is to examine the tellurium chemistry in the presence of airborne CsI in the primary circuit. In addition to the investigation of tellurium in various atmospheres, the effect of containment spray system is also going to be tested for the removal of different tellurium species from the containment atmosphere into the sump. All of the aforementioned experiments will provide completely new data, which will be needed for example for the development of severe accident simulation codes and in general to understand the progress of accident and to mitigate the possible source term. Furthermore, gaseous and aerosol species formed in the experiments as well as liquid samples from the sump will be analyzed with several different techniques.

Research Area: Severe Accidents
Activity leader: Christian Ekberg, CTH
Funded organizations: CTH, VTT, UIO
Funding: 525 kDKK

Milestones

Tasks, milestones and deliverables	Date
Preparation of coming experiments	2019-04-30
Experiments at VTT	May/June
Neutron activation at JEEP (Norway)	July/Aug
Analysis of samples	Sep/Oct
Analysis of activated samples at Chalmers	Sep/Oct
Finalization of data	2019-11-30
Final report	2019-12-31

Status update

Work progressing according to plan (May 9)

The initialization of the TETRA project has begun without any significant issues and according to the two first milestone.

Milestone 1. Preparation of coming experiments
During the first part of the year, preparations of the experiments where done: supplies where purchased and equipment prepared.

Milestone 2. Experiments at VTT
The experimental phase has also begun and is ongoing according to the general plan of the project. However, after some great work by the Finnish part of TETRA, the extent of the experimental matrix has been expanded. This was made possible by the use of a second system, solely focusing on the containment spray. The change can be seen by comparing the initial experimental matrix, found in Table 1, with updated experimental matrix found in Table 2 for the primary circuit experiment and in Table 3 for the containment spray experiments.

Essentially what the change means is that the two parts of the project primary circuit transport and containment spray investigation is split into two parts. Standalone from one another and using different (but similar) equipment. This enables more dedicated experiments and more can be done within the same project. However, the use of hydrazine will not be performed as it was not possible to ensure safe working conditions.

Table 1: Initial experimental matrix

Exp.	Precursor	Temperature (K)	Atmosphere	Humidity	CSS
1.a.	Te	1500	Air	no	H_3BO_3, NaOH
1.b.	Te	1500	Air	no	H_3BO_3, NaOH, $Na_2S_2O_3$
1.c.	Te	1500	Air	no	H_3BO_3, NaOH, N_2H_4
2	Te	1500	Air	yes	H_3BO_3, NaOH
3.a.	Te	1500	N_2	no	H_3BO_3, NaOH
3.b.	Te	1500	N_2	no	H_3BO_3, NaOH, $Na_2S_2O_3$
3.c.	Te	1500	N_2	no	H_3BO_3, NaOH, N_2H_4
4	Te	1500	N_2	yes	H_3BO_3, NaOH
5	Te+CsI	1500	Air	no	H_3BO_3, NaOH
6	Te+CsI	1500	N_2	no	H_3BO_3, NaOH

Table 2: The latest updated experimental matrix for the primary circuit experiments. Green color indicates, performed and success with the experiment.

Exp.	Precursor	Temperature (K)	Atmosphere	Humidity
1	Te	1500	Air	no
2	Te	1500	Air	yes
3	Te+CsI	1500	Air	yes
4	Te	1500	N_2	no
5	Te	1500	N_2	yes
6	Te+CsI	1500	N_2	yes

Table 3: The latest updated experimental matrix for the containment experiments. Green color indicates, performed and success with the experiment.

Exp.	Precursor	Temperature (K)	Atmosphere	Humidity	CSS
1.a.	TeO_2	1100	Air	no	Water, Milli-Q
1.b.	TeO_2	1100	Air	no	H_3BO_3, NaOH,
1.c.	TeO_2	1100	Air	no	H_3BO_3, NaOH, $Na_2S_2O_3$
3.a.	TeO_2	1100	Air	yes	Water, Milli-Q
3.b.	TeO_2	1100	Air	yes	H_3BO_3, NaOH
3.c.	TeO_2	1100	Air	yes	H_3BO_3, NaOH, $Na_2S_2O_3$
4.a.	TeO_2 + CsI	1100	Air	yes	Water, Milli-Q
4.b.	TeO_2 + CsI	1100	Air	yes	H_3BO_3, NaOH
5.c.	TeO_2 + CsI	1100	Air	yes	H_3BO_3, NaOH, $Na_2S_2O_3$
6.a.	Te	723	Air	no	Water, Milli-Q
6.b.	Te	723	Air	no	H_3BO_3, NaOH,
6.c.	Te	723	Air	no	H_3BO_3, NaOH, $Na_2S_2O_3$
7.a.	Te	723	Air	yes	Water, Milli-Q
7.b.	Te	723	Air	yes	H_3BO_3, NaOH
7.C.	Te	723	Air	yes	H_3BO_3, NaOH, $Na_2S_2O_3$
8.a.	Te + CsI	723	Air	yes	Water, Milli-Q
8.b.	Te + CsI	723	Air	yes	H_3BO_3, NaOH
8.c.	Te + CsI	723	Air	yes	H_3BO_3, NaOH, $Na_2S_2O_3$
9.a.	Te	723	N_2	no	Water, Milli-Q
9.b.	Te	723	N_2	no	H_3BO_3, NaOH,
9.c.	Te	723	N_2	no	H_3BO_3, NaOH, $Na_2S_2O_3$
10.a.	Te	723	N_2	yes	Water, Milli-Q
10.b.	Te	723	N_2	yes	H_3BO_3, NaOH
10.c.	Te	723	N_2	yes	H_3BO_3, NaOH, $Na_2S_2O_3$
11.a.	Te + CsI	723	N_2	yes	Water, Milli-Q
11.b.	Te + CsI	723	N_2	yes	H_3BO_3, NaOH
11.c.	Te + CsI	723	N_2	yes	H_3BO_3, NaOH, $Na_2S_2O_3$

The actual increase in experiments concerns the containment spray part. It was expended by adding reference case (e.g. only water in the spray) and implementation of TeO_2 as a precursor under oxidizing conditions. Reasoning being, that it will be the main species reaching the containment during an accident under such conditions. For both the primary circuit transport and containment spray experiments, the first experiments have been carried out with good success. However, adjustments to parameters may be needed as experiments are proceeding

Milestone 3. Neutron activation at JEEP (Norway)

Unfortunately, the JEEP reactor is no longer available for the TETRA project. Therefore, the Norwegian part found an alternative in the Czech Republic. This is currently under discussion but is currently sounding very positive.

Milestone 4-7

These milestones are to be done from summer 2019 and onward. Thus, little can be said as of now regarding these. However, no significant changes are expected currently.

3.6 THEOS

Thermal Hydraulics of the Suppression Pool

Summary:
Summary of the work at KTH:
Effective Heat Source (EHS) and Effective Momentum Source (EMS) models have been developed to enable predicting the long-term thermal behavior of a large water pool during a steam injection through blowdown pipes and spargers. Validation of the EHS/EMS models was done using experimental data from the PPOOLEX and SEF-POOL facilities at LUT, Finland, and the PANDA facility at PSI, Switzerland. The validated models have been applied to full-scale analysis of a Nordic BWR Pressure Suppression Pool (PSP) during a steam injection through spargers. The results show that strong thermal stratification of potential safety importance can develop in the pool during prototypic steam injection conditions. The analysis results suggest that further development of the EHS/EMS correlations and computational models is necessary in order to enable modeling of regimes and conditions, which have not yet been studied in experiments, but are critically important and can completely change the PSP stratification and mixing behavior. More specifically, non-condensable gases in case of steam injection through blowdown pipes can affect chugging phenomena and thus pool mixing. Steam injection regimes through spargers, the effect of the load reduction rings, azimuthal velocity distribution and turbulence generated at sparger head are also very influential factors according to the analysis. The effects of other safety systems such as sprays and strainers also has not been addressed in experiments. In this project, KTH will provide analytical support for design of the new experiments in the SEF-POOL and PPOOLEX facilities at LUT and in the PANDA facility at PSI (in the framework of the OECD/HYMERES-2 project). Obtained experimental data will be used by KTH for development and validation of the models in order to address the remaining important sources of uncertainty for prediction of the pool behavior.

Summary of the work at LUT:
A set of experiments with spargers were performed in the PPOOLEX facility. The experiments were mainly focused on the oscillatory bubble regime, and exploratory tests were done in chugging and stable jet regimes. The experimental data was used by KTH to address important phenomena governing the pool behavior and validate the computational models. A small-scale Separate Effect Facility (SEF-POOL) was built to measure directly the effective momentum induced by steam injection through a sparger. A total of 19 experiments were performed, which enabled the developed effective momentum correlations to be used in the simulations performed at KTH and an validation effort of CFD models at VTT. Important variables affecting the effective momentum magnitude in full-scale plant need to be further analyzed in order to provide closures for the EMS model development for spargers by KTH. Furthermore, data on direct contact condensation gathered with the help of sophisticated instrumentation is needed for the improvement of calculation models of CFD codes at VTT. For this purpose further development of the experimental facilities for obtaining systematic data relevant to PSP phenomena and conditions will be carried out in this project. Particularly, injection plates with chamfered holes will be manufactured to be used in tests in 2019. Design for new experiments that can adress the effect of momentum distribution in azimuthal direction, turbulence generated by steam condensation and chugging regimes in spargers will be developed in 2019-2021. Feasibility of a new experimental campaign in PPOOLEX facility will be evaluated, considering remaining uncertainties in the phenomena such as effect of spray activation in the drywell and/or wetwell on a thermally stratified pool, combined affect of spargear head and load reduction rings, etc.

