

Total Investment in Research and Innovation 2020-2026



Facts and figures

Summary

Total Investment in Research and Innovation 2020-2026 (TWIN 2020-2026) describes trends in government expenditure on research and development (R&D) and innovation (see glossary on p. 35) over the period from 2020 to 2026, based on the 2022 National Budget. In 2020, the Dutch government spent EUR 6.1 billion on R&D. This constitutes about 30% of total direct expenditure on R&D in the Netherlands. In addition, the government provides direct funding for innovation. It also encourages private investment in R&D and innovation by allowing tax breaks for companies that invest in R&D and innovation.

In this publication, we look not only at government expenditure but also at total R&D expenditure (by the private sector, the public sector and other organisations) and at spending at provincial and EU level. Furthermore, we compare Dutch government expenditure on R&D with that of other countries. We look at actual and budgeted Dutch government expenditure based on the 2022 National Budget. The final expenditure figure in this report may differ from the budget and multi-year forecasts for the same year in previous TWIN reports. Readers should also bear in mind that it was not possible to include additional investment from the 2021 coalition agreement in this report and that there are several uncertainties, such as the war in Ukraine and rising inflation.

Our analysis leads to the following main conclusions:

1. Direct government expenditure on R&D will increase by more than EUR 1 billion over the period 2020-2026.

Direct government expenditure on R&D will increase by EUR 1.2 billion (+20%) from EUR 6.1 billion in 2020 to over EUR 7.3 billion in 2022 and is forecasted to remain at that level until 2026. The increase is largely accounted for by resources from the National Growth Fund and by the increase in funding from the Ministry of Education, Culture and Science. Both will grow by more than EUR 0.5 billion over the period 2020-2026. The increase in funding from the Ministry of Education, Culture and Science will mainly benefit the universities. The resources of the National Growth Fund are intended to contribute to economic growth in the longer term. A total of EUR 20 billion is available from this fund over the period 2021-2025, part of which is available for R&D. In the years 2023-2026, the National Growth Fund is expected to spend more than EUR 0.5 billion annually on R&D.

2. As a result of the increase, the government's share of the ambition to spend 2.5% of its GDP on R&D is expected to be achieved by 2022.

As part of its European commitments, the Netherlands agreed to spend 2.5% of GDP on R&D by 2020 in order to ensure the vitality of the knowledge society and to stimulate economic growth. Over the period 2013-2019, the public sector, the private sector and other funders together spent between 2.14% and 2.18% of GDP on R&D. In 2020, this rate increased to 2.29%, partly because the GDP

of the Netherlands decreased in 2020 due to the COVID-19 pandemic. In order to reach 2.5% in 2022, the latest projections suggest that an additional EUR 5.3 billion will be required, on top of the EUR 17.8 billion spent in 2019. If we assume that the public sector, the private sector and other sources continue to invest proportionately the same amount in R&D within the Netherlands (1.0: 2.0: 0.4), the government should invest EUR 1.5 billion more in R&D carried out in the Netherlands compared to 2019. In the TWIN reports, we see that the government has budgeted to spend EUR 1.6 billion more in 2022 compared to 2019. For the years following 2022, we see that government investment will again be lower than necessary to achieve its 2.5% share. Government expenditure on R&D may increase over the coming years due to the investment announced in the 2021 coalition agreement. An additional investment of EUR 3.0 billion is required from the private sector in 2022 compared to 2019. International and other parties would have to invest an additional EUR 0.7 billion in R&D carried out in the Netherlands.

3. The proportion of project funding is increasing due to the National Growth Fund.

The resources of the National Growth Fund are shifting the ratio of institutional to project funding further towards project funding. The proportion of project funding has grown steadily in recent years from 23% in 2005 to 33% in 2021. The National Growth Fund's resources are expected to increase this percentage after 2021, to 37% in 2024. This is a fairly average percentage in terms of international comparison.

4. Universities are expected to receive an additional EUR 0.5 billion.

The expenditure of the Ministry of Education, Culture and Science on R&D will increase from EUR 4.4 billion to EUR 5.0 billion (+12%) over the period 2020-2022, according to the national budget. This is mainly due to an increase in institutional funding for universities, which is set to rise from EUR 3.2 billion in 2020 to EUR 3.7 billion in 2022 (+16%) and remain around this level thereafter. This increase also excludes the additional investment announced in the 2021 coalition agreement.

5. Indirect expenditure on R&D is no longer exceptionally high.

In addition to direct expenditure on R&D, the Dutch government also provides tax-related support to encourage the private sector to invest in R&D. The Dutch government provided 0.15% of GDP in tax-related government support for R&D in 2019. In the past, the Netherlands provided relatively large amounts of tax-related government support compared to other countries. In 2017, for example, only the United Kingdom, Belgium and France spent more in relative terms. However, tax-related support as a percentage of GDP has risen faster in some other countries than in the Netherlands. In 2019, six countries provided relatively more tax-related government support for R&D as a percentage of GDP. In addition to the countries mentioned above, this also applied to Austria, Ireland

and Italy in 2019. The Dutch government's tax-related support is still above the EU-27 average (0.10%) and the OECD average (0.12%).

6. Innovation expenditure also rising sharply due to National Growth Fund.

Direct expenditure on non-R&D innovation is expected to rise very sharply by 71% between 2020 and 2026. Expenditure will increase from EUR 573 million to EUR 980 million. This increase will also be mainly thanks to the National Growth Fund. In 2020, no funds were yet available from the National Growth Fund. By 2026, the Ministry of Economic Affairs and Climate Change estimates, EUR 526 million will be allocated to innovation, in addition to the funds for R&D under item 1.

7. Importance of European research funding continues to grow

In recent years, funds from the European framework programmes have become an increasingly large part of the public funding available to Dutch researchers. On average, Dutch researchers obtained around EUR 760 million per year from *Horizon 2020*. With a total budget of EUR 95.5 billion, the new *Horizon Europe* programme has a slightly larger budget than its predecessor *Horizon 2020*.

8. Provinces make additional investments in knowledge and innovation in 2020-2022.

The budgets that provinces on aggregate have committed to knowledge and innovation in recent years ranged between EUR 137 and 172 million, up to and including 2019. This investment is higher in 2020, 2021 and 2022 mainly due to additional funds being made available in relation to COVID-19, but also due to new projects and initiatives. The provinces are budgeting for a total of EUR 242 million for knowledge and innovation in 2022.

Introduction

In this edition of Facts & Figures on Total Investment in Research and Innovation (TWIN), the Rathenau Instituut is presenting an overview of government expenditure on research and development (R&D) and innovation in the period 2020-2026. Every year, we make this TWIN report based on the most recent national budget. To this end, the Rathenau Instituut asks government ministries to indicate how much is spent on R&D and innovation, taking the most recent national budget as a starting point. The Rathenau Instituut collects this data in accordance with international agreements¹.

The most recent budget for this report is the 2022 National Budget, as presented on Budget Day 2021. For this reason, it was not possible to include in this report the additional investment from the 2021 coalition agreement, which was presented on 15 December 2021. The coalition agreement contains a number of major investments, some of which will be spent on R&D and innovation, which will have an impact on the TWIN figures for the years from 2023 onwards. An example of this is a fund of EUR 5 billion spread over 10 years for investing in free and undirected research and development. These investments will be included in the forthcoming National Budgets and will subsequently be included in subsequent TWIN reports.

A second point for readers to bear in mind when reading this report is that the current uncertainties have to be taken into account. The war in Ukraine is causing uncertainty, as is the rising inflation of recent months, and there is uncertainty about the way the coronavirus is developing in the Netherlands and internationally. These uncertainties have the potential to have a major impact on what happens in the coming period.

