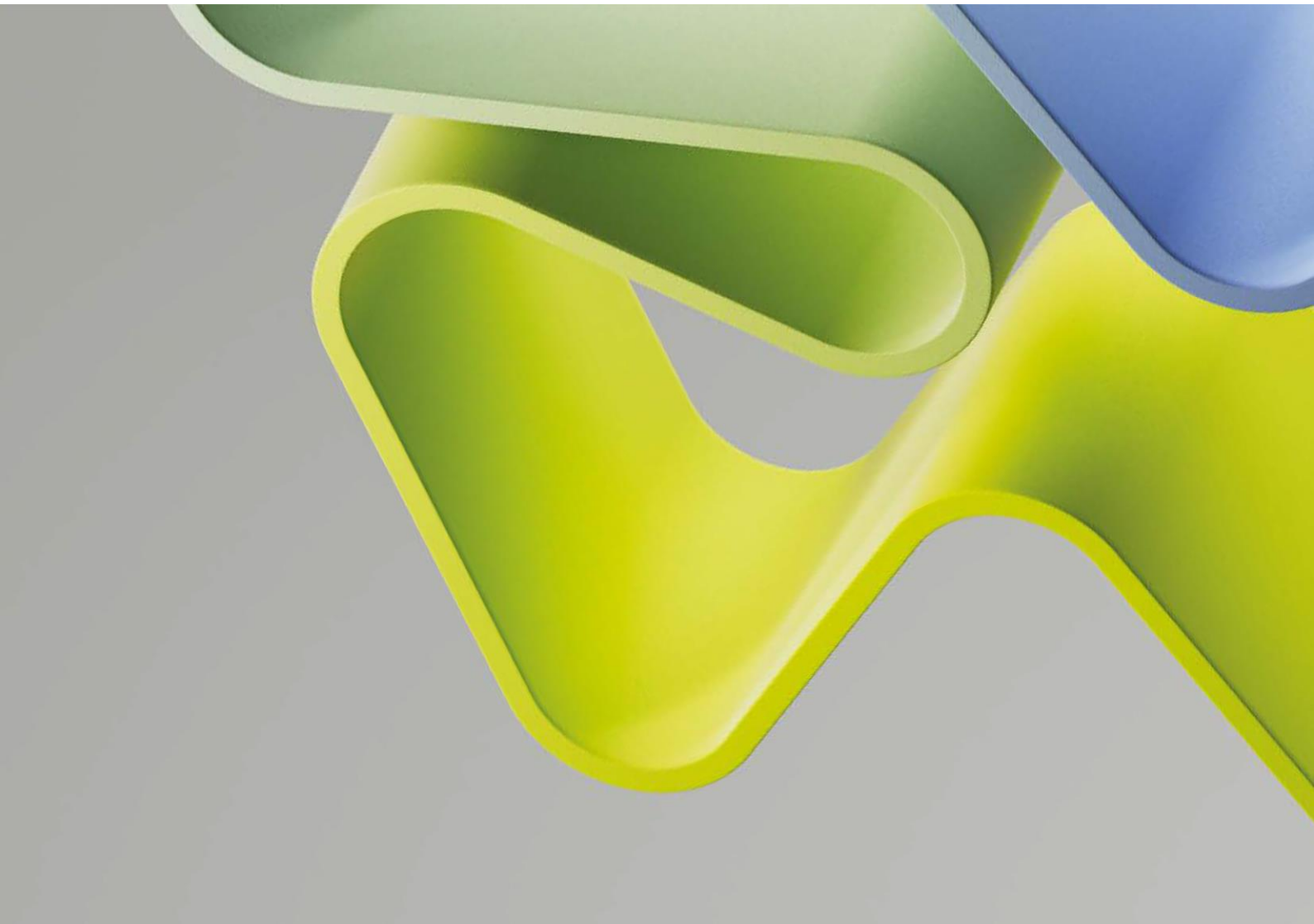
Research Council of Norway

Evaluation of biosciences (EVALBIOVIT) 2022-2023

RCN funding of biosciences



Content

Preface

This report has been prepared as background material for the Evaluation of biosciences (EVALBIOVIT). It aims to summarise the Research Council of Norway's (RCN) funding of biosciences research over the period 2011 to 2021.

The data that is presented stem mainly from the RCN's internal database Datavarehuset. In this database, projects within the biosciences are found among several fields in the classification scheme used by the RCN. The following RCN fields or disciplines have been included in the analyses:

Within the area of research Mathematics and natural sciences:

- Basic biosciences (code 47F)
- Zoology and botany (code 48F)

Within the area of research Technology:

- Biotechnology (code 59F)
- Medical technology (code 62F)

Within the area of research Agriculture and fisheries science:

- Agriculture (code 91F)
- Fisheries science (code 92F)
- Interdisciplinary agriculture and fisheries science (code 90F)

Within the area of research Medicine and health:

- Interdisciplinary medicine (code 70F), but only the following disciplines:
    - Interdisciplinary medicine and other fields (706)
- Basic medical, dental and veterinary fields (code 71F), but only the following disciplines:
    - Basic medical, dental and veterinary fields (710)
    - Human and veterinary physiology (718)

In the following report these fields will collectively be referred to simply as the *biosciences*.

Role of the RCN in Norwegian R&D funding

Role of the RCN in Norwegian R&D funding

In 2021, the RCN distributed 31% of Norwegian public R&D expenditure.

The Research Council of Norway (RCN) is a national strategic body for research. It manages research funding from all of the Norwegian ministries and allocates funds to basic and applied research and innovation within all fields and disciplines.

The RCN has a strategic responsibility for the sector. The RCN advises the authorities on research and research policy and helps to ensure that research structures and policy tools are coherent. It aims to increase the quality of Norwegian research and is also responsible for research evaluations. The RCN creates venues where Norwegian researchers can meet, promotes collaboration between research communities and has a national responsibility for research-related communication[1].

The evaluation for which this report is made is expected to produce new knowledge and recommendations that may be of use in the development of to the RCN's funding instruments and as a basis of advice to the government.

According to the Science and Technology Indicators for Norway, NOK 81.6 billion was spent on research and development (R&D) in Norway in 2021. Of this, NOK 26.9 billion (33%) was spent in the University and university college sector, NOK 16.4 billion (20%) in the Institute sector and NOK 38.3 billion (47%) in the Business sector. In the same year, public R&D funding amounted to NOK 37.8 billion (46% of total)[2].

Based on RCN data, RCN's total R&D expenditure in 2021 was NOK 11,9 billion, or 31 % of public spending. Of this, close to NOK 2 billion was basic allocations which are excluded from subsequent analyses (see Methods).

Over the period 2011-2021, the RCN's total expenditure on R&D projects was NOK 80 billion, excluding basic allocations. The area of research Technology has been and continues to be the largest in the RCN's portfolio (see Figure 1.1). Most areas have seen a real increase (after adjusting for inflation) except for the area of Agriculture and fisheries science. The largest relative increases in funding over the period 2011 to 2021 have come in Social sciences and Mathematics and natural sciences.