Summary of the work at VTT:
Computational Fluid Dynamics (CFD) simulations will be performed for the direct-contact condensation and thermal stratification experiments of LUT. The simulations will be done by using the commercial ANSYS Fluent code. The EHS/EMS models developed at KTH will be implemented in the Fluent code by using user-defined functions. In the model, the sparger of the vent pipe in the pressure suppression pool will be described with mass, heat and momentum sources. In 2019, simulations of stratification and mixing experiments performed with the PPOOLEX facility will be performed with the Fluent code. The results will be compared to the experiments of LUT and to the results calculated by KTH. In addition, possibilities to implement an approach based on the EHS/EMS model in the Apros system code will be studied. In 2020–2021, CFD calculations will be performed to validate the implemented EHS/EMS model for stratification and mixing. In addition, the implementation of the approaches based on the EHS/EMS model in the Apros system code will be tested.

Research Area: Thermal Hydraulics
Activity leader: Pavel Kudinov, KTH
Funded organizations: KTH, LUT, VTT
Funding: 565 kDKK

Milestones

Tasks, milestones and deliverables	**Date**
Tasks in 2019: i. To study the effect of chamfer at the injection holes of sparger ii. To study regim etransition between 125 and 175 kg/m^{2}s to determine the actual transition pattern iii. To study high steam mass flux regimes (above 330 kg/m^{2}s)	
Milestones: 1. Modifications to the SEF-POOL facilty done 2. Tests on effect of chamfer done 3. Regime transition tests done 4. Assessment of the adaption of the EHS/EMS models to the lumped parameter code Apros 5. High steam mass flux done	 2019-05-31 2019-08-31 2019-10-31 2019-10-31 2019-12-31
Deliverables: Delivery of relevant experimental data to the simulation partners Report on experimental activities in the SEF-POOL	 2019-12-31 2020-01-31

Status update

Work progressing according to plan (20 May)

Work at LUT
The goal of the SEF POOL experiments at LUT in 2019 is to obtain data for necessary further development of effective heat and momentum source models (EHS/EMS) for steam injection through spargers. Based on pre-test analysis, following factors were selected for investigation:

(i) The effect of pool water subcooling on the effective momentum created by condensing steam jet. Test procedure has been modified in order to address water pool temperatures down to 5-10°C and significant effect was observed for sub-sonic steam jets.
(ii) The effect of high steam mass flux (above 330 kg/(m2s)) in sonic (chocked flow) regimes. Sonic regimes are expected in certain plant scenarios. Current experimental database needs further extension. The tests are ongoing.
(iii) The effect of trans-sonic steam flow on the effective momentum. There is significant qualitative and quantitative difference between sub- and sonic regimes. New tests are under preparation to provide data in the trans-sonic regimes.
(iv) Feasibility of carrying out tests on the effect of chamfer at the injection holes in 2019 to be assessed based on the amount of resources that will be needed for the tests (i)-(iii) above.

Work at Royal Institute of Technology (KTH)
KTH is providing analytical support for determining test conditions and interpretation of the experimental data in SEF-POOL (LUT) and PANDA (PSI) tests. Implementation of EHS/EMS models is under development for spargers to include new regimes studied at SEF-POOL, namely (i) higher water subcooling, (ii) sonic regimes at high mass flow rates, (iii) transonic regimes. New correlations for the effective momentum are currently under development.
PANDA tests with spargers are under preparations with support from KTH to investigate (i) the effect of the distance between sparger head and thermocline on the rate of erosion of the cold layer, and (ii) to provide PIV data on the velocity profile in the vicinity of the sparger.
Further work is ongoing on the mesh independent numerical implementation of the EHS/EMS models.

Work at VTT
The EHS/EMS models developed at KTH are being implemented in the Fluent code by using user-defined functions. In the model, the sparger of the vent pipe in the pressure suppression pool is described with mass, heat and momentum sources. The implementation will be validated against stratification and mixing experiments performed with the PPOOLEX facility. The results will be compared to the experiments of LUT and to the results calculated by KTH. In addition, possibilities to implement the EHS/EMS based modeling approaches in the containment model of the Apros system code is studied. Test simulations with chosen implementation candidate will be performed in fall.

4 Overview of all NKS-R activities from CfP's 2010-2019

All activities started in 2016 and earlier have been finalised, see table below.

An activity is considered to be started at the time of the January board meeting, and ended when the final report has been delivered.

CfP	Activity	NKS number	Started	Ended
2010	Decom-sem	NKS_R_2010_83	01/2010	12/2010
	DIGREL	NKS_R_2010_86	01/2010	12/2010
	IACIP	NKS_R_2008_61	01/2010	12/2010
	INCOSE	NKS_R_2009_75	01/2010	05/2011
	MOSACA10	NKS_R_2008_69	01/2010	01/2011
	NROI	NKS_R_2008_70	01/2010	04/2011
	POOL VTT	NKS_R_2007_58	01/2010	05/2011
	POOL KTH	NKS_R_2007_58	01/2010	06/2011
	POOL LUT	NKS_R_2007_58	01/2010	03/2011
2011	AIAS	NKS_R_2011_98	01/2011	12/2012
	DIGREL	NKS_R_2010_86	01/2011	01/2012
	ENPOOL	NKS_R_2011_90	01/2011	03/2012
	ENPOOL	NKS_R_2011_90	01/2011	05/2012
	ENPOOL	NKS_R_2011_90	01/2011	05/2012
	MoReMO	NKS_R_2011_95	01/2011	02/2012
	NOMAGE4	NKS_R_2008_63	01/2011	11/2011
	POOLFIRE	NKS_R_2011_96	01/2011	02/2012
	SADE	NKS_R_2011_97	01/2011	03/2012
	RASTEP	NKS_R_2010_87	06/2011	09/2012
2012	AIAS	NKS_R_2011_98	01/2012	06/2013
	DECOSE	NKS_R_2012_100	01/2012	07/2013
	DIGREL	NKS_R_2010_86	01/2012	02/2013
	ENPOOL VTT	NKS_R_2011_90	01/2012	04/2013
	ENPOOL LUT	NKS_R_2011_90	01/2012	03/2013
	ENPOOL KTH	NKS_R_2011_90	01/2012	05/2013
	MoReMO	NKS_R_2011_95	01/2012	03/2013
	Nordic-Gen4	NKS_R_2012_103	01/2012	11/2012
	POOLFIRE	NKS_R_2011_96	01/2012	02/2013
	RASTEP	NKS_R_2010_87	01/2012	10/2013
	SADE	NKS_R_2011_97	01/2012	03/2013
2013	Decom-sem	NKS_R_2013_106	01/2013	02/2014
	DECOSE	NKS_R_2012_100	01/2013	10/2014

CfP	Activity	NKS number	Started	Ended	
2013	DIGREL	NKS_R_2010_86	01/2013	03/2014	
	DPSA	NKS_R_2013_107	01/2013	07/2014	
	ENPOOL	NKS_R_2011_90	01/2013	10/2014	
	Exam HRA	NKS_R_2013_110	01/2013	03/2014	
	HUMAX	NKS_R_2013_108	01/2013	02/2014	
	L3PSA	NKS_R_2013_109	01/2013	03/2014	
	POOLFIRE	NKS_R_2011_96	01/2013	12/2014	
	SADE	NKS_R_2011_97	01/2013	02/2014	
2014	ATR	NKS_R_2014_111	01/2014	06/2015	
	DECOSE	NKS_R_2012_100	01/2014	07/2015	
	DIGREL	NKS_R_2010_86	01/2014	02/2015	
	DPSA	NKS_R_2013_107	01/2014	08/2015	
	ENPOOL	NKS_R_2011_90	01/2014	07/2015	
	HUMAX	NKS_R_2013_108	01/2014	01/2015	
	L3PSA	NKS_R_2013_109	01/2014	04/2015	
	Nordic-Gen4	NKS_R_2012_103	01/2014	02/2015	
	ProCom	NKS_R_2014_112	01/2014	03/2015	
2015	ADdGROUND	NKS_R_2015_113	01/2015	04/2016	
	ATR-2015	NKS_R_2014_111	01/2015	06/2016	
	COPSAR	NKS_R_2015_114	01/2015	08/2016	
	DECOSE	NKS_R_2012_100	01/2015	10/2016	
	L3PSA	NKS_R_2013_109	01/2015	11/2016	
	LESUN	NKS_R_2015_115	01/2015	12/2015	
	MODIG	NKS_R_2015_116	01/2015	03/2016	
	PLANS	NKS_R_2015_117	01/2015	01/2016	
2016	ADdGROUND	NKS_R_2015_113	01/2016	08/2017	
	BREDA-RPV	NKS_R_2016_118	01/2016	03/2017	
	COPSAR	NKS_R_2015_114	01/2016	08/2017	
	FIREBAN	NKS_R_2016_119	01/2016	10/2017	
	HYBRID	NKS_R_2016_120	01/2016	04/2017	
	L3PSA	NKS_R_2013_109	01/2016	03/2017	
	SC_AIM	NKS_R_2016_121	01/2016	01/2017	
	SPARC	NKS_R_2016_122	01/2016	08/2017	
2017	COPSAR	NKS_R_2015_114	01/2017	09/2018	
	FIREBAN	NKS_R_2016_119	01/2017	ongoing	Prel. report received May 6.
	HYBRID	NKS_R_2016_120	01/2017	12/2018	
	NORDEC	NKS_R_2017_123	01/2017	02/2018	