In this publication, we discuss three categories of national government expenditure:

1. Direct expenditure on R&D aimed at increasing knowledge and developing new applications;
2. Direct expenditure on non-R&D innovation, aimed at promoting innovation without an R&D component. Examples include the purchase of external knowledge and activities such as industrial design;

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3. Indirect support for R&D and innovation through tax instruments to stimulate R&D and innovation in the private sector. An important example of this is the WBSO (Dutch Research and Development Promotion Act).

In order to put government expenditure into perspective, this TWIN publication also looks at total R&D expenditure in the Netherlands, including expenditure by the private sector and private non-profit organisations and foreign investment. We also compare Dutch R&D investment with investment levels in a set of reference countries and review European and regional public investment.

Reader's guide

In Section 1, we provide a picture of total R&D expenditure in the Netherlands and we compare the level of Dutch R&D spending with that of a number of reference countries. In Section 2, we focus on government expenditure on R&D and innovation. In Section 3, we look at the expenditure of regional and international government agencies on R&D and innovation in the Netherlands.

¹ More details of the methodology used can be found in the appendix.

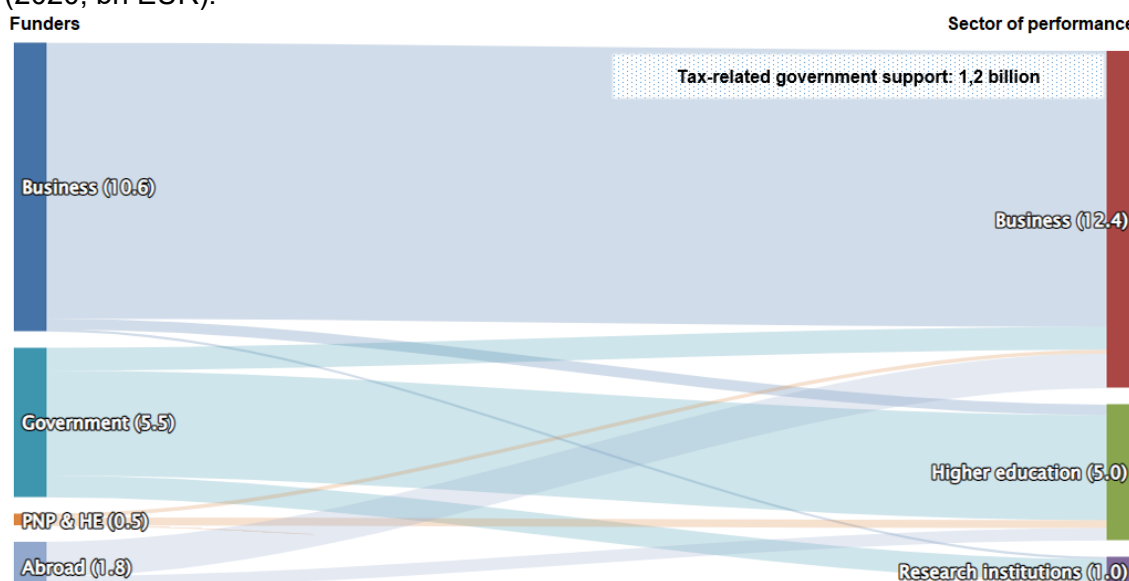
1. Total R&D expenditure in the Netherlands

To get an accurate picture of government expenditure on R&D, we first look at total R&D expenditure in the Netherlands. In this section, we look at spending by the public sector, the private sector, private non-profit organisations and international players on research and development. We will then go on to take a detailed look at government expenditure on R&D.

1.1. Overview of total R&D expenditure in the Netherlands

In 2020, EUR 18.4 billion was spent on R&D in the Netherlands (Statistics Netherlands, provisional figures). This includes indirect tax-related government support for R&D (EUR 1.2 billion), whereby the government creates a tax break on R&D costs for businesses, making it cheaper for them to carry out R&D.² At EUR 10.6 billion (58%), the private sector is the largest funder of R&D, followed by the public sector at EUR 5.5 billion (30%). The remaining funding comes from private non-profit organisations, from higher education institutions and from international sources, which includes funds from the European Framework Programme.

Figure 1 R&D performed in the Netherlands, by source of funding and performing sector (2020, bn EUR).



Source: Rathenau Instituut, adapted from preliminary figures from Statistics Netherlands.

Note 1: The companies that carry out R&D receive EUR 1.2 billion in tax-related support through the Dutch Research and Development (Promotion) Act (WBSO). tax-related support through the Environmental Investment Rebate (MIA) and the Indiscriminate Depreciation of Environmental Investments (VAMIL) is aimed at innovation and not specifically at R&D activities and is therefore not included in this figure (EUR 149 million).

Note 2: Funding from private non-profit organisations (PNP) and higher education institutions has been combined.

If we look at the organisations that receive R&D expenditure, we see that companies are not only the largest funders of R&D, but also the largest performers. They carry out 67% of the research. 27% of the research is conducted by higher education institutions. The rest is carried out by public research institutions, such as the NWO institutes, the

² This is about tax breaks on R&D expenditure that companies actually incur. This R&D expenditure is included in the companies' accounts. The tax-related support means reducing tax revenues for the government (and is therefore not shown as government expenditure in Figure 1) and reduces the R&D costs of companies.

National Institute for Public Health and the Environment (RIVM) and the Netherlands Forensic Institute (NFI). In the chart, only the expenditure on R&D performed in the Netherlands is included. In addition, almost EUR 2.8 billion (2019, most recent figures from Statistics Netherlands) is spent in the Netherlands on R&D performed in other countries. These funds come almost entirely from the private sector.

1.2. R&D expenditure by the government as a percentage of GDP increases

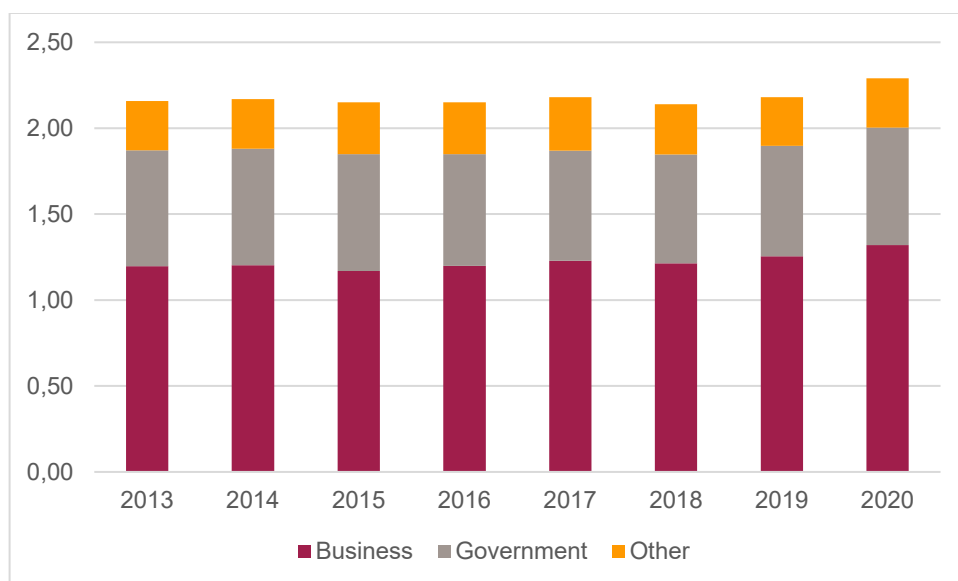
In the past, the Netherlands has agreed, as part of its European commitments, to spend 2.5% of GDP on R&D. This is R&D performed in the Netherlands and funded by the parties mentioned in the previous paragraph: the public sector, the private sector, private non-profit organisations, other national players and other countries. The idea behind this agreement is that investment in R&D is vital to our knowledge society and stimulates economic growth. European countries would have to spend 3% of GDP on R&D to keep up with trends in other parts of the world. In 2002, the European standard of 3% was mentioned for the first time.³ In 2010, the Europe 2020 strategy was drawn up, which included the 3% target. The Netherlands, having regard to the structure of the economy, has set the target at 2.5% of GDP.