[1] https://www.regjeringen.no/en/dep/kd/organisation/kunnskapsdepartementets-etater-og-virksomheter/Subordinate-agencies-2/the-research-council-of-norway/id426571/

[2] Indikatorrapporten, 2023

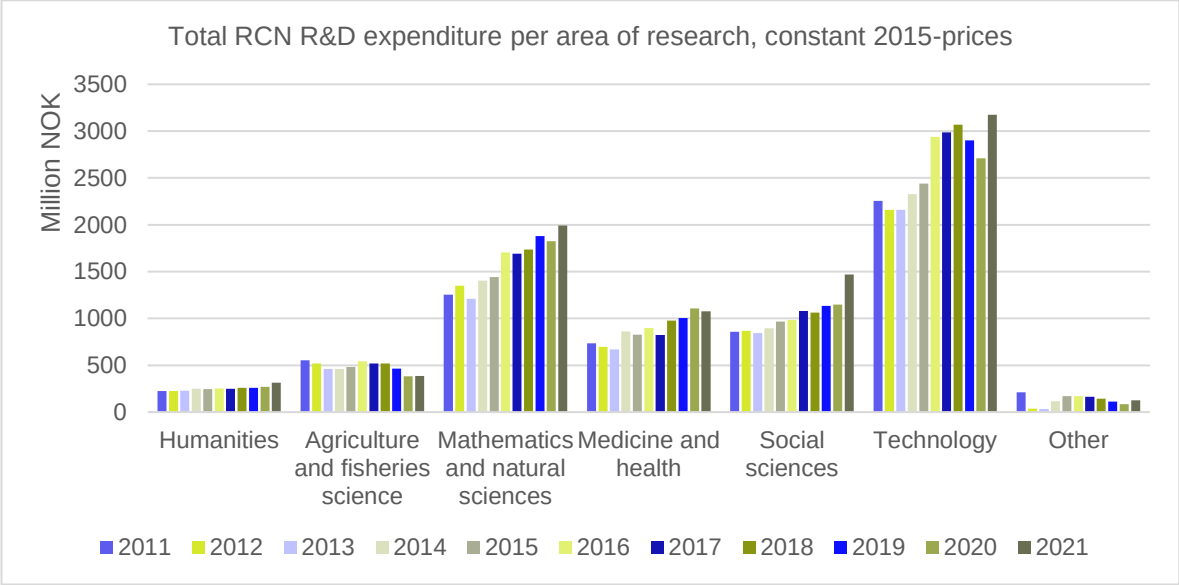


Figure 1.1. The graph shows total annual RCN R&D expenditure in constant 2015-prices by area of research ("fagområde"). Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Basic allocations not included. Inflation adjustment according to Statistics Norway's R&D adjustment.

The RCN has many funding schemes. These activities are for administrative and statistical purposes binned into what is called funding instruments. The RCN har six funding instruments for R&D projects:

1) Independent projects - bottom-up researcher-initiated projects. Projects are of medium size and often in basic science.
2) Programmes - strategic and targeted research efforts to generate new knowledge in a limited area.
3) Infrastructure and institutional measures - the largest funding schemes within this instrument are the national financing initiative for research infrastructure (FORINFRA) and the Centres of Excellence schemes (SFF and SFI). The projects funded in these schemes are few and large.
4) Networking measures
5) Public administration – funds administered by the RCN for external entities, i.e.not subject to RCN board decisions.
6) Diverse R&D-related activities – mostly publication and dissemination costs including science museum ("vitensentre") funding. This instrument is

Over the period 2011 to 2021 53% of RCN's total expenditure (in current prices) was allocated through Programmes, 21% through Infrastructure and institutional measures, 15% through Independent projects, 7% through Networking measures, 3% through Public administration and 1% through Diverse R&D-related activities.

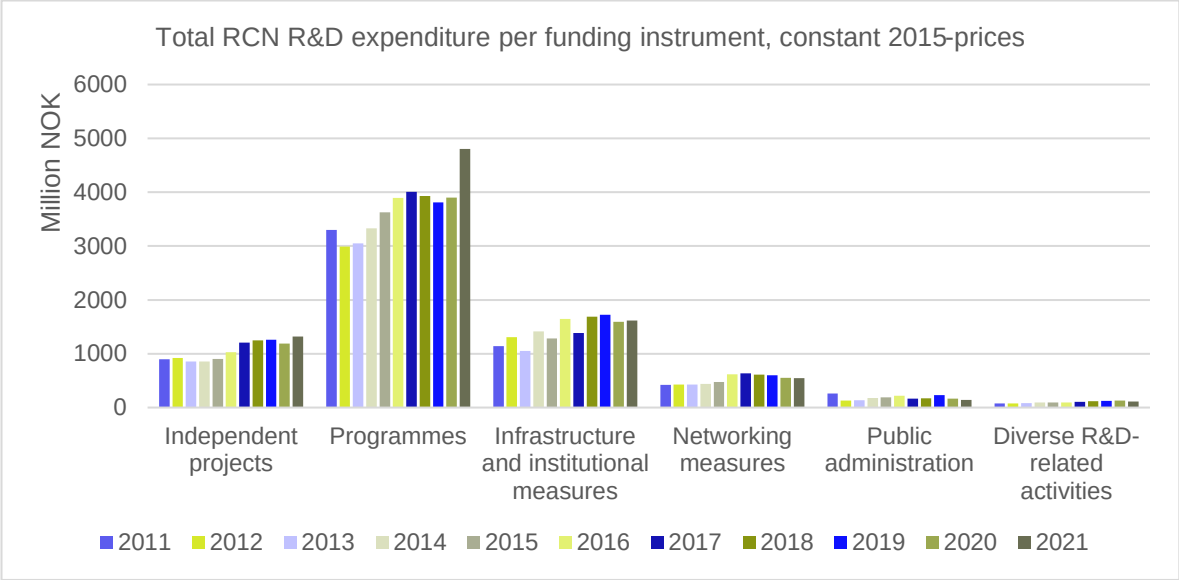


Figure 1.2. The graph shows RCN's total annual expenditure per funding instrument ("virkemiddel"), in constant 2015-prices. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Basic allocations not included. Inflation adjustment according to Statistics Norway's R&D adjustment.

While the Business sector is the largest R&D-performing sector in Norway, it is the University and university colleges sector and the Institute sector that are the largest recipients of funding from the RCN. Over the period 2011-2021 41% of RCN's R&D funds (in current prices) went to the University and university colleges sector, 30% to the Institute sector and 20% to the Business sector.

It is worth noting that both the University and university colleges sector and the Hospital sector receive basic allocations from their respective Ministries that are not funneled through the RCN. Although RCN administrates the basic allocation for a specific subset of Institutes, data on RCN funding is in this report is limited to competitive funding. The Public sector designation is a recent addition. The large relative increase in this sector is thus likely a statistical artefact.

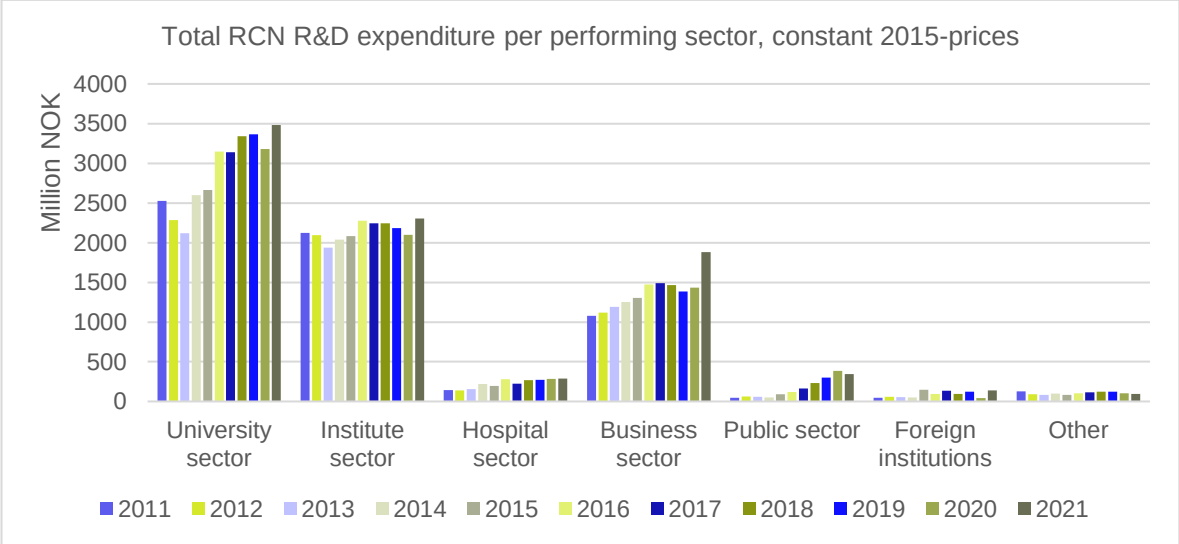


Figure 1.3. The graph shows RCN's total annual R&D expenditure in all areas of research by R&D-performing sector, in constant 2015-prices. Data is based on annual revised budgets per project.