CfP	Activity	NKS number	Started	Ended	
2017	SC_AIM	NKS_R_2016_121	01/2017	01/2018	
	SPARC	NKS_R_2016_122	01/2017	10/2018	
	WRANC	NKS_R_2017_124	01/2017	ongoing	Expected delivery June 2019.
2018	BREDA-RPV	NKS_R_2016_118	01/2018	02/2019	
	FIREBAN	NKS_R_2016_119	01/2018	ongoing	Prel. report received May 6.
	SPARC	NKS_R_2016_122	01/2018	ongoing	Expected delivery June 2019.
	NORDEC	NKS_R_2017_123	01/2018	02/2019	
	SITRON	NKS_R_2018_125	01/2018	02/2019	
	SYNTAGMA	NKS_R_2018_126	01/2018	04/2019	
2019	BREDA-RPV	NKS_R_2016_118	01/2019	ongoing	
	COCOS	NKS_R_2019_127	01/2019	ongoing	
	PROSAFE	NKS_R_2019_128	01/2019	ongoing	
	SPARC	NKS_R_2016_122	01/2019	ongoing	
	TETRA	NKS_R_2019_129	01/2019	ongoing	
	THEOS	NKS_R_2019_130	01/2019	ongoing	

NKS-B Status Report

Kasper G. Andersson

NKS-B Programme Manager

Summary

Overall the work in NKS-B is progressing well

- Since last NKS-B status report
  - *6 final reports published on website and 1 received but on request not yet published*
- Delayed activities (from before 2018)
  - *None*
- Activities commencing in 2018
  - *7 (of 8) completed, 1 nearing completion (NORCO II)*
- Activites commencing in 2019
  - *All 8 contracts signed, work on schedule*

Nordic nuclear safety research

Final reports published on NKS website (since last Board Meeting):

- RADWORKSHOP final report 2018
- AVESOME final report 2018
- MOMORC final report 2016 (now published in journal form)
- AUTOMORC final report 2017 (now published in journal form)
- NANOD final report 2018
- OPTIMETHOD final report 2018

- AUTOMORC report 2018 approved but not published (journal paper)

NORCO II

Activity leader – Tanya Hevrøy (DSA)

- Progress report received on 8 April, with partial deliverables: survey of possibilities to construct relevant laboratory in Finland, and preliminary experimental results from Sweden/Norway.

- More time needed to reach the final experimental deliverables. About half of the samples have not yet been analysed due to now solved analytical facility problems. New report date set at 16 August 2019.

- They are working on a journal paper on the results, and say this will be submitted in the early autumn too.

- Budget 460 kDKK.

NKS-B Seminars 2019

None

Kasper G. Andersson
NKS-B Programme Manager

NKS Board meeting
Copenhagen June 4, 2019

NKS-B CfP 2020

A large number of selected potential activity leaders will again this year be contacted (in May-June), urging them to send in proposals.

Will follow up on this systematically in the autumn when the CfP is announced.

May be useful to ask for Board members' assistance also this year.

Lobbying for CfP2020 will also be done at NSFS 2019.

Presentation at NSFS next week (12 June):

Nordic nuclear safety research

Recent Nordic research collaboration results obtained under the NKS-B programme

Kasper G. Andersson[1,2*], Christian Linde[1,3], Sigurður M. Magnússon[1,4] and Finn Physant[1,5]

[1] NKS, Roskilde, Denmark
[2] Technical University of Denmark, DTU Nutech, Roskilde, Denmark
[3] Swedish Radiation Safety Authority, Stockholm, Sweden
[4] Icelandic Radiation Safety Authority, Reykjavik, Iceland
[5] FRIT, Roskilde, Denmark

The Nordic countries have throughout decades shared a regional research and development program on nuclear reactor safety and emergency preparedness: NKS. Its results have received great recognition and have been integrated in state-of-the-art tools over the world, e.g., for emergency preparedness and response management. The presentation provides information on recent results from the NKS-B programme, which comprises the topics emergency preparedness, radioecology, and measurement technologies and strategies, e.g., also in waste management and decommissioning. Although the Fukushima accident did not lead to any radiological consequences in the Nordic region, it taught a number of important lessons of generic nature that can further strengthen and secure future maintenance of the Nordic region's capability to effectively respond to such events, and have since been addressed in NKS activities. Studies of radioecological challenges under NKS-B are by no means restricted to accident scenarios, but also comprise for example aspects of naturally occurring radioactive material (NORM). Among the recent measurement activities in NKS are a series of efforts to secure that Nordic laboratories are able to measure a series of 'difficult-to-measure' radionuclides (including alpha emitters) in for example decommissioning waste, which has become a challenge shared by Denmark, Finland, Norway and Sweden. Over the latest 5 years, a total of 48 topical NKS-B projects have been carried out, comprising organization of 23 exercises, workshops or seminars. All results of these activities are freely available in reports on the NKS website.

Initial preparations for R/B NKS Seminar in 2022

- Wide or narrow theme (suggestions)?
- Venue Finlandshuset, Stockholm (?)
- Potential program committee members (new faces)?

Kasper G. Andersson
NKS-B Programme Manager

NKS Board meeting
Copenhagen June 4, 2019

NKS R and B Seminar 2019 Survey

Report based on the answers following the survey sent 24 January with follow-up reminder 15 February

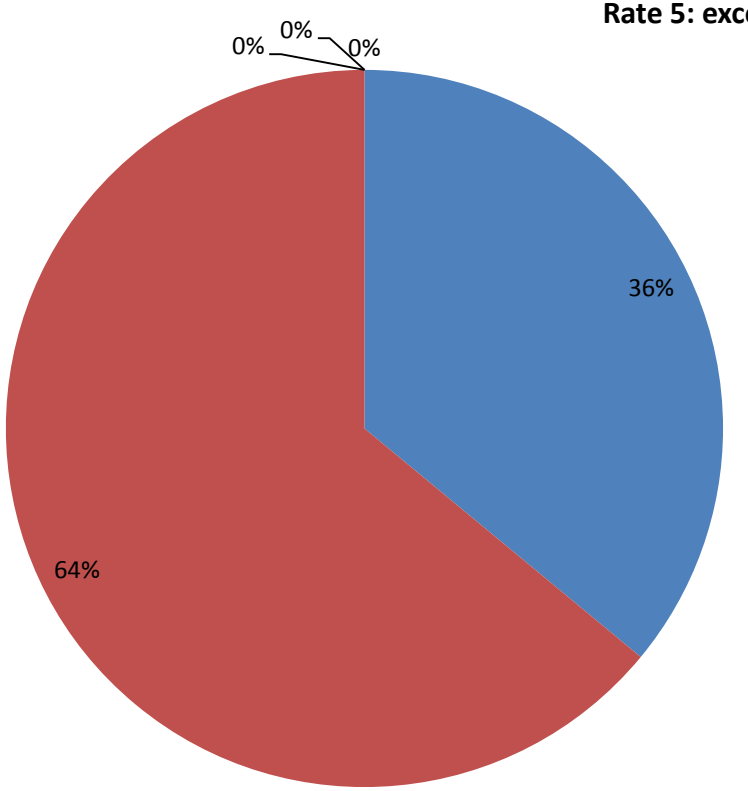
NKS R and B Seminar 2019 - Survey

- The questionaire was sent to all 100 registered participants
- The maximum number of possible responses was 96, as the 4 coordination group members were not expected to answer
- We received 33 responses – meaning a response percentage of 34
  (2016: 35 and 2013: 44)

NKS R and B Seminar 2019 - Survey

Overall rate of the seminar – 33 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 36%
- Rate 4: 64%
- Rate 3: 0
- Rate 2: 0
- Rate 1: 0