Figure 2 shows R&D expenditure as a percentage of GDP remaining fairly constant over the years 2013-2019. The percentage varies between 2.14% and 2.18%. In 2020, 2.29% of GDP was spent on R&D. This increase was partly due to a 3.4% increase in R&D expenditure (from EUR 17.8 billion in 2019 to EUR 18.4 billion in 2020). Another reason for the increase in R&D as a percentage of GDP is that due to the COVID-19 pandemic, GDP decreased by 1.6% in 2020 (from EUR 813.1 billion in 2019 to EUR 800.1 billion in 2020).⁴

³ <https://www.consilium.europa.eu/media/20939/71025.pdf>

⁴ GDP figures are the nominal figures extracted by the Netherlands Bureau for Economic Policy Analysis (CPB) from the Core Data Table CEP 2022, March 2022.

Figure 2 R&D expenditure within the Netherlands as a percentage of GDP, by source of finance.



Source: Rathenau Instituut, based on Statistics Netherlands and Eurostat.

Note: The category "Other" includes higher education, the private non-profit sector and other countries.

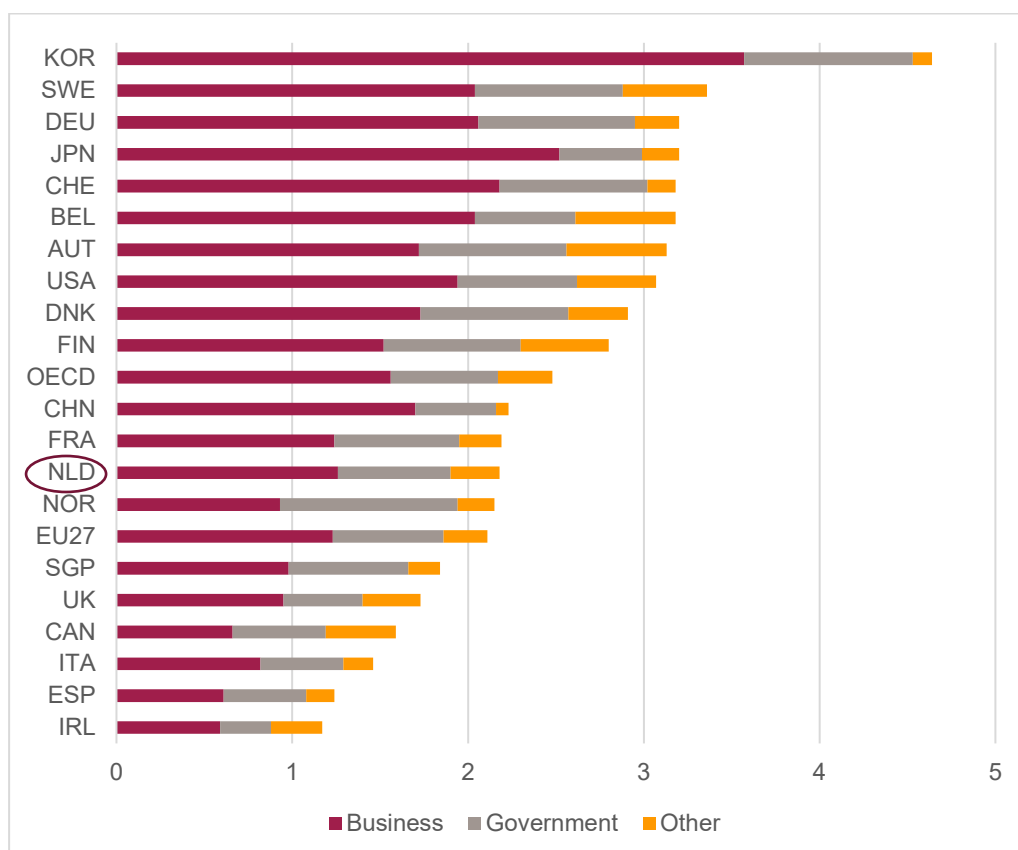
In order to achieve R&D expenditure of 2.5% of GDP in 2022, according to the latest projections, EUR 5.3 billion more than the EUR 17.8 billion spent in 2019 would be needed. If we assume that the public sector, the private sector and other sources continue to invest proportionately the same amount in R&D within the Netherlands (1.0: 2.0: 0.4), this means that the government would have to invest EUR 1.5 billion more in R&D performed within the Netherlands compared to 2019.⁵ In the TWIN reports, we see that the government has budgeted to spend EUR 1.6 billion more in 2022 compared to 2019. The government is therefore on course. The private sector would need to invest an additional EUR 3.0 billion in 2022 compared to 2019. International and other players would have to invest an additional EUR 0.7 billion in R&D carried out in the Netherlands. For the years after 2022, we see that the government's budgeted investments are again lower than needed to achieve its share of the 2.5%. Government expenditure may increase over the coming years due to the investment announced in the 2021 coalition agreement. We will be monitoring this in forthcoming TWIN reports. The above calculations are based on the GDP figures and estimates issued by the Netherlands Bureau for Economic Policy Analysis (CPB). Of course, the war in Ukraine causes additional uncertainty, making estimates more difficult.

⁵ In 2019, the Dutch government spent EUR 5,625.6 million on R&D.

1.3. Dutch R&D expenditure just above EU-27 average

To obtain a more comprehensive picture of Dutch R&D expenditure, we compare it with R&D expenditure in other countries in Figure 3. We see that total Dutch R&D expenditure as a percentage of GDP is below the OECD average and just above the EU-27 average.

Figure 3 R&D expenditure by country as a percentage of GDP and by source of finance (2019).



Source: Rathenau Instituut, based on OECD, MSTI database, 2019 data. Sweden and Switzerland: 2017. Ireland, Singapore and United Kingdom: 2018.

Notes: The category "other" consists of other national sources and funding from other countries (industry, EU and other organisations). Based on data from R&D funders.

R&D expenditure by the Dutch government is comparable to the average of the EU-27 and slightly above the average of OECD countries. Dutch R&D funding by the private sector is similar to the EU-27 average but lower than the OECD average. One of the reasons why the private sector is not investing more in R&D is the Dutch sectoral structure (the Netherlands has predominantly a service economy).⁶

⁶ <https://www.rathenau.nl/nl/wetenschap-cijfers/geld/rd-investeringen-internationaal-vergeleken>

2. Dutch government expenditure on R&D and innovation

In this section, we discuss in more detail the developments in government expenditure on R&D and innovation. The figures on government R&D expenditure in this section differ slightly from the figures in Section 1. The figures in Section 1 are from Statistics Netherlands, which are based on R&D expenditure data provided by the performing organisations in the Netherlands. For the figures in Section 2, the Rathenau Instituut reviewed R&D expenditure data provided by the Dutch government as a funder, which includes the government expenditure on international research institutes.⁷

Section 2.1 first of all provides an overview of the R&D and innovation expenditure by the Dutch government. Section 2.2 goes on to discuss direct R&D expenditure by the various ministries and the distribution of this expenditure over the various performing organisations. Section 2.3 deals with indirect tax-related and other support for R&D and Section 2.4 with government expenditure on innovation.

2.1. Overview of R&D and innovation expenditure by the Dutch government

In this section, we discuss in detail the Dutch government's expenditure on R&D and innovation. Table 1 provides an overview of government expenditure on R&D and innovation for 2020-2026, expressed as nominal amounts. The data in the table is based on the 2022 National Budget, as presented on Budget Day 2021. The table also shows the percentage of GDP to illustrate the significance of this spending within the economy.