Each project is assigned in its entirety to its main area of research. University sector = University and university college sector. Basic allocations not included. Inflation adjustment according to Statistics Norway's R&D adjustment.

The clearest trend is that the share of R&D funds received by the Institute sector has declined over the period. Some of this effect is due to structural changes in the sector (mergers of Institutes with HEIs), but these do not explain all of the decline.

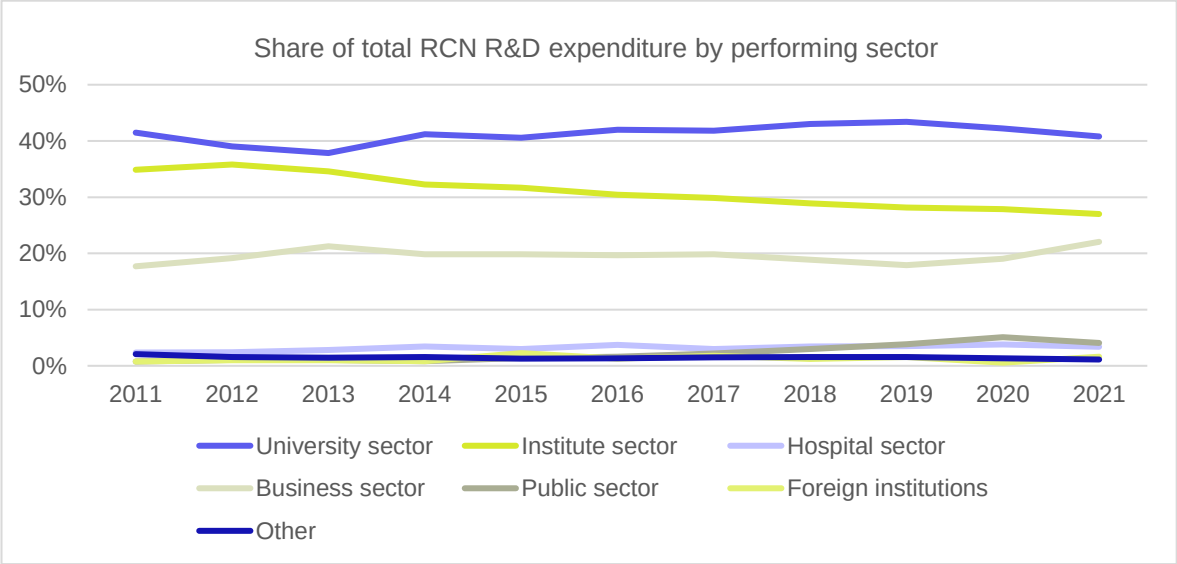


Figure 1.4. Share of total RCN R&D expenditure by performing sector. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Basic allocations not included. Inflation adjustment according to Statistics Norway's R&D adjustment.

Methods

Methods

Data

The national data presented in this report is from Indikatorrapporten from 2023. The latest English version, from 2021, can be found here.

The analysis of RCN funding is based on internal data from the RCN database (Datavarehuset). It shows RCN funded R&D projects excluding basic allocations ("basisbevilgninger" as main activity).

The data shown is based on annual revised budgets for the years 2011-2021. Only previously or currently funded projects are included in the data set.

Only projects that are marked as predominantly within a given field are included in the analyses ("hovedfagmerking"). This means that interdisciplinary projects that are marked as mostly within a different field are not included in the data set, even if they have parts that are within the covered fields.

The Norwegian R&D system has undergone some structural changes in the period 2011-2021 that affect the RCN data. Projects owned by an organisation at the time of the organisational change were transferred in their entirety to the new organisation only if the project was still active/receiving funding at that time. This means that some of the projects that were already ongoing at the time of the transfer will be shown as owned by the new organisation even before the organisational change took place. Conversely, projects owned by the old organisational units that were finished before the organisational change took place, will not be included in the data set used here.

The RCN data is presented in constant 2015-prices. The adjustment from current prices is done according to Statistics Norway's R&D price index as shown here (c-tabeller-statistiske-basistall-2021.xlsx (live.com)).

Over the period that the report covers the value of the Norwegian currency has decreased relatively steadily, both in relation to the Euro and USD. In 2011 one Euro cost NOK 7,79 whereas in 2021 one Euro cost NOK 10,16. Similarly, one USD cost NOK 5,61 in 2011 and NOK 8,60 in 2021.

Field designations

The RCN uses a field designation that is based on, but not identical to, the FORD classification in the Frascati manual. The designation has three levels (from less to more detailed):

1. Area of research (corresponds to FORD level "Broad classification") = "Fagområde"
2. Field of research (corresponds to FORD "Second-level classification") = "Fag"
3. Discipline (third level) = "Fagdisiplin"

Funding instruments

The RCN has six funding "Instruments" ("virkemiddel") that fund R&D projects:

1. Independent projects = "Frittstående prosjekter"
2. Programmes = "Programmer"
3. Infrastructure and institutional measures = "Infrastruktur og institusjonelle tiltak"
4. Networking measures = "Nettverkstiltak"
5. Public administration = "Forvaltning"
6. Diverse R&D-related projects = "Diverse FoU-relaterte prosjekter"

Sector designations

The RCN's sector designation differs somewhat from OECD's classfication. In Norwegian national R&D statistics the following three basic sectors are used (see sti-report-2021.pdf (forskningsradet.no):

1. The Higher Education Sector ("UH-sektor") is comprised of universities, university colleges and other units providing higher education as well as university hospitals.
2. The Institute Sector ("Instituttsektor") is comprised of research institutes and other R&D-performing institutes mainly controlled and funded by the government, health trusts not conducting education, private non-profit hospitals as well as private non-profit research institutes mainly serving industry. The latter institutes are classified as business sector in the OECD classification.
3. The industrial sector ("Næringslivssektor") is comprised of companies and enterprises that provide commercial goods and services.

The RCN's sector designation is based on the same basic classification but is somewhat more fine-grained and uses the following classifications:

1. Universities and University Colleges Sector
2. Hospital Sector – all types of hospitals, with or without university affiliation / functions
3. Institute sector
4. Business sector
5. Public sector
6. Foreign institutions
7. Other

RCN biosciences funding

RCN biosciences funding

Research fields and funding instruments

Over the period 2011-2021 RCN expenditure on projects within biosciences amounted to NOK 15 billion (in current prices). This constitutes almost 19% of total RCN R&D expenditure over the period.

The largest expenditure has been in the fields of Biotechnology, Zoology and botany and Agriculture, but the most consistent increase has occurred within Basic biosciences.