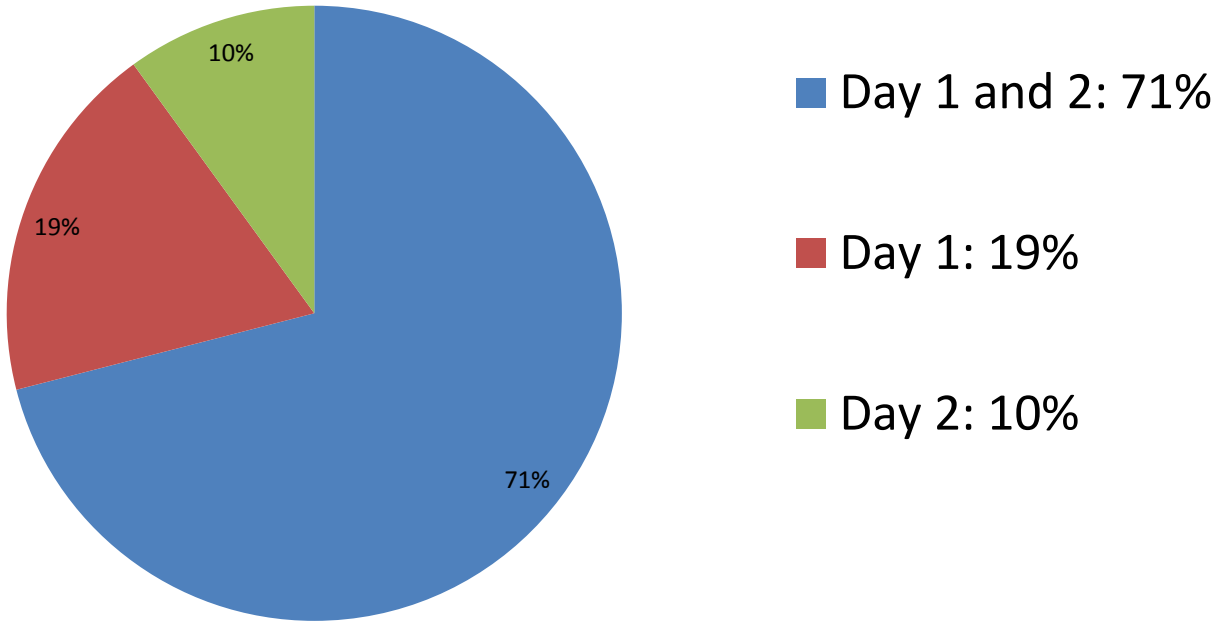
Average: 4,4

Average 2016: 4,2

Average 2013: 4,3

NKS R and B Seminar 2019 - Survey

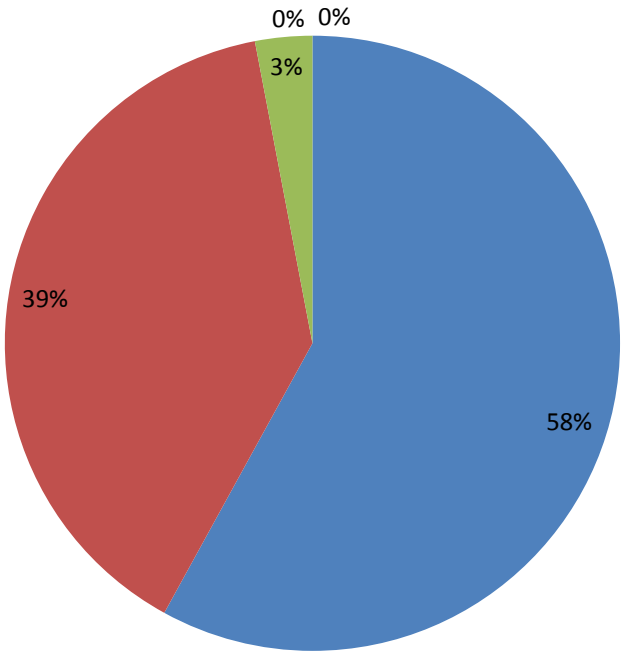
Seminar attendance? Did you attend day1 and 2? Day1? / Day 2? – 31 responses



NKS R and B Seminar 2019 - Survey

Relevance of seminar theme – risk and uncertainties – 33 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 58%
- Rate 4: 39%
- Rate 3: 3%
- Rate 2: 0
- Rate 1: 0

Average: 4,5

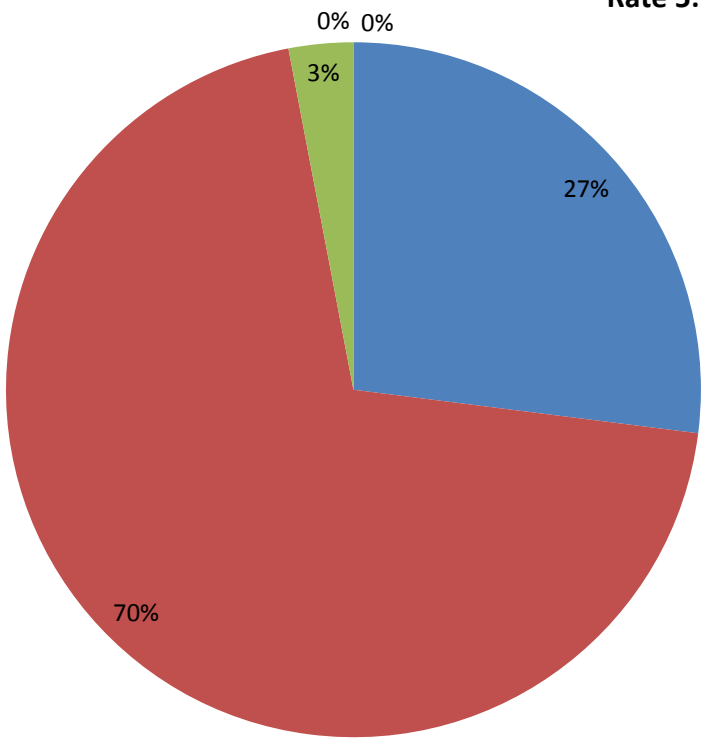
Average 2016: 4,2

Average 2013: 4,6

NKS R and B Seminar 2019 - Survey

Usefulness of information presented – 33 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 27%
- Rate 4: 70%
- Rate 3: 3%
- Rate 2: 0
- Rate 1: 0

Average: 4,2

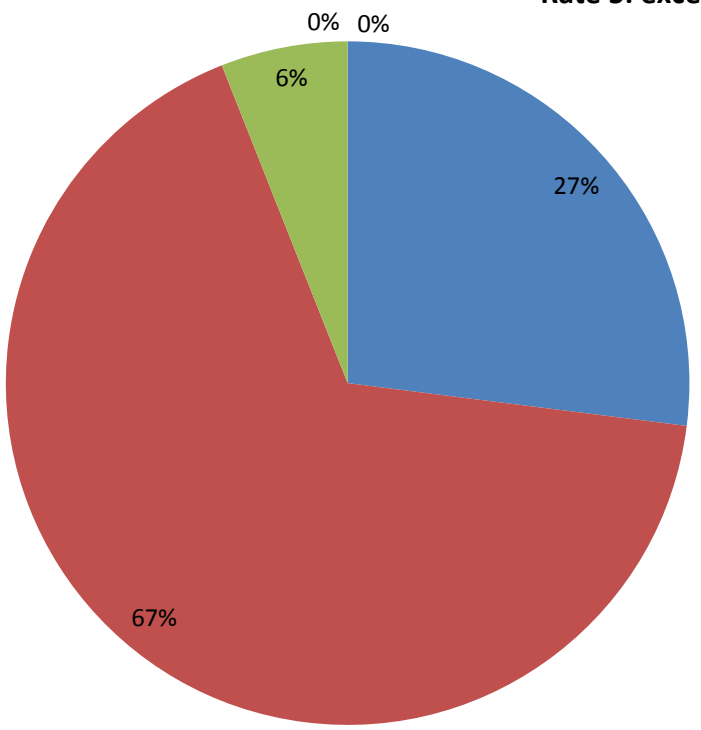
Average 2016: 4,0

Average 2013: 4,1

NKS R and B Seminar 2019 - Survey

Quality of presentations – 33 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 27%
- Rate 4: 67%
- Rate 3: 6%
- Rate 2: 0
- Rate 1: 0

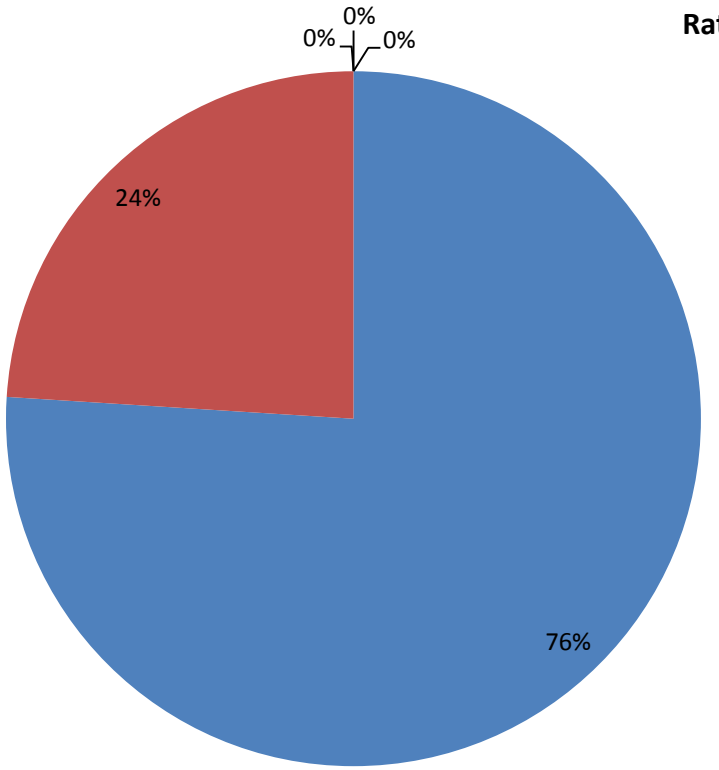
Average: 4,2

Average 2016: 4,2

Average 2013: 4,1

NKS R and B Seminar 2019 - Survey

Seminar organization: scheduling and timing – 33 responses



Rate 5: excellent and rate 1: not good

- Rate 5: 76%
- Rate 4: 24%
- Rate 3: 0
- Rate 2: 0
- Rate 1: 0

Average: 4,8

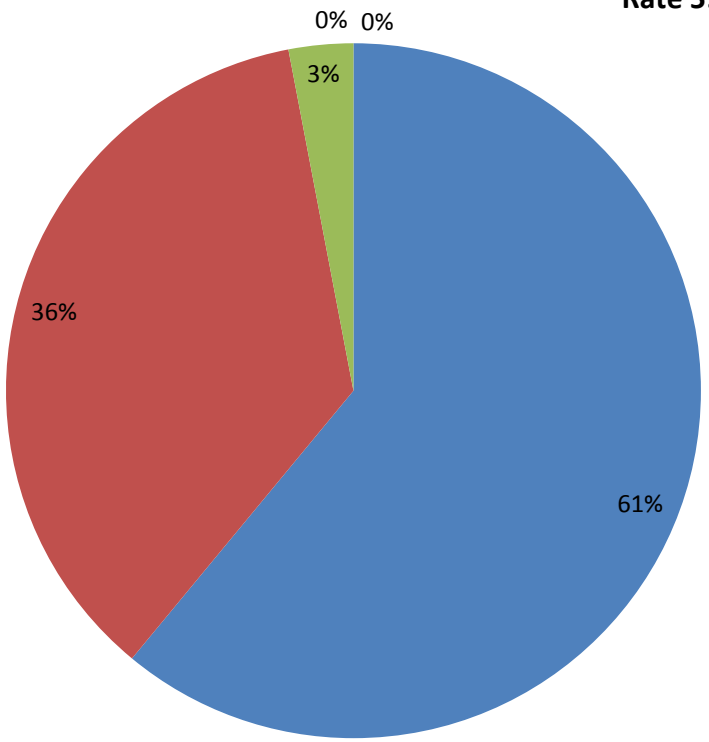
Average 2016: 4,3

Average 2013: 4,5

NKS R and B Seminar 2019 - Survey

Seminar organization: facility / venue – 33 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 61%
- Rate 4: 36%
- Rate 3: 3%
- Rate 2: 0
- Rate 1: 0