If we look at the trends between 2020 and 2026, we see that direct expenditure on non-R&D innovation, in particular, is increasing very strongly, by 71% (+ EUR 408 million). This increase is mainly thanks to the National Growth Fund. Intended to contribute to long-term economic growth, this fund spends money on knowledge development and research, development and innovation.⁸ A total of EUR 20 billion is available from the fund for allocations during the period 2021-2025. Based on the budget, the Ministry of Economic Affairs and Climate Change has made a best estimate indicating which part of the resources from the National Growth Fund is relevant for R&D and which for innovation. The first allocations from the fund were made in April 2021. Some of the funds were allocated directly to R&D and innovation projects and some were allocated conditionally.⁹ The earmarked funds may be allocated after re-evaluation pending receipt of further evidence or proven success during the first phase. In 2022, allocations will be made from the second round.

⁷ Because the TWIN figures are based on information from the funder and not from the performing organisation (as is the case with Statistics Netherlands), differences may occur. In addition, the TWIN figures also include spending by ministries on R&D performed in other countries (especially spending on international institutions such as the European Space Agency (ESA)). The data from Statistics Netherlands focuses on R&D carried out in the Netherlands.

⁸ The Infrastructure area used to be also one of the three areas in which the National Growth Fund invested in projects. During negotiation of the coalition agreement 2021-2025, the parties agreed to remove this pillar from the National Growth Fund.

⁹ <https://www.rijksoverheid.nl/documenten/kamerstukken/2021/04/09/kamerbrief-bekostiging-investeringsvoorstellen-uit-nationaal-groEIFonds>

Table 1 Direct and indirect government contributions to R&D and innovation (m EUR and as percentage of GDP).

	2020	2021	2022	2023	2024	2025	2026
	Actual	Provi-sional	Budget	Multi-year forecast			
Direct expenditure on R&D	6,063.6	6,805.7	7,254.4	7,195.4	7,373.2	7,312.1	7,153.3
Direct expenditure on non-R&D innovation	572.6	694.9	883.5	1,068.5	1,188.0	1,174.2	980.4
Indirect tax-related support for R&D and innovation	1,380.0	1,582.0	1,510.0	1,455.0	1,455.0	1,425.0	1,425.0
Total	8,016.2	9,082.5	9,647.9	9,718.8	10,016.2	9,911.3	9,558.7
R&D expenditure, as % of GDP	0.76	0.79	0.79	0.77	0.77	0.75	0.73
Non-R&D innovation expenditure as % of GDP	0.07	0.08	0.10	0.11	0.12	0.12	0.10
Tax instruments for R&D and innovation, as % of GDP	0.17	0.18	0.16	0.16	0.15	0.15	0.14
Total as % of GDP	1.00	1.06	1.05	1.04	1.05	1.02	0.97

Sources: Rathenau Instituut, TWIN figures 2020-2026. GDP figures 2020 to 2022 are nominal figures extracted from CPB Core Data Table in CEP 2022, March 2022. The volume growth rates extracted from CPB CEP, March 2022, were used to determine GDP from 2023 onwards. This is because the multi-year forecasts do not yet include all wage and price adjustments.

Note: the amounts in the multi-year forecast are usually subject to annual wage and price adjustments in the Budget. As in previous years, tax-related support is exclusive of the innovation box. (See note at Section 2.3.)

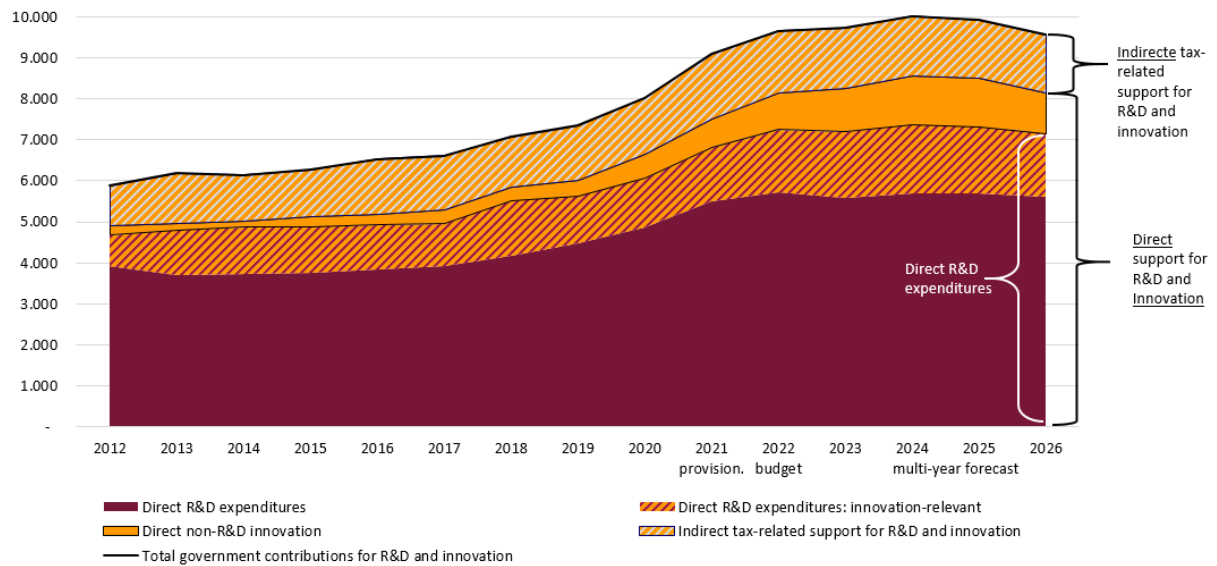
Direct expenditure on R&D will increase over the period to 2026. Between 2020 and 2022, direct R&D expenditure increases by EUR 1.2 billion (+20%) and will continue to fluctuate around this level thereafter. The increase is largely driven by the funds from the National Growth Fund and the increase in funding for the universities from the Ministry of Education, Culture and Science. Government R&D expenditure as a percentage of GDP increases from 0.76% in 2020 to 0.79% in 2022. The increase in direct R&D expenditure therefore also translates into a higher percentage of GDP for the years 2021 and 2022. Over the years following 2022, the percentage will decrease to 0.73% by 2026. For those years, according to the Netherlands Bureau for Economic Policy Analysis, GDP will rise faster than direct R&D expenditure. It should be noted, however, that the war in Ukraine adds a level of uncertainty to the GDP figures.

It should also be noted that the R&D and innovation expenditure for 2022 and beyond is based on budget figures and multi-year forecasts. Multi-year forecasts can still change substantially in the future, for example if a new government makes different choices, adds new programmes and investments, or discontinues existing programmes and investments. In its 2021 coalition agreement, the new Rutte IV government has announced that there will be additional investment in free and undirected research. Among other things, the government is establishing a EUR 5 billion fund over ten years. It was not possible to include these funds in the figures in this report because it is based on the 2022 National Budget. Also, actual figures may end up being higher or lower than the budget for that year, because draft budgets may be adjusted if, for example, additional investment is required or the implementation of a programme is delayed. The amounts in the multi-year forecast are usually subject to annual wage and price adjustments in the budget. Spending from the National Growth Fund may be subject to significant adjustments from year to year to the National Growth Fund budget.

Figure 4 shows how the various categories of government expenditure on R&D and innovation have developed since 2012. In the chart, we see expenditure increasing on direct non-R&D innovation. We also see direct R&D expenditure increasing over the period 2019-2022. In the following paragraphs, we will be looking more closely at each of the categories of government expenditure on R&D and innovation.

The increase in innovation expenditure also changes the balance between R&D expenditure, non-R&D innovation expenditure and tax-related support. Whereas innovation expenditure accounted for about 2% of the total government contribution in 2012, this percentage will increase to 12% by 2025. The proportion of direct R&D expenditure falls from 79% to 74% over the same period. The proportion of tax-related support drops from 17% to 14%.

Figure 4 Government contribution to R&D and innovation by category, 2012-2026 (m EUR).



Source: Rathenau Instituut, TWIN figures based on budgets 2014-2022.

Note: 2012 has been taken as the starting year, because the figures on innovation expenditure were collected from implementation year 2012 onwards. Some R&D expenditure is aimed at innovation or, in other words, it is innovation-relevant. If an activity is intended to promote innovation, it is said to be innovation-relevant.