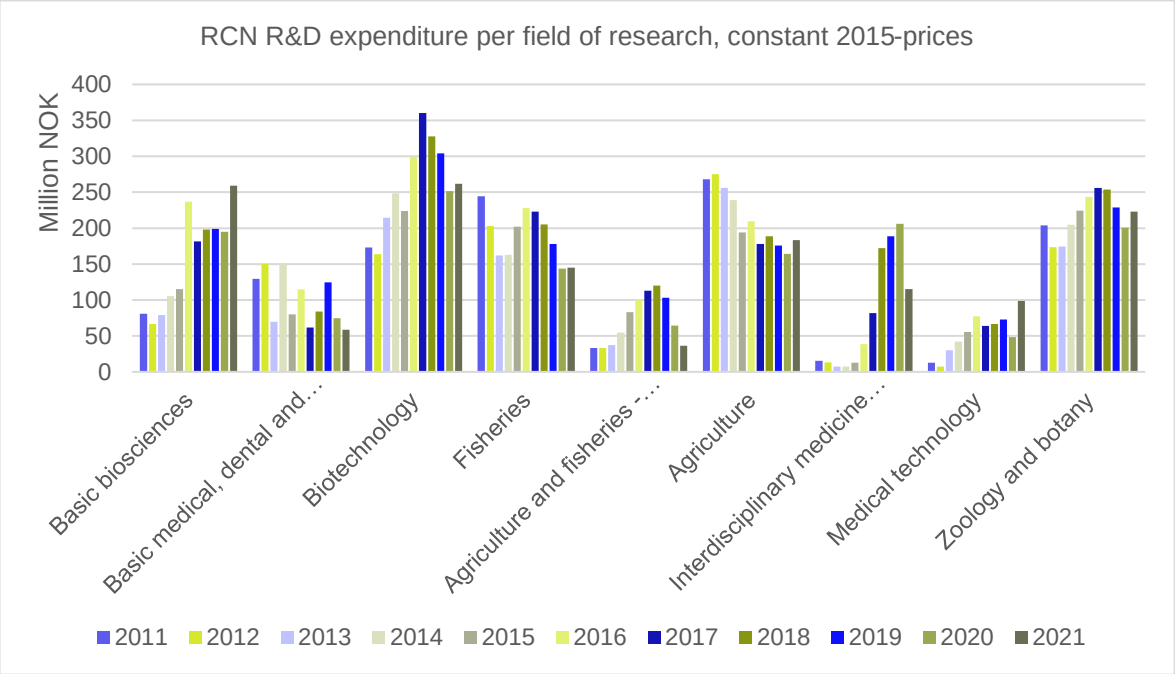


Figure 3.1. Graph shows RCN expenditure on all R&D projects within the biosciences. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Five of the RCN's funding instruments provide significant funding to biosciences. The largest amount is funneled through activities within the funding instrument Programmes. Calls within this instrument have provided NOK 8,5 billion to the biosciences (56% of the total) over the period 2011-2021. The largest amount of funding came from activities that fund research to promote profitable and sustainable terrestrial production of food and bioresources (BIONÆR, NOK 1.8 billion), marine research (MARINFORSK, NOK 0.8 billion), biotechnology (BIOTEK2021, NOK 1.4 billion) and aquaculture (HAVBRUKs/HAVBRUK2, NOK 1.6 billion).

Over the same period, Independent projects provided a total of NOK 2,6 billion (17% of the total), Infrastructure and institutional measures NOK 2,2 billion (14%), Networking measures NOK 0,7 billion (5%) and Public administration NOK 1,2 billion (8%).

Compared to the overall picture (Figure 1.2), the R&D funding of the biosciences is relatively similar when it comes to use of funding instruments. However, there is a slightly larger component of Public administration funds. In the biosciences the dominant activities within Public administration aim to support agriculture and food production.

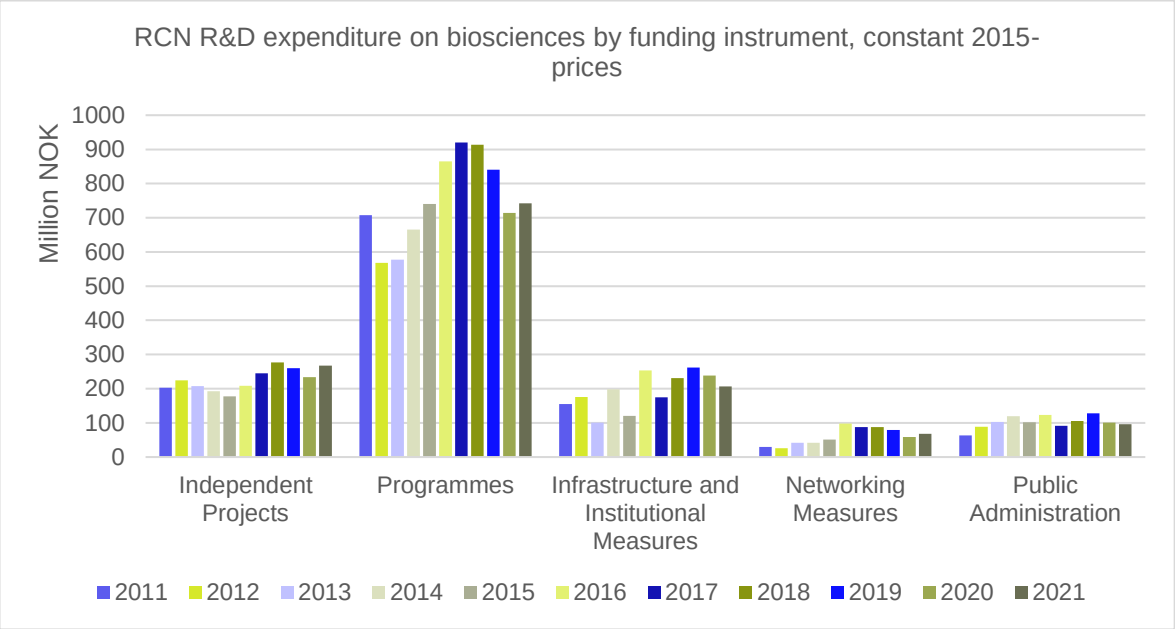


Figure. 3.2. Graph shows RCN R&D expenditure on biosciences by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

The significance of each funding instrument varies between the research fields covered by the evaluation. In Basic biosciences the research funding is dominated by projects within the instrument Independent projects, 83% of which is from FRIPRO activities. Within the instrument Infrastructure and institutional measures the majority of the funding has come through the national funding initiative for research infrastructure (FORINFRA). Funding from the FORINFRA scheme is typically used to buy major scientific equipment and hence the projects appear as large and of short duration. This explains the large jump in funding in 2016, for instance.

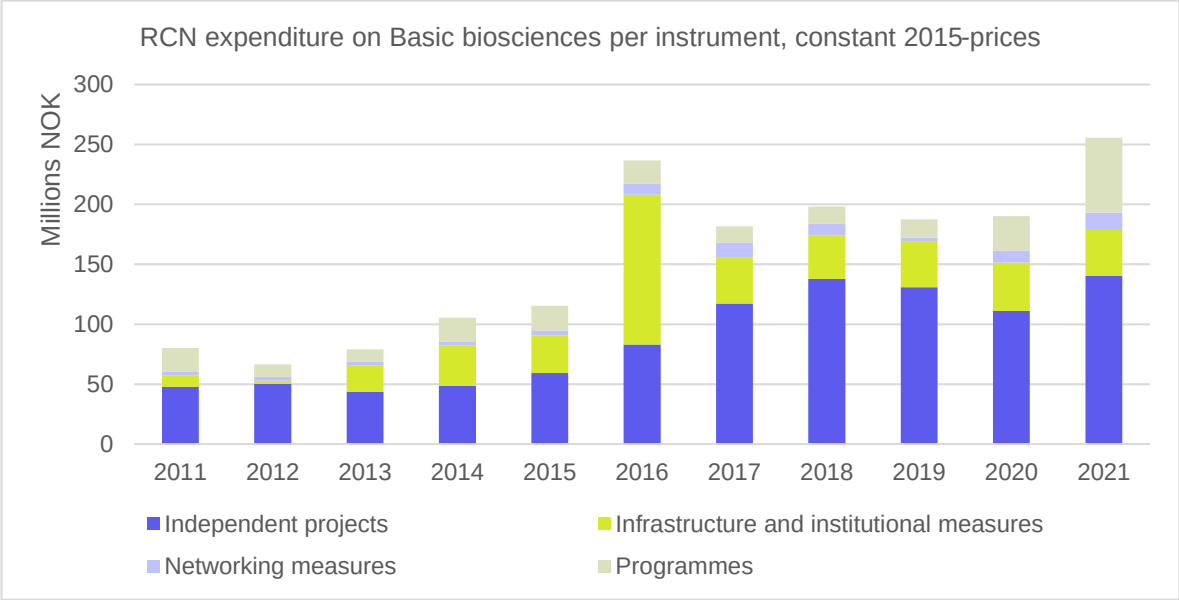


Figure 3.3. Graph shows RCN R&D expenditure in Basic biosciences by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

In Basic medical, dental and veterinary sciences calls within the instrument Infrastructure and institutional measures is quite important. 62% of these funds come from national funding initiative for research infrastructure. This also explains the large annual variability. Another 33% come from the Centres of Excellence schemes, in this case predominantly SFF. Another important contribution to this field has come through Independent projects which nevertheless has seen a gradual decrease since 2012.