Average: 4,6

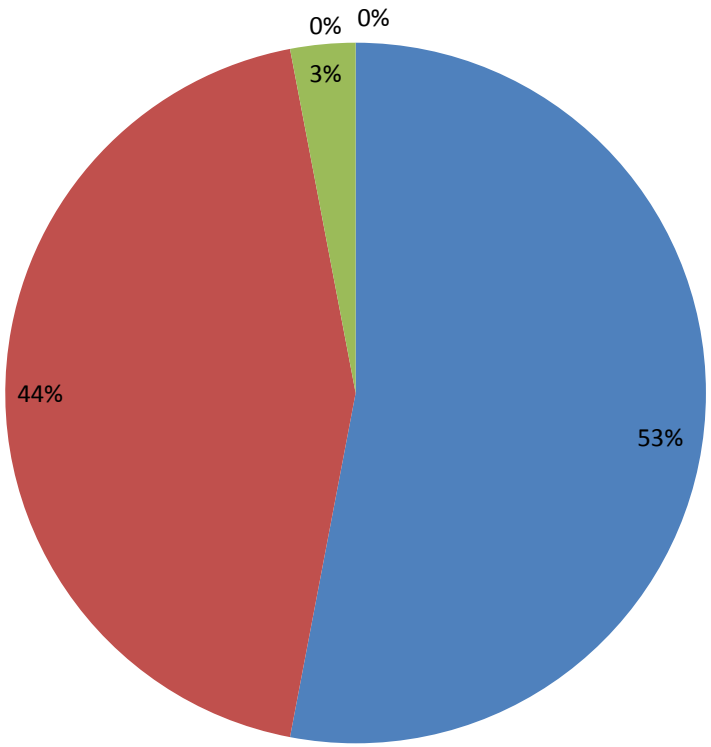
Average 2016: 4,2

Average 2013: 4,2

NKS R and B Seminar 2019 - Survey

Seminar organization: handouts of books of abstracts – 32 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 53%
- Rate 4: 44%
- Rate 3: 3%
- Rate 2: 0
- Rate 1: 0

Average: 4,5

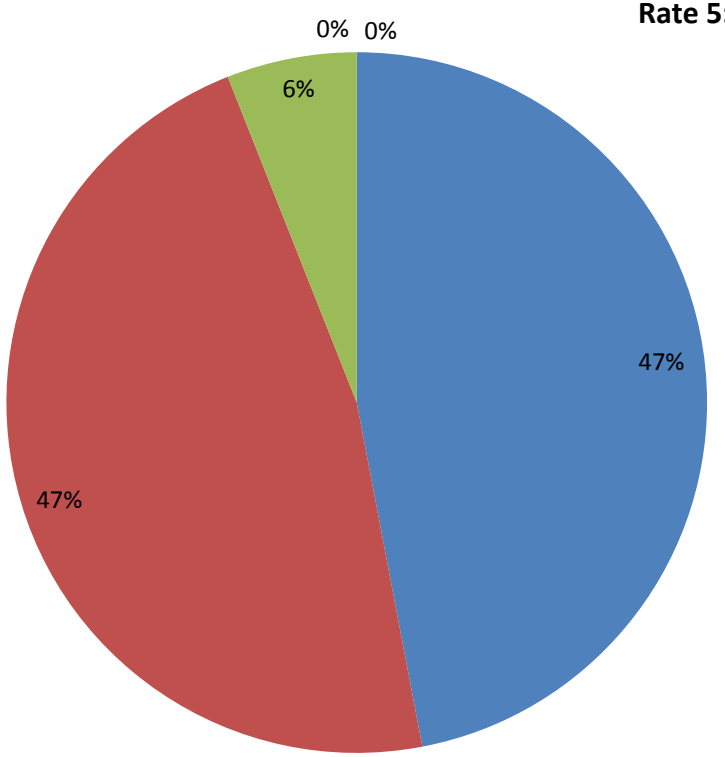
***Average 2016: 3,8**

***Average 2013: 3,5**

NKS R and B Seminar 2019 - Survey

Seminar organization: handouts of pamphlets – 30 responses

Rate 5: excellent and rate 1: not good



- Rate 5: 47%
- Rate 4: 47%
- Rate 3: 6%
- Rate 2: 0
- Rate 1: 0

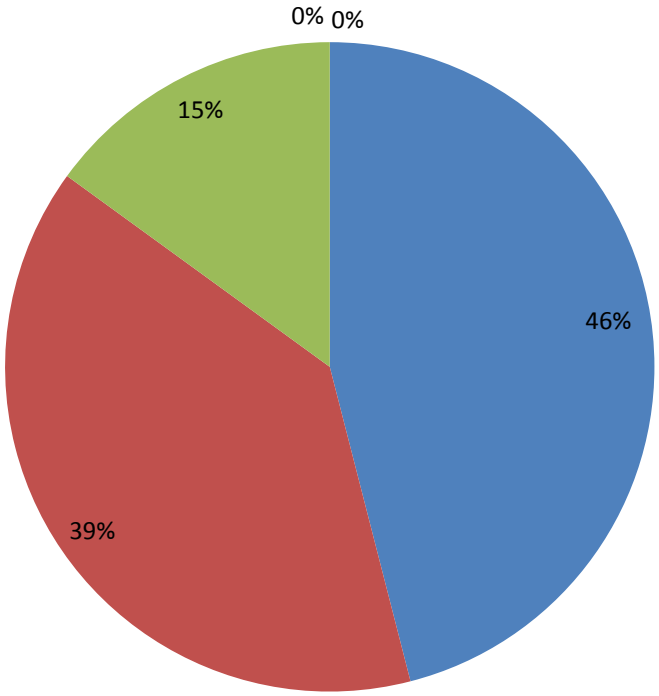
Average: 4,4

***Average 2016: 3,8**

***Average 2013: 3,5**

NKS R and B Seminar 2019 - Survey

Networking possibilities/opportunities: How did you rate these? – 33 responses



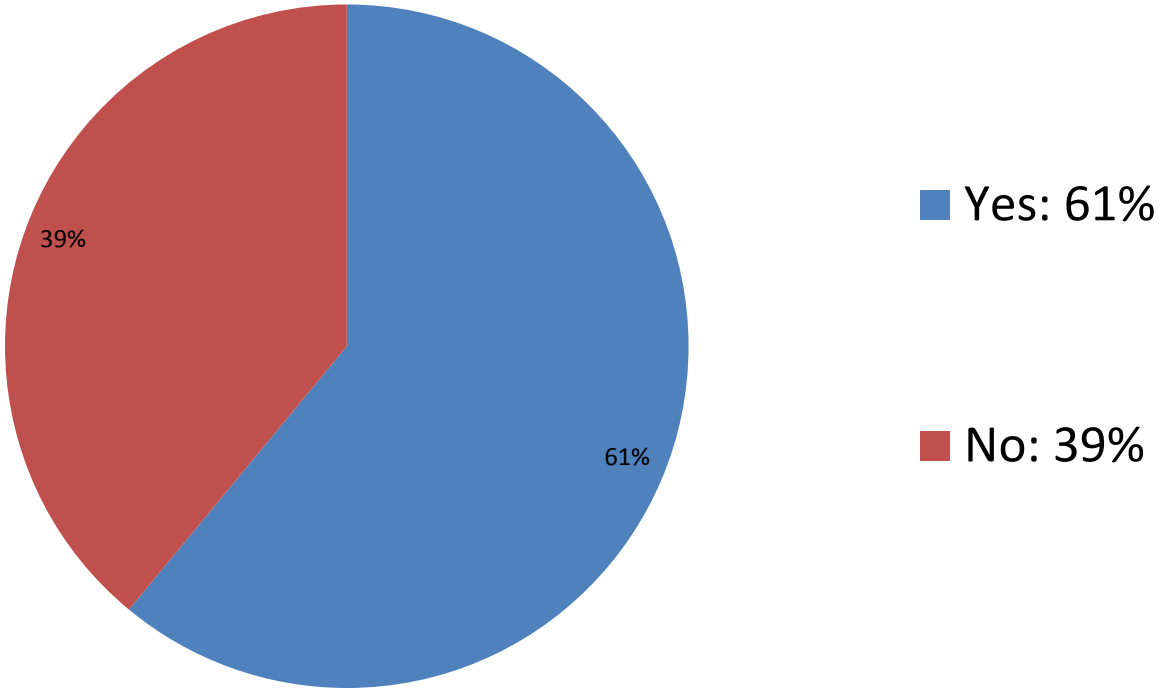
- Rate 5: 46%
- Rate 4: 39%
- Rate 3: 15%
- Rate 2: 0
- Rate 1: 0