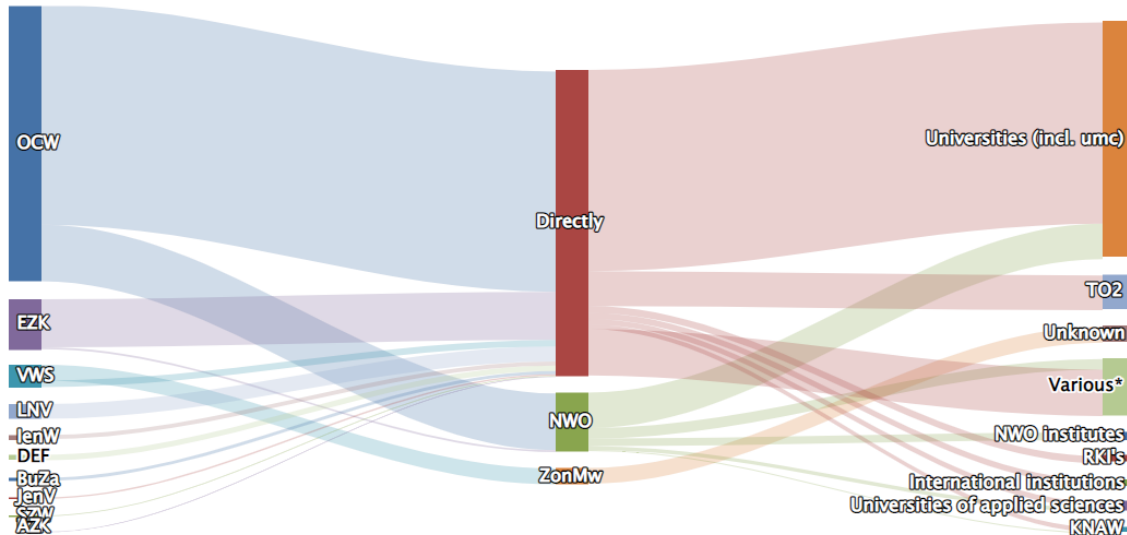
2.2. Direct government R&D expenditure rises sharply

In this section, we will be looking more closely at direct government R&D expenditure. We look at both the spending of the various departments and the organisations to which this spending is allocated.

Figure 5 is a summary overview that provides an indication of the money flows for R&D from the Dutch government for 2020. This shows that, at 73%, the Ministry of Education, Culture and Science (OCW) is the largest direct R&D funder in the Netherlands. It is followed by the Ministry of Economic Affairs and Climate Change (EZK) and the Ministry of Health, Welfare and Sport (VWS), contributing 13% and 6% respectively.

If we look at the performing organisations, we can see that most state-funded research takes place at the universities and university medical centres (UMCs). This is followed by the knowledge institutions for applied research (TO2 institutions).¹⁰ The organisations on the right-hand side of the chart generally receive institutional funding and some project funding. Performing organisations may receive additional project funding, which at the time of the budget cannot yet be allocated to specific (types of) organisations. This amount shown in the chart as "Various".

Figure 5 Indication of direct R&D expenditure by ministries on R&D performers in 2020.



Source: Rathenau Instituut, TWIN figures 2020-2026. Distribution of NWO funds based on the NWO Annual Report 2020. Notes: The category "Various" cannot be broken down beforehand and contains different types of financing. This is partly project funding for universities, universities of applied sciences, NWO institutes and TO2 institutes as well as other types of organisations. In addition, this category also includes institutional and project funding for organisations that cannot be placed under the categories in the chart, such as the Clingendael Institute. "RKIs" stands for national knowledge institutions. The ZonMw funds cannot (yet) be broken down by institution. From 2023 onwards, this will be made possible by the introduction of a new system at ZonMw.

¹⁰ Since 2010, TNO, Wageningen Research (formerly DLO) and the major technological institutes (Deltares, the Maritime Research Institute Netherlands (MARIN) and the Netherlands Aerospace Centre (NLR)) have been working together under the name TO2.

Direct R&D expenditure by ministries

Table 2 provides an overview of direct R&D expenditure by ministry for the years 2020 to 2026. The ministries spend a combined total of EUR 7.3 billion on R&D in 2022. Funds from the National Growth Fund also contribute to this, commencing in 2021. This fund is listed separately in Table 2 because it is a separate budget heading in the 2022 National Budget. The fund is managed by the Ministry of Economic Affairs and Climate Change and the Ministry of Finance. The funds shown for National Growth Fund in the table include undistributed grants and conditionally allocated grants. The grants that have already been allocated, are listed in ministry budget headings.

Table 2 Direct expenditure on R&D by ministry (m EUR).

	2020	2021	2022	2023	2024	2025	2026	Difference 2020-2026	
	Actual	Provisional	Budget	Multi-year forecast				m EUR	%
OCW	4,418.7	4,832.1	4,967.2	4,809.9	4,874.6	4,925.7	4,956.5	537.8	12.2
EZK	797.2	937.2	1029.8	1006.3	985.6	911.9	900.3	103.1	12.9
VWS	356.0	506.6	431.3	388.0	350.9	307.4	296.5	-59.5	-16.7
LNV	238.9	250.5	232.8	228.1	223.8	220.4	222.2	-16.6	-7.0
DEF	87.9	78.2	76.1	76.0	76.0	76.1	76.1	-11.8	-13.4
I&W	68.1	91.5	98.3	92.0	89.9	88.1	80.2	12.1	17.8
BuZa	50.0	48.1	45.0	40.8	40.2	40.2	40.2	-9.9	-19.7
J&V	23.4	23.5	23.7	23.7	23.7	23.7	23.7	0.3	1.1
SZW	13.3	14.0	17.4	18.3	16.5	16.4	17.9	4.5	34.0
BZK	9.5	10.8	10.9	9.8	9.8	9.8	9.9	0.4	4.2
AZ	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.0	-5.0
National Growth Fund	0.0	12.5	321.3	502.0	681.5	691.8	529.3	529.3	
Total	6,063.6	6,805.7	7,254.4	7,195.4	7,373.2	7,312.1	7,153.3	1,089.7	18.0

Source: Rathenau Instituut, TWIN figures 2020-2026.

Note: The amounts in the multi-year forecast are usually subject to annual wage and price adjustments in the budget.

Table 2 shows increases and decreases over the years 2020-2026. The increase at the Ministry of Education, Culture and Science (OCW) is mainly due to the increase in the

lump sum paid to the universities. The increase at the Ministry of Economic Affairs and Climate Change (EZK) is partly caused by increases in budgets for instruments within the framework of the Mission-Oriented Top Sectors and Innovation Policy. The budgets for both the PPP allowance and the SME Innovation Stimulation Region and Top Sectors (MIT: MKB-Innovatiestimulerend Regio en Topsectoren) are increasing. At the Ministry of Economic Affairs, grants awarded from the National Growth Fund have been added to the budget as from 2021. The decrease at the Ministry of Health, Welfare and Sport (VWS) shown in Table 2 is mainly due to reduced budgets for research programming at ZonMw, the Dutch organisation for health research and care innovation. This decrease is an effect of an earlier temporary increase in budget allocation for ZonMw, due to one-off investments in various research programmes. The budget allocation for ZonMw first increased from EUR 172 million in 2018 to EUR 382 million in 2021 and is then set to decline to EUR 185 million in 2026. The slight decrease in the research budget of the Ministry of Agriculture, Nature and Food Quality (LNV) is partly driven by the addition of research programmes in 2020 and 2021. The slight decrease at the Ministry of Defence (DEF) is mainly due to a decrease in the budgets for technology and knowledge application, which are allocated as projects. The increase at the Ministry of Infrastructure and Water Management (IenW) is mainly due to a change in the figures: the assessment of the institutional funding provided by the Royal Netherlands Meteorological Institute (KNMI) that contributes to R&D will be made differently from 2022 onwards in order to better reflect the definition of research and development. The decrease at the Ministry of Foreign Affairs (BuZa) is mainly due to the fact that a budget was allocated in previous years for research to tackle COVID-19. The research budgets of the other ministries remain fairly constant over the period 2020-2026. The National Growth Fund shows strong growth over the period 2020-2026. From 2023 onwards, the National Growth Fund will be the number three funder of R&D, after the Ministries of Education, Culture and Science and of Economic Affairs.