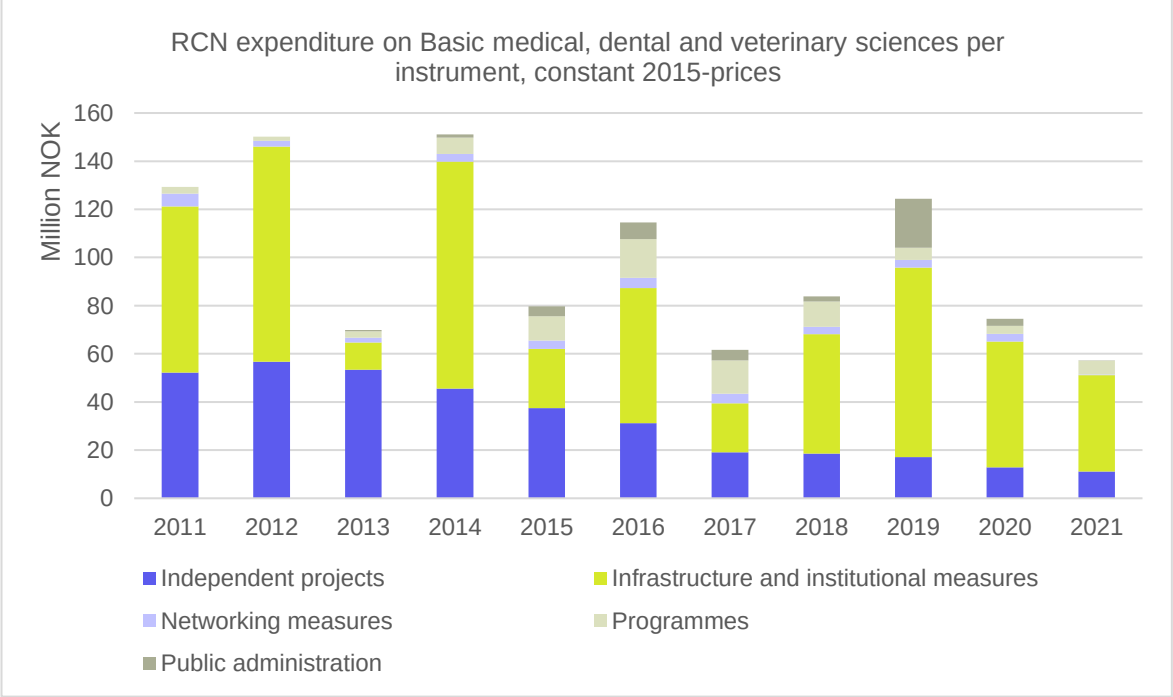


Figure 3.4. Graph shows RCN R&D expenditure on Basic medical, dental and veterinary sciences by funding instrument. Only discipline codes 710 and 718 are included. Data is based on annual revised

budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

For Biotechnology funding has been dominated by Programmes, roughly 57% of which is from the biotechnology programme (BIOTEK21, NOK 1,4 billion).

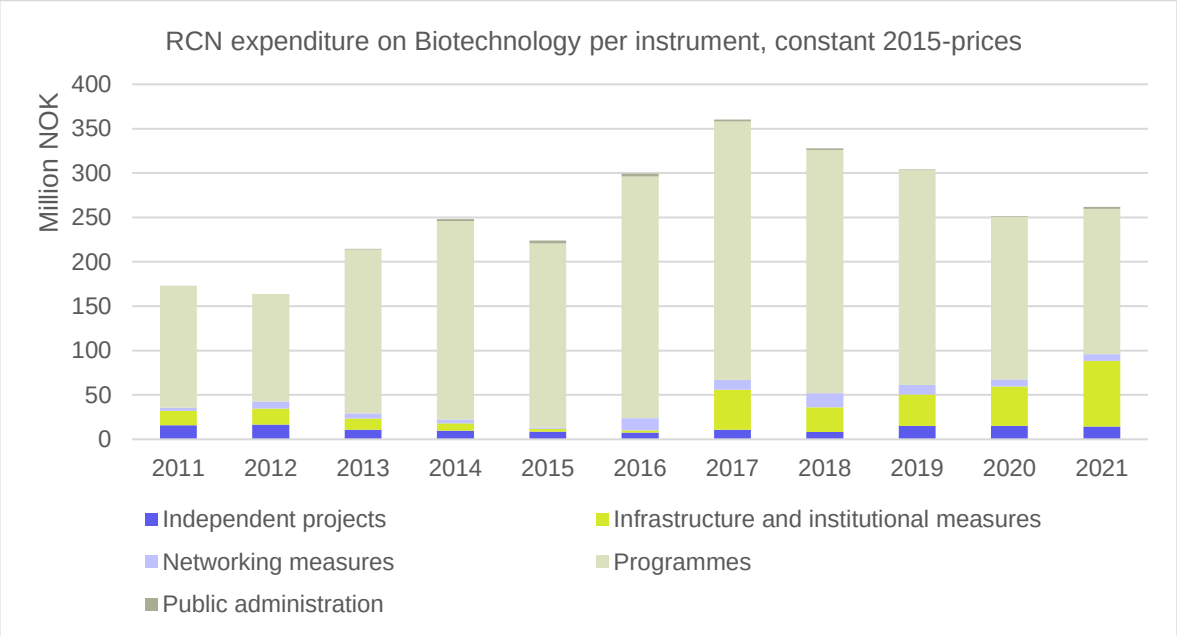


Figure 3.5. Graph shows RCN R&D expenditure on Biotechnology by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Also Fisheries science funding is largely from Programmes. 87% of this comes from funding activities supporting research on aquaculture (HAVBRUKS and HAVBRUK2).

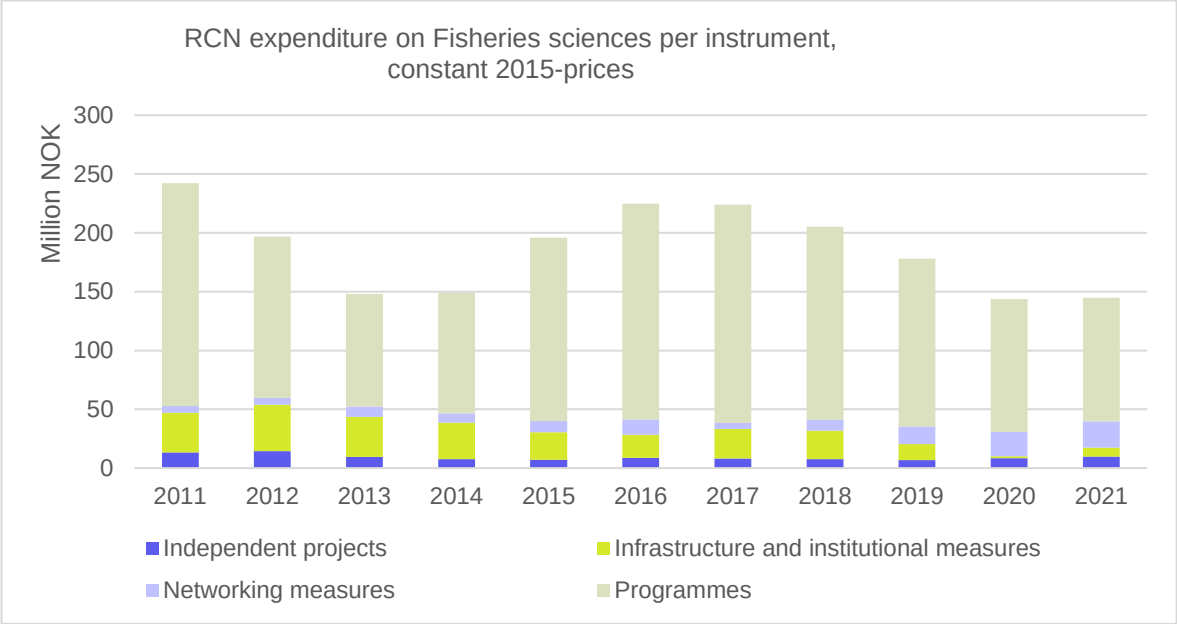


Figure 3.6. Graph shows RCN R&D expenditure on Fisheries sciences divided by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

In the field called Interdisciplinary agriculture and fisheries sciences Programmes is also a major contributor. In particular activities that fund research to promote profitable and sustainable terrestrial production of food and bioresources (BIONÆR) are important in this field. In this field the funding instrument Public administration is also significant. Whereas funding instruments within Public administration are administered by the RCN, they are subject only to external board decisions. In this case the funds are awarded mostly based on competitive calls that fund research on agriculture and food production.