Average: 4,3

Rate 5: excellent and rate 1: not good

NKS R and B Seminar 2019 - Survey

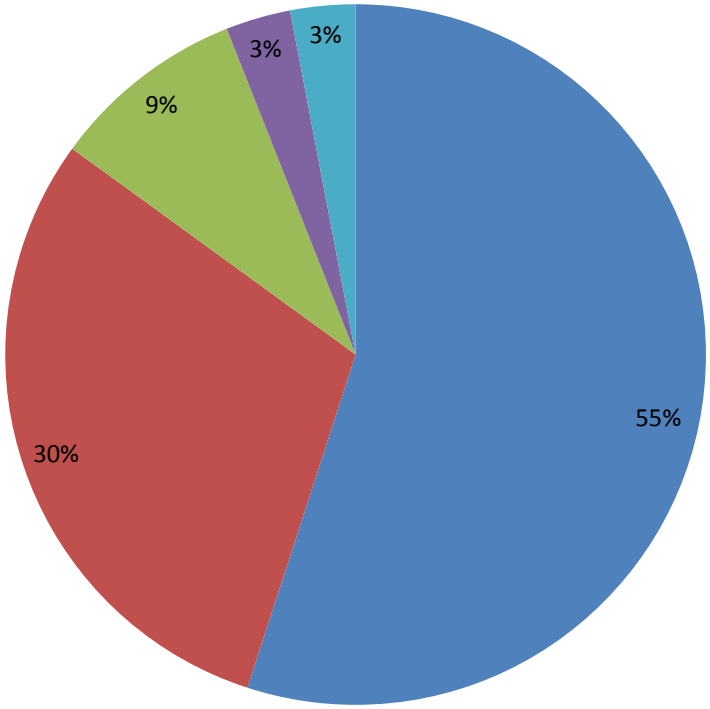
Did you visit the poster session? – 33 responses



NKS R and B Seminar 2019 - Survey

How likely are you to attend future NKS seminars? – 33 responses

Rate 5: very likely and rate 1: not likely



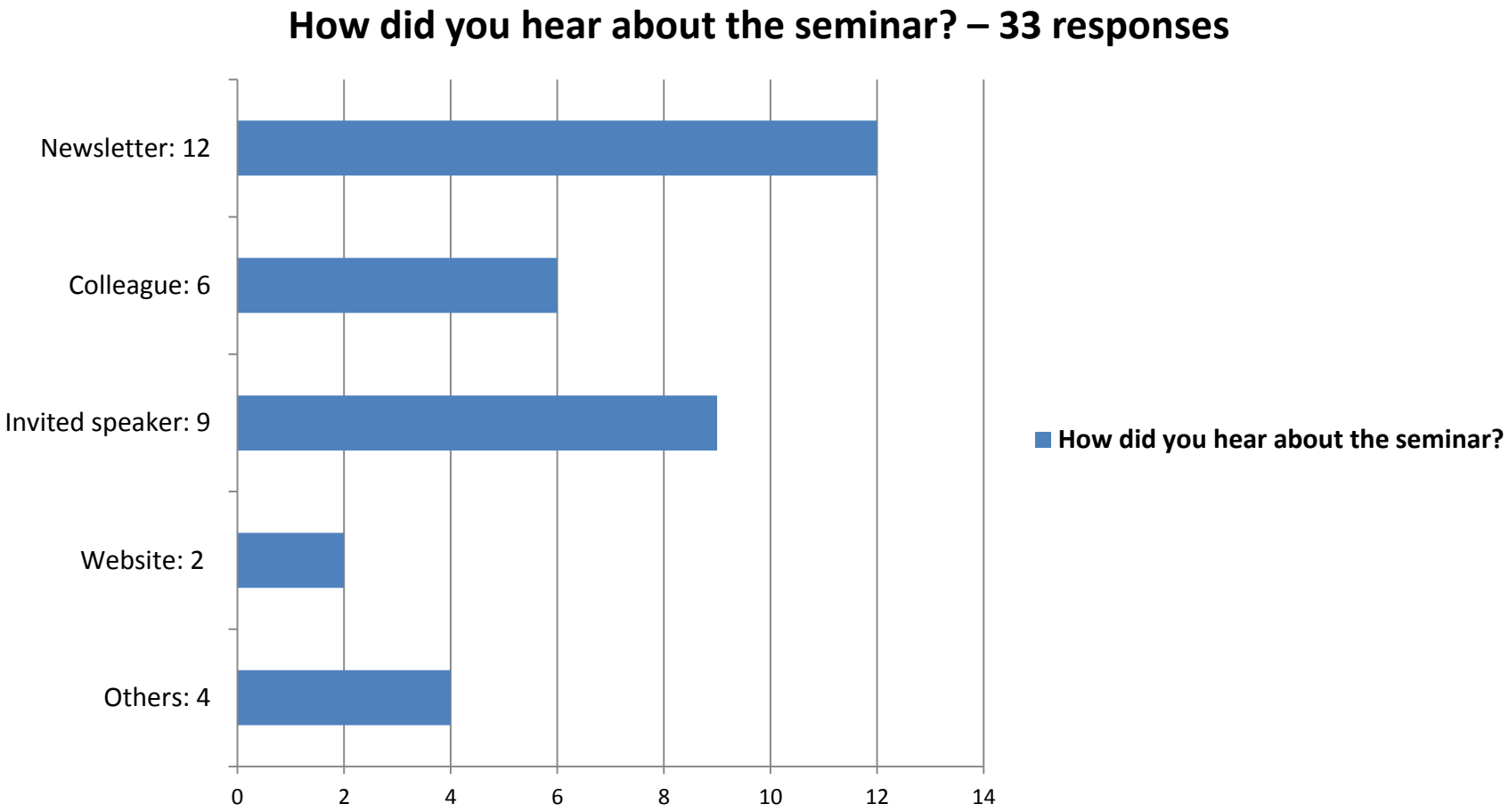
- Rate 5: 55%
- Rate 4: 30%
- Rate 3: 9%
- Rate 2: 3%
- Rate 1: 3%

Average: 4,3

Average 2016: 4,5

Average 2013: 4,5

NKS R and B Seminar 2019 - Survey



NKS R and B Seminar 2019 - Survey

- Survey comments (1):
- Generally very good speakers although some exception. Especially enjoyed Britt-Marie Drottz Sjöberg's presentation: it was refreshing to hear insights outside nuclear field, yet so relevant to us.
- Overall very interesting and well organized

NKS R and B Seminar 2019 - Survey

- Survey comments (2):
- The presentations should concentrate on showing the need for the research, what is the essential outcome, and how this affects safety. The details of experimental methods is not important in this kind of seminar. Enough time should be allocated to questions after the presentations.
- Time for questions and discussion after each session.
- Longer and SCHEDULED Q&A & discussion periods.
- More time for Q&A.

NKS R and B Seminar 2019 - Survey

- Survey comments (3):
- Seminar proceeding should have been more official and citeable i.e. NKS report number & ISBN. It always takes time and effort to produce scientific abstract and poster/presentation and it's motivating to have some kind of price for that effort i.e. something to cite and something to put in CV etc. Posters should have been more in spotlight i.e. mentioned during the seminar and separate poster session (not only during the coffee, when people want to chat, refresh, drink coffee, go to the toilet etc.

NKS R and B Seminar 2019 - Survey

- Survey comments (4):
- Details only, but as a suggestion: Maybe make the handout of books of abstracts in a bigger size, that is for instance in a A4 format? And maybe give space for notes in the handout?
- It would be nice to have more non-Nordic participants taking part in future NKS seminars.
- Keep arranging good seminars of different topics and for different audience

NKS R and B Seminar 2019 - Survey

- Survey comments (5):
- It was a little disturbing a few times when there was noise from the kitchen/dishes during presentations. Presenters must understand that they are mostly presenting to an audience that are not very familiar with their field. There were a few who lost the audience.

NKS R and B Seminar 2019 - Survey

- Survey comments (6):
- With my own field being mostly related to radioecology, and not nuclear facilites, most of the presentations were of very limited relevance to me personally. Although I see that the information is very relevant to others and the general area of radiation protection.

Short note on status of the website, NewsLetters etc.

The Secretariat

Finn Physant

NKS board meeting, Copenhagen
4 June 2019

Website

- The present version of the website was opened in 2012 and still a state-of-the-art day-to-day working tool.
- Update/upgrade proposals are always welcome.
- For the present sites we have since 2012 obtained statistics from a Google Analytics site. Here you have some main monthly figures for the first more than 6 years – starting with the 2019 figures:

Data 2019

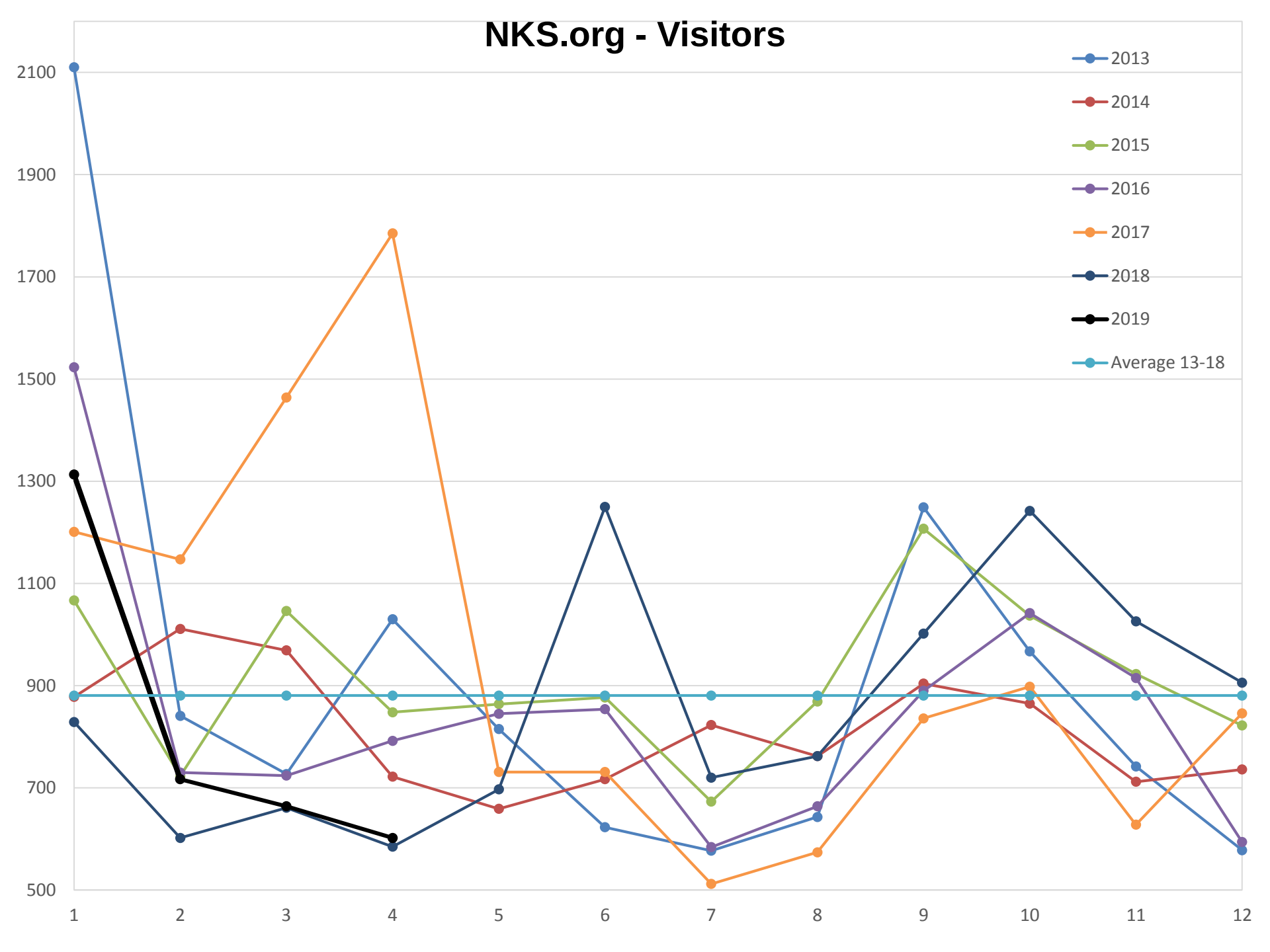
nks.org user statistics

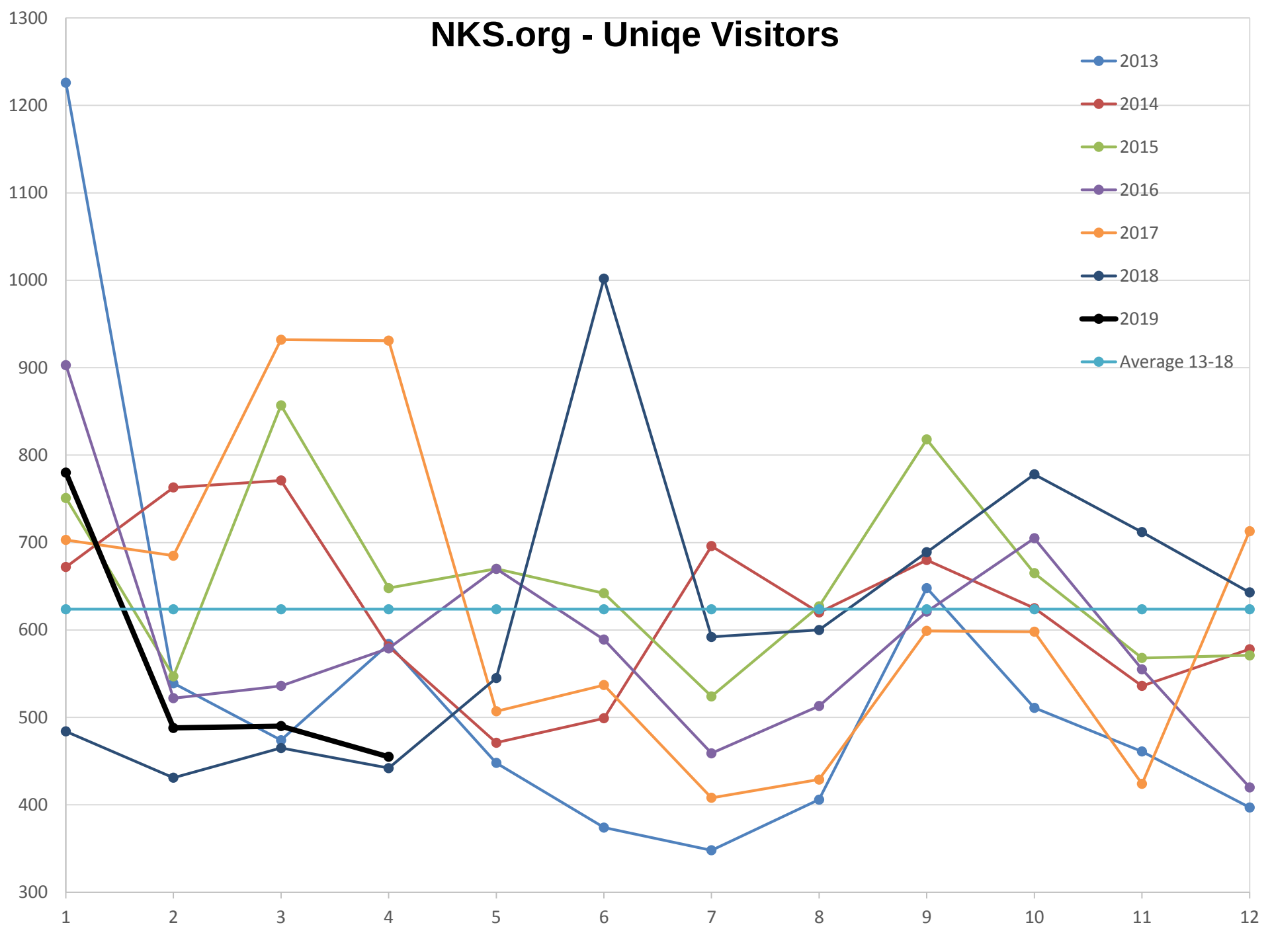
Year: 2019	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Visitors	1313	717	664	602								
Unique visitors	780	488	490	455								
New visitors	622	398	421	388								
Return visitors	691	319	243	214								
Av. session time	191	134	134	172								

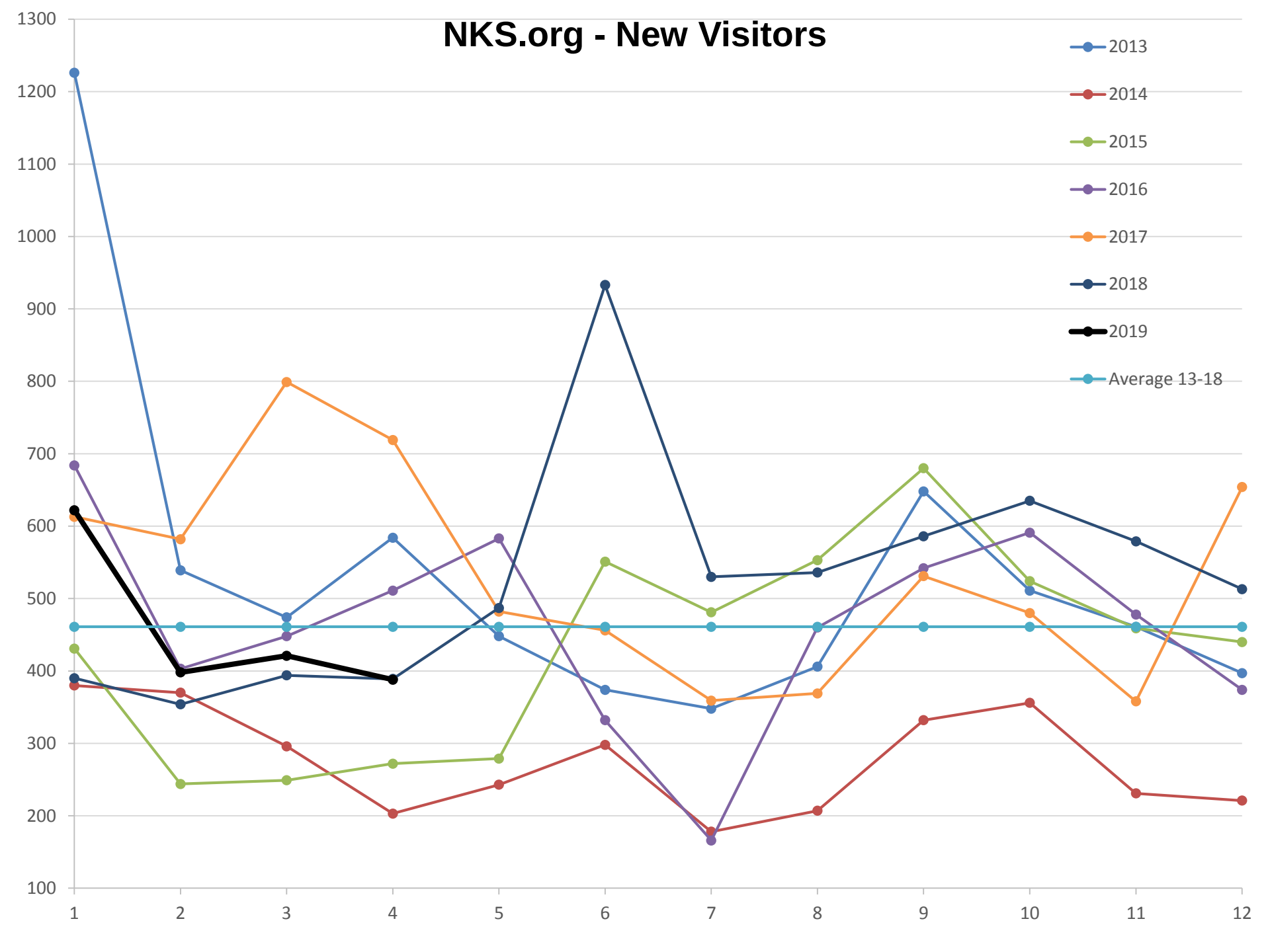
Data 2018

nks.org user statistics

Year: 2018	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Visitors	829	602	661	585	697	1250	720	762	1002	1242	1026	906
Unique visitors	484	431	465	442	545	1002	592	600	689	778	712	643
New visitors	390	354	394	389	487	933	530	536	586	635	579	513
Return visitors	439	248	267	206	210	325	190	226	417	607	447	393
Av. session time	167	111	155	138	137	80	97	120	146	171	173	154