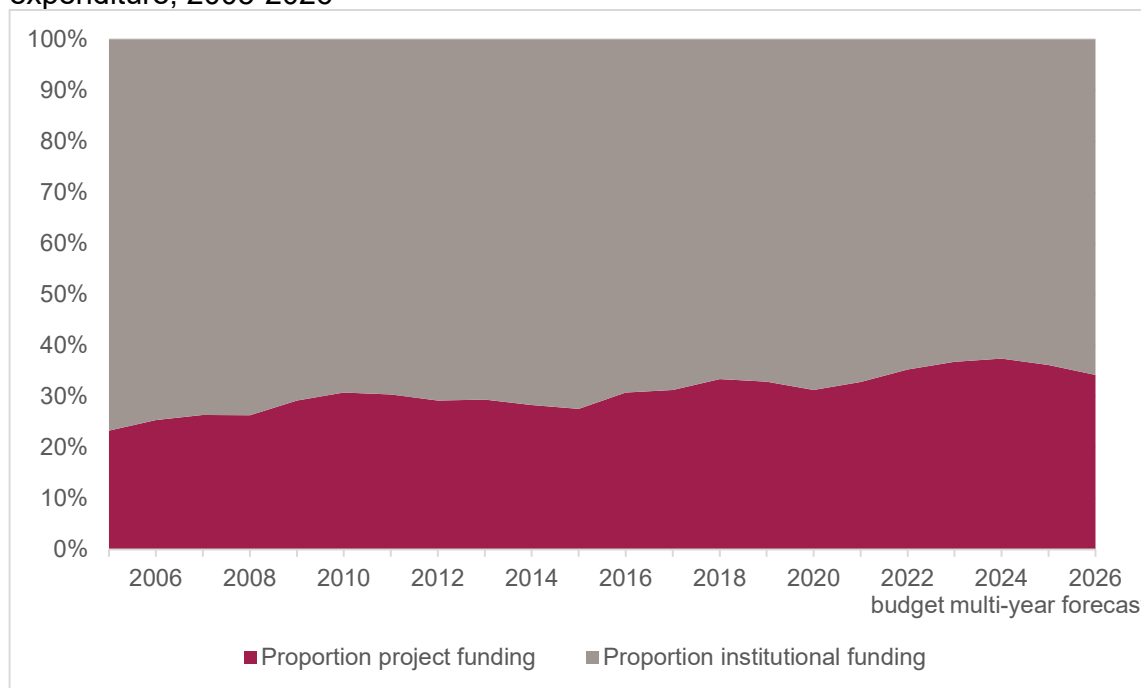
Institutional and project funding of R&D

Direct R&D funding consists of institutional and project funding. "Institutional funding" refers to funds not obtained through a competitive process which the performing institution can decide how to use. Project funding usually involves a competitive process and research projects are carried out on the basis of a proposal or assignment. Figure 6 shows that the proportion of project funding varies over time and has been growing steadily from 23% in 2005 to 33% in 2021. The funds provided by the National Growth Fund are expected to increase the proportion of project funding even further after 2021, to 37% in 2024. In other countries (where information is available), the proportion of project funding shows a wide variation. In Austria, for example, 28% of government R&D expenditure was distributed through project funding in 2020, and 61% in Ireland. At 31% in 2020, the Netherlands has a relatively small proportion of project funding. The expected increase to 37% will take the Netherlands further towards the average of these countries.

The proportion of project funding varies widely between the ministries. At 18% in 2021, OCW has the smallest proportion of project funding and the largest proportion of

institutional funding. The rate of project funding is as high as 100% in a number of ministries. More information can be found in the Rathenau Instituut publication on Dutch state support for R&D by type of funding.¹¹ This publication also includes an appendix containing details of the distribution of the national research budget according to different social goals.

Figure 6 Proportion of project and institutional funding of government R&D expenditure, 2005-2026



Source: Rathenau Instituut, TWIN figures accompanying budgets 2007-2022.

Direct R&D expenditure allocated to recipient institutions

Another way of providing an insight into direct government expenditure on R&D is to classify it according to the institutions that receive the R&D expenditure. Table 3 lists organisations that receive direct R&D expenditure. They use it for their own research, for development or distribute it through a competitive process. The higher education institutions, international institutions, TO2 institutions and the Academy or its research institutes carry out the research themselves. NWO, ZonMw and Regieorgaan SIA allocate most of the funds received via competitive calls. Most NWO-funded research projects are carried out at institutions of higher education (universities, UMCs and universities of applied sciences). In 2022, 15% of the funds going to NWO are allocated to the NWO institutes (EUR 134 million). Most of the remaining EUR 757 million is distributed via competitive calls.

¹¹ <https://www.rathenau.nl/nl/wetenschap-cijfers/geld/wat-geeft-nederland-uit-aan-rd/nederlandse-overheidsbijdrage-aan-rd-naar>

Table 3 Direct government R&D expenditure, by recipient (m EUR)

	2020	2021	2022	2023	2024	2025	2026	Difference 2020-2026	
	Actual	Provisional	Budget	Multi-year forecast				m EUR	%
Research at universities (incl. UMCs)	3,210.6	3,596.2	3,729.7	3,602.4	3,669.3	3,724.8	3,758.4	547.7	17.1
Research at Universities of Applied Sciences	87.8	89.9	89.9	89.9	89.9	89.9	89.9	2.1	2.4
Universities of Applied Sciences via Taskforce for Applied Research (SIA)	60.5	58.9	57.3	55.2	55.2	53.2	53.2	-7.3	-12.0
NWO institutes	121.6	117.5	134.2	134.2	134.2	134.2	134.2	12.6	10.4
NWO, other funding	753.6	776.2	756.6	742.3	738.5	736.9	733.3	-20.3	-2.7
ZonMw health funding	251.7	382.4	322.0	276.2	239.4	195.9	185.4	-66.3	-26.4
The Academy	72.5	72.8	71.6	69.5	71.0	70.6	70.7	-1.8	-2.5
International institutions OCW	97.2	101.2	107.3	96.7	96.8	96.8	96.8	-0.4	-0.4
Subtotal	4,655.6	5,194.9	5,268.5	5,066.3	5,094.3	5,102.3	5,121.8	466.2	10.0
Inst. fin. TNO	282.0	273.2	251.0	249.4	249.5	250.6	250.1	-31.9	-11.3
Inst. fin. MARIN, Deltares and NLR	65.5	64.5	58.5	57.0	56.5	56.0	56.0	-9.5	-14.5
Inst. fin. Wageningen Research	208.3	208.9	197.5	189.1	187.2	185.4	185.3	-23.0	-11.0
Subtotal, TO2 Institutes	555.8	546.6	506.9	495.6	493.2	492.0	491.4	-64.4	-11.6
Institutional funding: RKIs	111.1	133.0	131.2	129.1	127.5	128.2	127.1	16.0	14.4
National Growth Fund	0.0	29.1	363.0	532.1	700.5	699.2	529.3	529.3	-
Other R&D expenditure	741.0	902.0	984.8	972.4	957.7	890.5	883.7	142.7	19.3
Total expenditure	6,063.6	6,805.7	7,254.4	7,195.4	7,373.2	7,312.1	7,153.3	1,089.7	18.0

Source: Rathenau Instituut, TWIN figures 2020-2026

Note: TWIN figures have been clustered when amounts are clearly allocated to a distinct organisation. This does not mean that these are all the funds for these organisations, as they can also obtain funds (for project funding) from other budget items. Inst. fin. stands for institutional funding. In addition to institutional funding, these organisations often receive project funding. The amounts in the multi-year forecast are usually subject to annual wage and price adjustments in the budget.