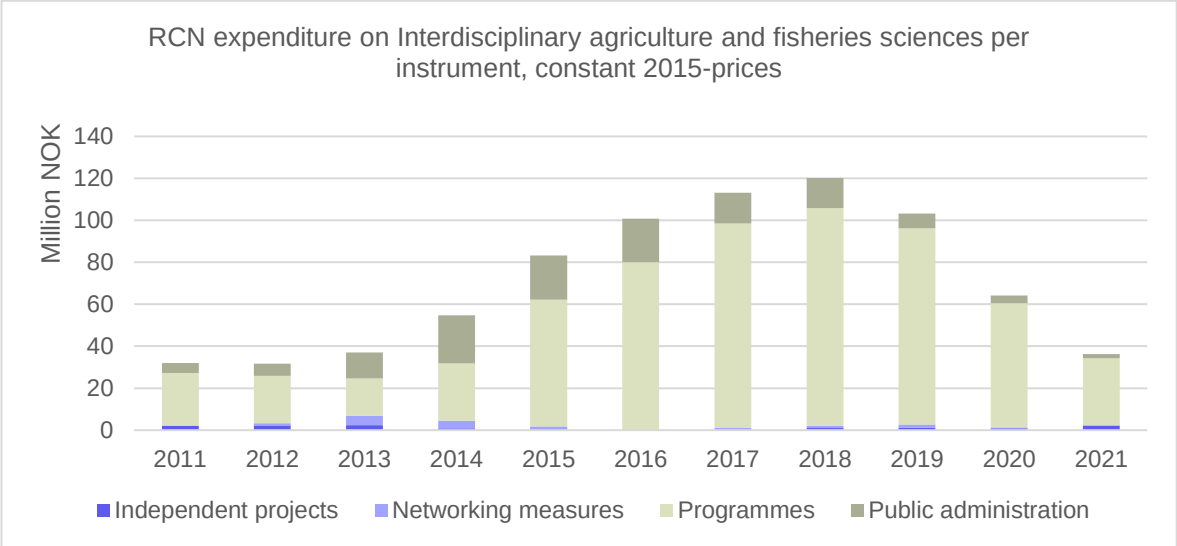


Figure 3.7. Graph shows RCN R&D expenditure on Interdisciplinary agriculture and fisheries sciences divided by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Within Agriculture the two most important funding instruments are Programmes and Public administration. Within Programmes it is activities that fund research to promote profitable and sustainable terrestrial production of food and bioresources (BIONÆR) that is of particular importance.

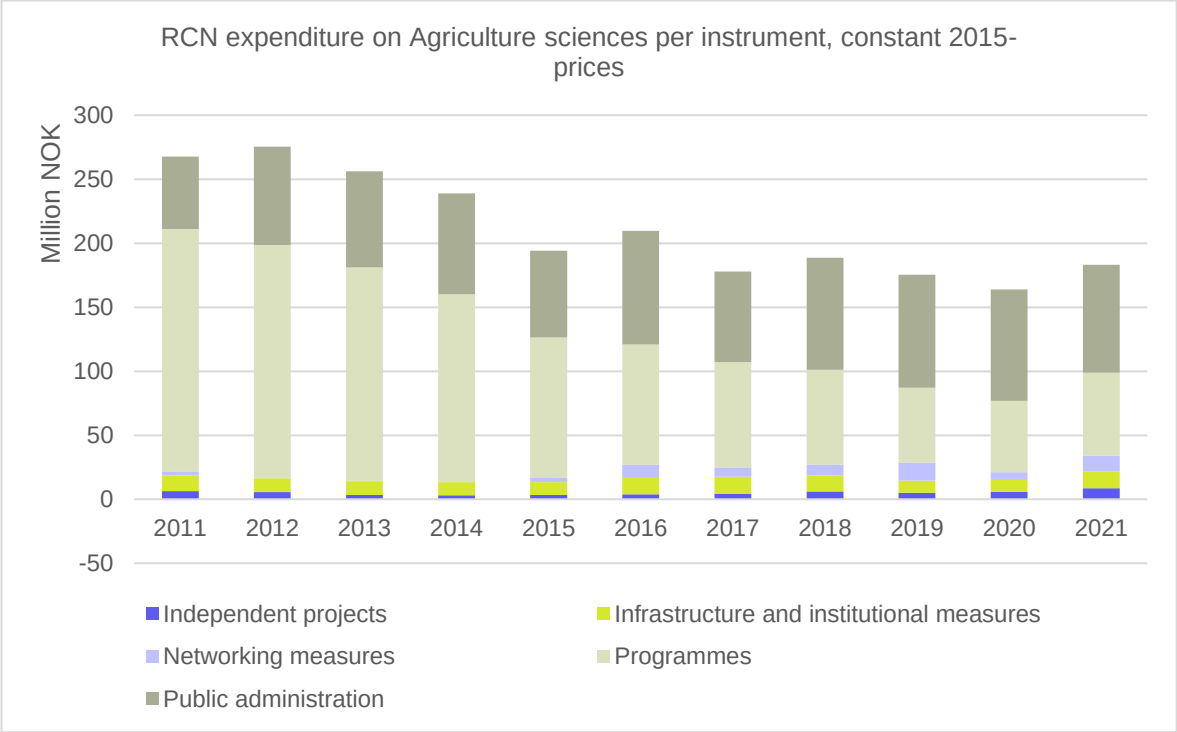


Figure 3.8. Graph shows RCN R&D expenditure on Agriculture divided by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Within the research field called Interdisciplinary medicine only the research discipline Interdisciplinary medicine and other fields (code 706) is included in the analysis. This discipline has seen a dramatic increase in funding starting in 2016. Much of the funding has come through activities within the funding instrument Programmes, and these mostly through the funding for health, care and welfare services (HELSEVEL)[3]. There is also significant funding in 2018-2020 through Infrastructure and institutional measures that have been allocated mostly through the FORINFRA scheme.

[3]HELSEVEL does not fund any biosciences projects, but these projects are included in the data set because all projects classified within the field Interdisciplinary medicine, discipline code 706 are captured, without regard to subject matter.