NKS.org - Visitors
2100
1900
1700
1500
1300
1100
900
700
500
1
2
3
4
5
6
7
8
9
10
11
12
2013
2014
2015
2016
2017
2018
2019
Average 13-18


NKS.org - Uniqe Visitors
2013
2014
2015
2016
2017
2018
2019
Average 13-18
1300
1200
1100
1000
900
800
700
600
500
400
300
1
2
3
4
5
6
7
8
9
10
11
12


NKS.org - New Visitors
2013
2014
2015
2016
2017
2018
2019
Average 13-18
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
1
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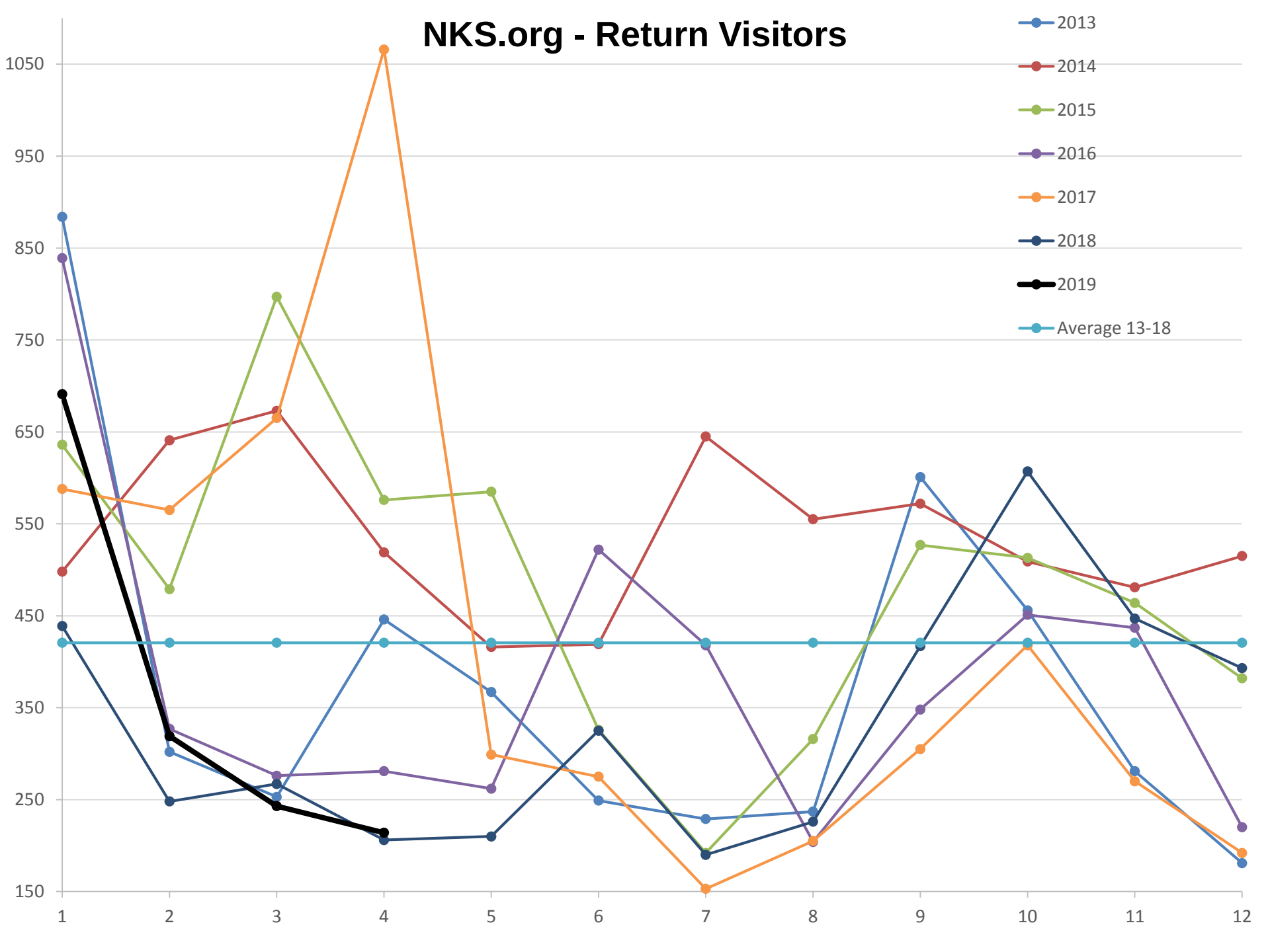
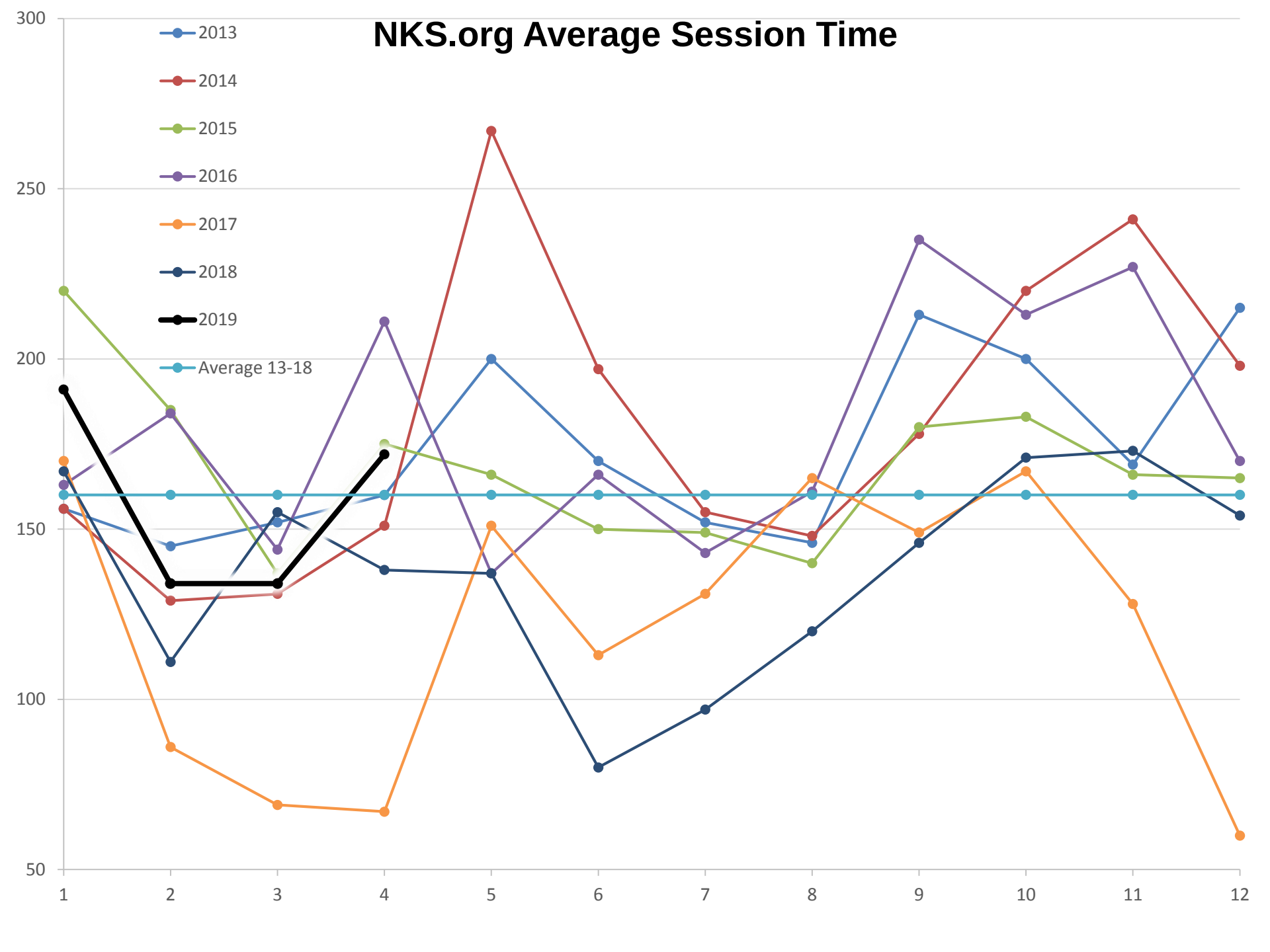
12


NKS.org - Return Visitors
2013
2014
2015
2016
2017
2018
2019
Average 13-18
1050
950
850
750
650
550
450
350
250
150
1
2
3
4
5
6
7
8
9
10
11
12


NKS.org Average Session Time
2013
2014
2015
2016
2017
2018
2019
Average 13-18
300
250
200
150
100
50
1
2
3
4
5
6
7
8
9
10
11
12

NewsLetters and NewsFlashes

- Since the last board meeting one NewsFlash has been distributed.
- January 24: Presentations from the R and B seminar available at www.nks.org and summary report from the board meeting in Stockholm, January 17 2019
- May 28: A NewsLetter was distributed a week before this board meeting with presentation of many new publications
- There is a list of more than 540 e-mail addresses, to which our electronic letters are forwarded.
- A NewsFlash will be prepared for distribution within a week after this board meeting.

Other kinds of info activities

- LinkedIn. We now have 51 followers.
- Roll-up and pens have been produced for the 2019 NSFS conference.