Table 3 shows that research funding over the period 2020-2026 increases for some organisations and decreases for others. At universities (including UMCs), we see a substantial increase of more than EUR 0.5 billion (EUR 548 million; +17%). This increase is due to the fact that OCW invests more: the lump sum of universities increases. Research funding for universities of applied sciences is also rising slightly (EUR 2 million; +2%).

We see a decline in research funding at the intermediary organisations Netherlands Organisation for Applied Research (NWO), health research funder ZonMw and Taskforce for Applied Research SIA (Regieorgaan SIA). The decrease at NWO is partly driven by the decline in funding for the Netherlands Initiative for Education Research (NRO). The funds are declining because additional temporary funding was provided in previous years. The decrease at ZonMw is partly due to the fact that ZonMw received additional funding from the Ministry of Health, Welfare and Sport at the beginning of the period. This is intended for COVID-19 research and other supplementary programmes.¹² As a result, ZonMw's funds increase, as indicated earlier, from EUR 172 million in 2018 to EUR 382 million in 2021 and then will decrease to EUR 185 million in 2026. The decline at the Taskforce for Applied Research (SIA) can be explained in a similar way. The funds increase from EUR 49 million in 2018 to EUR 61 million in 2020 and then will decrease to EUR 53 million in 2026. The increase is partly due to additional investment in capacity building for practice-based research (coalition agreement 2017-2021) and a vocational post-doctoral programme.¹³ The funding that the Ministry of Education, Culture and Science (OCW) gives international institutions and the funding for the Royal Netherlands Academy of Arts and Sciences (The Academy) remain more or less at the same level.

After 2010, the TO2 institutions experienced a long period in which the institutional funding for R&D decreased. The institutional funding for the TO2 institutions for the period 2020-2026 is above that of 2010 (EUR 478 million, TWIN figures), which doesn't take inflation into account. If we do take it into account, the institutional funding of the TO2 institutions in 2020 will be slightly higher than in 2010 for the first time (2% higher). However, based on current figures, institutional funding after 2020 will be lower than in 2010.¹⁴ In addition to institutional funding, the TO2 institutions also obtain project funding. You can read more about the total funding of the TO2 institutions on the Rathenau Instituut website.¹⁵

¹² <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/begrotingen/2021/09/21/xvi-volksgezondheid-welzijn-en-sport-rijksbegroting-2022/16%20VWS.pdf>

¹³ <https://www.rijksoverheid.nl/documenten/begrotingen/2020/09/15/viii-onderwijs-cultuur-en-wetenschap-rijksbegroting-2021>

¹⁴ Calculated using the OECD GDP deflator.

¹⁵ <https://www.rathenau.nl/nl/wetenschap-cijfers/geld/inkomsten-en-uitgaven-van-kennisinstututen/financiering-publieke>

Looking at the individual TO2 institutions, we see declines in the projected institutional allocations to each of them over the period 2020-2026. The decrease in institutional funding for TNO is mainly due to the fact that TNO received a one-time grant for infrastructure in 2020. The decline in institutional funding for Deltares, the Netherlands Maritime Research Institute (MARIN) and the National Aerospace Laboratory (NLR) is mainly driven by the fact that NLR funding peaked in 2020. This peak was caused in part by a one-off compensation payment from the Ministry of Economic Affairs and Climate Change (EZK) in connection with the settlement of NLR's changed VAT position.¹⁶ The decline in institutional funding for Wageningen Research is primarily due to a decrease in the Ministry of Agriculture, Nature and Food Quality's (LNV) budget for research programming. As stated above, it remains to be seen whether this will continue. It is possible that additional research programmes may be launched in the future for subsequent years. In the 2021 coalition agreement, for example, it has been announced that research will be conducted into the health effects of integrated crop protection on farmers and local residents.

We see an increase at the national knowledge institutions (RKIs). This is mainly due to an increase at the Royal Netherlands Meteorological Institute (KNMI), which is the result of a change in methodology: the estimate of the KNMI's institutional funding for R&D has been adjusted as of 2022 to better reflect the international definition of research and development.

Spending through the National Growth Fund is seeing a sharp rise during the period 2020-2026. Other R&D expenditure is also increasing during this period. These funds can be disbursed to different types of organisations. This may cause the amounts in some of the above-mentioned institutions to increase over the coming years. This may also result in budgets increasing rather than decreasing in some institutions.

2.3. Indirect government R&D expenditure above OECD average

The Dutch government supports R&D not only through direct financing, but also through tax measures. These schemes aim to promote innovation and economic growth by stimulating R&D investment by the private sector.

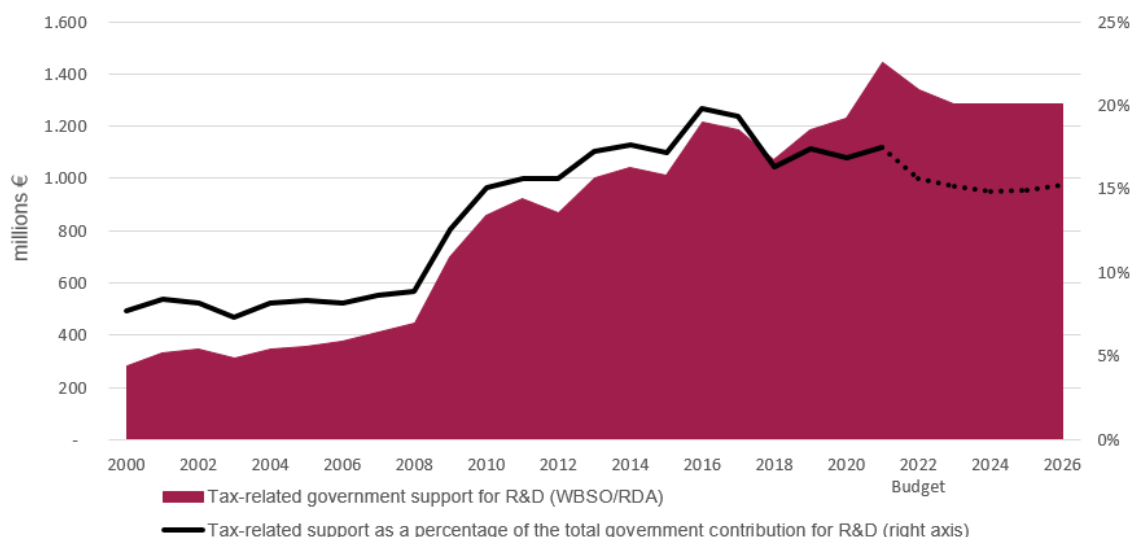
The most important tax measure for R&D is the WBSO (Dutch Research and Development (Promotion) Act), which has existed since 1994. The WBSO enables companies to reduce their payroll tax and national insurance contributions on personnel costs relating to research and development work. The Research and Development Allowance (RDA) was added in 2012. Companies could use this scheme to receive an increased tax deduction for R&D investment and R&D operating costs. In 2016, the two schemes were merged into a single tax scheme, referred to as WBSO. This is reconciled via the payroll tax. The scheme is administered by the Netherlands Enterprise Agency (RVO). Only companies that conduct research themselves, can use it.

¹⁶ NLR Annual Accounts 2020, 28 April 2021.