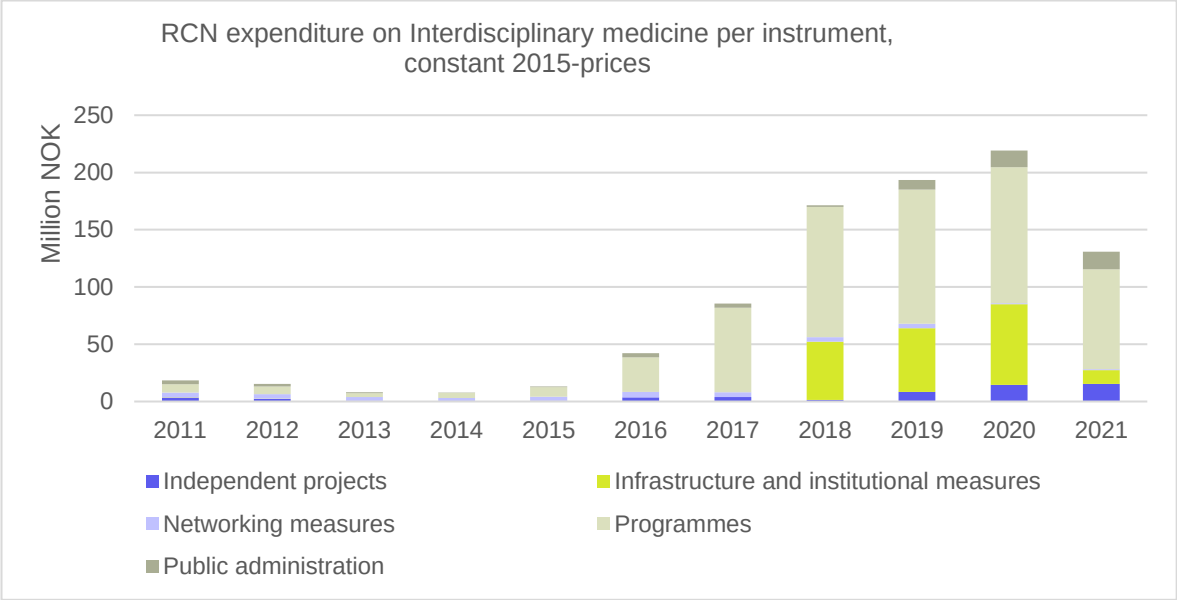


Figure 3.9. Graph shows RCN R&D expenditure on Interdisciplinary medicine divided by funding instrument. Only discipline code 706 (Interdisciplinary medicine and other fields) is included. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Within Medical technology much of the funding has come from the funding instrument Networking measures. Nearly all of this funding has been allocated through the activity to support increased commercial use of research results (FORNY2020). The large jump in Programmes in 2021 is due to allocations through the activity that supports innovation (BIA).

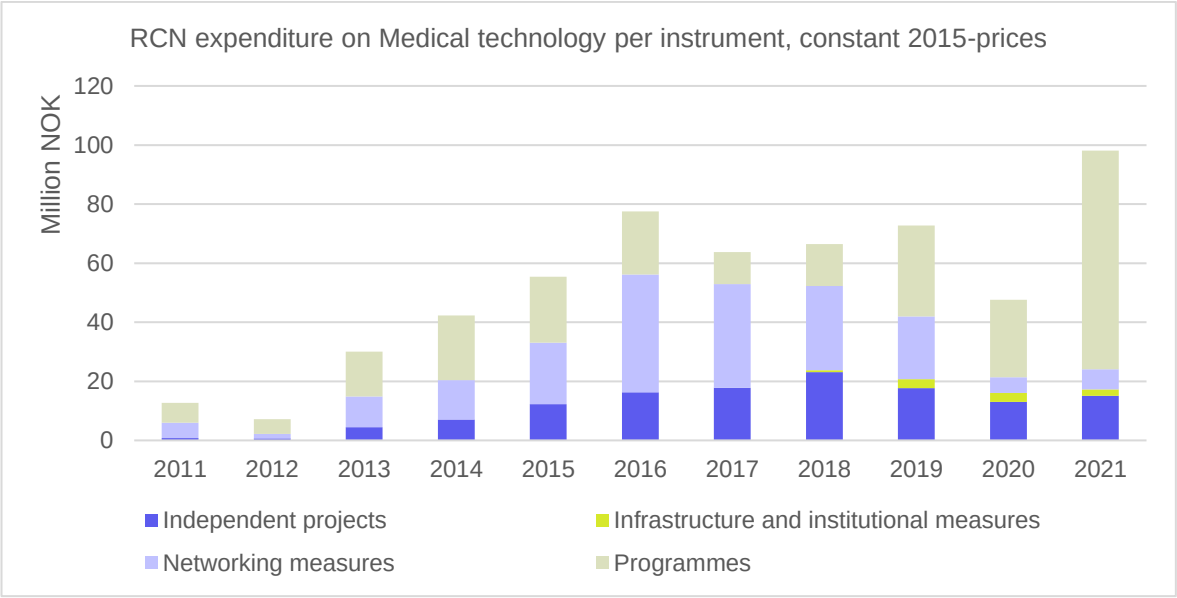


Figure 3.10. Graph shows RCN R&D expenditure on Medical technology divided by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Funding for Zoology and botany mainly from Programmes and Independent projects. The funding from Programmes comes from several activities, the most important being those that support research on marine science (MARINFORSK), environmental science (MILJØFORSK), polar research (POLARPROG) and climate research (KLIMAFORSK). Within Independent project FRIPRO is the most important funding source.

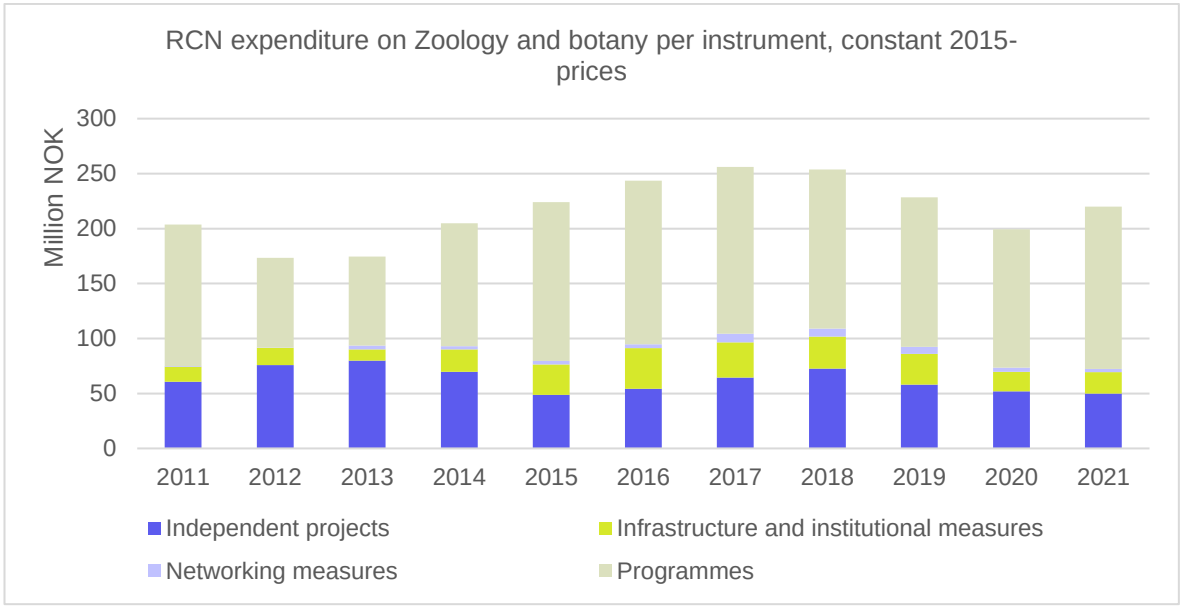


Figure 3.11. Graph shows RCN R&D expenditure on Zoology and botany divided by funding instrument. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

Sectors and institutions

In the rest of the report we will look at the RCN data from the point of view of recipient institutions. As for the RCN portfolio as a whole, it is the University and university colleges sector that has received the most R&D funding from RCN R&D funds within the biosciences, but also the Institute sector and the Business sector has received significant amounts of funding. That medicine is not covered by the EVALBIOVIT evaluation explains why the funding received by the Hospital sector is quite modest.

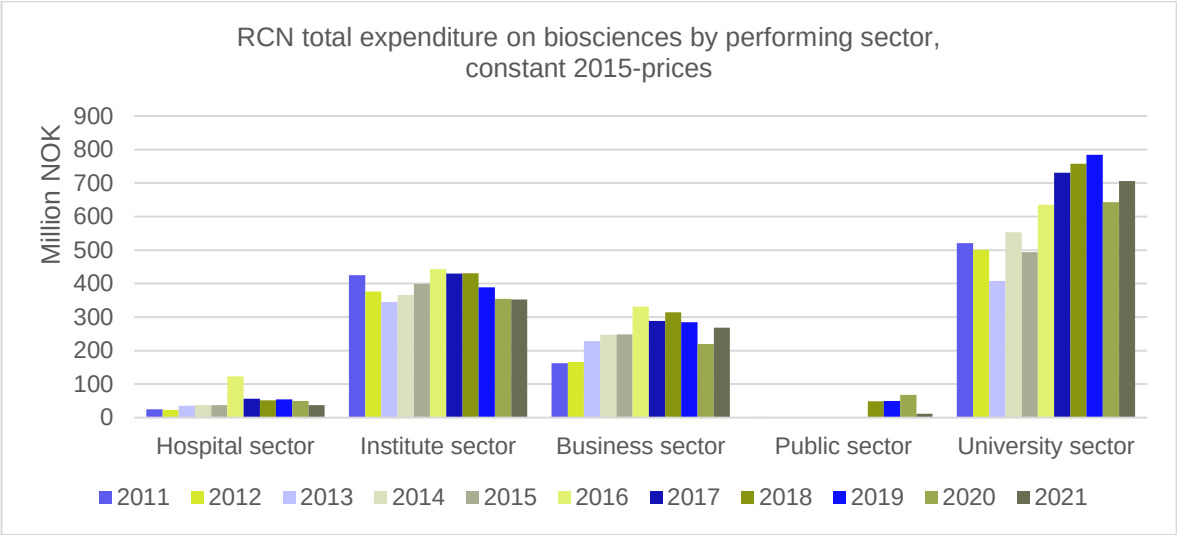


Figure 3.12. The graph shows RCN's R&D expenditure in biosciences by R&D-performing sector. The categories Foreign institutions and Other are not shown because they are insignificant. Numbers are in constant 2015-prices. Data is based on annual revised budgets per project. Each project is assigned in its entirety to its main area of research. University sector = University and university college sector. Basic allocation not included. Inflation adjustment according to Statistics Norway's R&D adjustment.

The RCN database does not contain information that links research projects to the administrative units assessed in the EVALBIOVIT evaluation, but it is possible to identify project affiliation at the highest organisational level. It is therefore only possible to identify the funding each organisation as a whole has received from RCN for R&D projects within the relevant research fields.

Note also, that in the period that the evaluation covers there have been organisational changes affecting several of the organisations under assessment that affect the data (see Methods for details). And it is worth bearing in mind that the organisations are quite diverse in size and purpose.

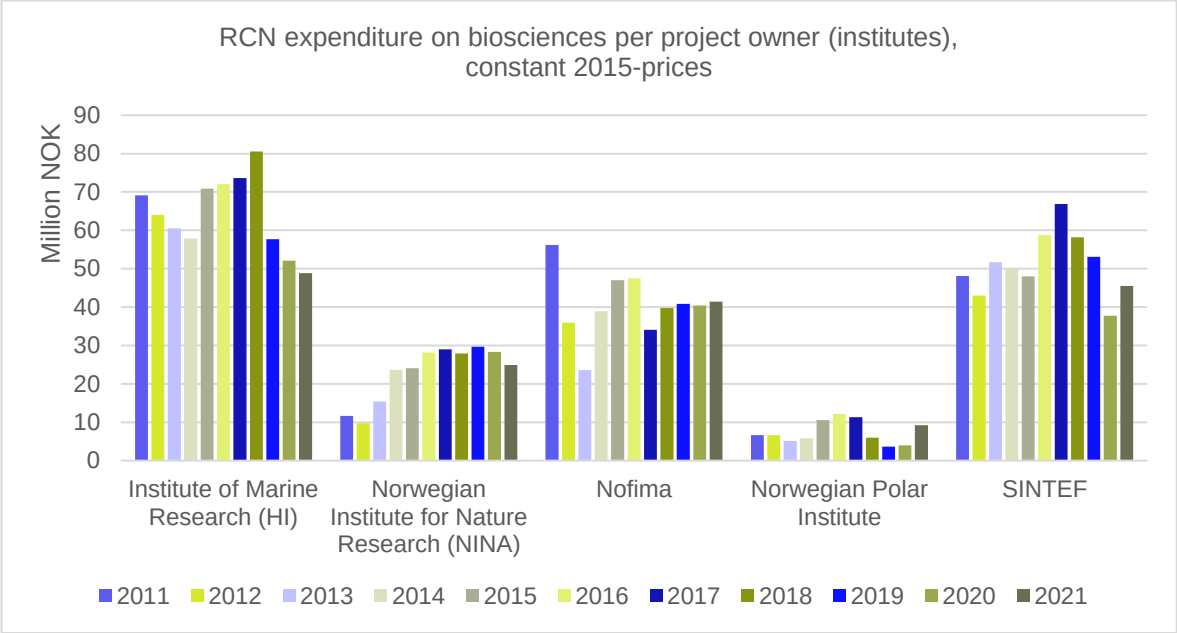


Figure 3.13. Graph shows amount of R&D funding received by relevant institutes (at the main organisational level) to projects in biosciences. Institute of Marine Research = Havforskningsinstituttet, NINA = Norwegian Institute for Nature Research NINA, Nofima = Nofima Food Research Institute, Norwegian Polar Institute = Norsk Polarinstitutt, SINTEF = SINTEF, all units. Data is based on annual revised budgets per project with institution as project owner. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

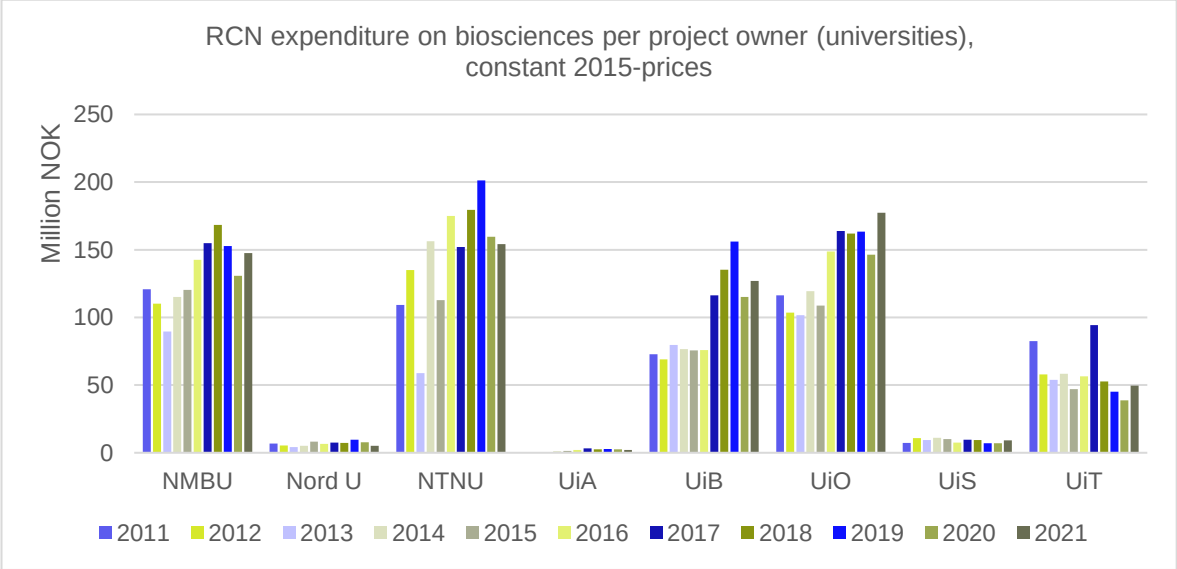


Figure 3.14. Graph shows amount of R&D funding received by relevant universities (at the main organisational level) to projects in biosciences. NMBU = Norwegian University of Life Sciences, Nord U = Nord University, NTNU = Norwegian University of Science and Technology, UiA = University of Agder, UiB = University of Bergen, UiO = University of Oslo, UiS = University of Stavanger, UiT = University of Tromsø – The Aarctic University of Norway. Data is based on annual revised budgets per projectwith institution as project owner. Each project is assigned in its entirety to its main area of research. Amounts are shown in constant 2015-prices, adjusted according to Statistics Norway's R&D adjustment. Basic allocations are excluded.

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