In addition to the WBSO, there are two environmental tax schemes. Because they focus on innovation, they are discussed in Section 2.4, which deals with government expenditure on innovation. Then there is the innovation box, which amounted to EUR 1.6 billion in 2020. The innovation box reduces the corporate income tax on profits from R&D and innovation activities. As in previous years, the innovation box is not included in the calculation of indirect R&D expenditure. Internationally, it has been agreed not to include this type of measure in the R&D and innovation statistics.¹⁷

Figure 7 shows trends in the WBSO, both in absolute terms and as a percentage of total government R&D expenditure. It shows that between 2008 and 2021, the tax-related support for R&D grew from EUR 445 million to EUR 1.4 billion. The reason for the peak in 2021 was the increase in that year of the rate of the first tranche of the WBSO, to incentivise investment in R&D.¹⁸ The idea behind this is that the COVID-19 pandemic put R&D investment under pressure, while this is precisely what is needed to help the country emerge from the crisis.¹⁹ Tax-related support also increased as a percentage of the total government contribution to R&D: from 9% in 2008 to 15% in 2010. Between 2010 and 2026, the percentage ranges from 15% to 20%. The dip in 2018 (16%) is probably due to the fact that companies performed less R&D than planned.²⁰

Figure 7 Trends in indirect (tax-related) government support for R&D from 2000 to 2026 (m EUR and as a percentage of the total government contribution for R&D).



Sources: Rathenau Instituut, TWIN figures and Ministry of Economic Affairs.

Note: figures for 2023-2026 are multi-year forecasts. Excluding the environmental tax measures MIA and VAMIL, which are not explicitly aimed at encouraging R&D.

¹⁷ For a detailed explanation, see TWIN 2015-2021, p.11-12 and the OECD Frascati Manual 2015, p. 346. The innovation box is not a budgeted scheme, so its future budgetary importance and related use is not limited. The size in budgetary terms of the innovation box grew from EUR 605 million to EUR 1.6 billion between 2011 and 2020.

¹⁸ <https://www.rijksoverheid.nl/documenten/begrotingen/2020/09/15/xiii-economische-zaken-en-klimaat-rijksbegroting-2021>

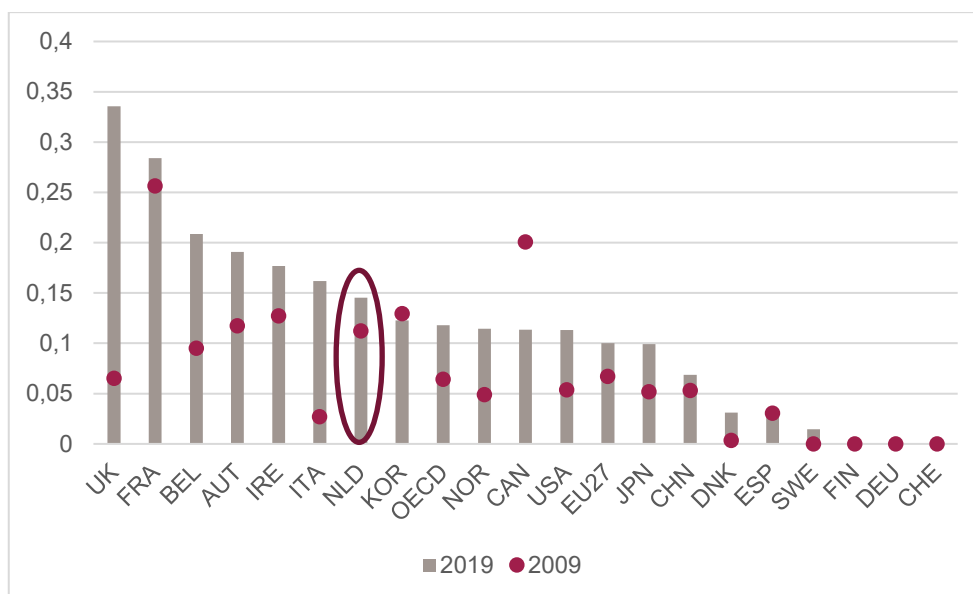
¹⁹ Letter to Parliament concerning the rates of tax-related support in WBSO 2021

²⁰ https://www.rijksfinancien.nl/sites/default/files/kamerstuk_pdf/kst-35200-2.pdf

We can compare indirect tax-related government support with other countries by relating it to GDP. We have shown this in Figure 8. We see that the amount of tax-related government support given by countries varies greatly. The United Kingdom spends the most (0.34% of GDP in 2019), but there are also countries such as Germany and Switzerland that did not (yet) provide any tax-related government support in 2019.²¹

The Dutch government spends 0.15% of GDP on tax-related government support. This is above the EU-27 average (0.10%) and the OECD average (0.12%), but below six reference countries, such as the UK, France and Belgium (see Figure 8). In the past, the Netherlands has provided relatively generous tax-related government support for R&D compared to other countries. In 2017, for example, only the UK, Belgium and France spent more on tax support for R&D. However, tax-related support in a number of other countries has increased more than in the Netherlands, particularly in the UK. The sharp increase in the UK is partly due to a number of changes in schemes and allowances.²² The Dutch percentage has risen slightly. As the OECD average has risen more steeply, the Dutch percentage in 2019 was closer to the OECD percentage.

Figure 8 tax-related government support for R&D in 2019 and 2009 (as a percentage of GDP).



Source: Rathenau Instituut, adapted from OECD.

Notes: Germany, Finland and Switzerland do not have tax-related government support for R&D. United States and Spain: 2018 instead of 2019. China: 2017 instead of 2019.

2.4. Government expenditure on innovation rises thanks to National Growth Fund

²¹ Germany and Switzerland were going to introduce a tax scheme in 2020, see <https://www.oecd.org/sti/rd-tax-stats-database.pdf>.

²² <https://www.oecd.org/sti/rd-tax-stats-united-kingdom.pdf>

In this section, we look at government expenditure on innovation. This consists of three parts: innovation-relevant R&D expenditure, innovation expenditure without an R&D component and tax instruments aimed at innovation. The innovation-relevant R&D expenditure is that part of any R&D expenditure referred to above that is aimed at innovation (and therefore innovation-relevant).²³ The tax instruments already discussed in the previous section are presented here again because they do not only focus on R&D, but are also innovation-relevant.

Table 4 shows the scale and evolution of the types of national government contributions aimed at innovation. Direct expenditure on non-R&D innovation increases the most, by 71%, between 2020 and 2026. The increase is mainly driven by funds from the National Growth Fund. In 2020, there were no funds yet available from the National Growth Fund and in 2026, an estimated EUR 526 million from the fund will be spent on innovation.

Direct innovation-related R&D expenditure is also rising sharply. This increase is mainly thanks to the National Growth Fund. Another major rising trend is spending on the PPP allowance (see also Section 2.2).

The tax resources for R&D and innovation are budgeted to increase slightly by 3% over 2020-2026. The increase is due to an increase in funds for the WBSO. The environmental tax measures MIA and VAMIL, on the other hand, are declining slightly.

Finally, the share of the government contribution for innovation is increasing in relation to the total government contribution for R&D and innovation, standing at around 40% over the period 2013-2021. Then it is expected to rise to 43% in 2024, mainly thanks to funds from the National Growth Fund.

²³ It also depends on the *intention* of the activity whether an R&D activity can be called innovation-relevant. If an activity is intended to promote innovation, it is said to be innovation-relevant.

Table 4 Government contribution to innovation, including innovation-relevant R&D (m EUR)

	2020	2021	2022	2023	2024	2025	2026	Difference 2020-2026	
	Actual	Provisional	Budget	Multi-year forecast				m EUR	%
Direct innovation-related R&D expenditure	1192.4	1316.4	1522.9	1603.6	1677.8	1623.4	1534.7	342.3	29
Direct expenditure on non-R&D innovation	572.6	694.9	883.5	1068.5	1188.0	1174.2	980.4	407.8	71
Tax instruments for R&D and innovation...	1380.0	1582.0	1510.0	1455.0	1455.0	1425.0	1425.0	45.0	3
...of which R&D (WBSO)	1231.0	1443.0	1341.0	1286.0	1286.0	1286.0	1286.0	55.0	4
...of which innovation only (MIA/VAMIL)	149.0	139.0	169.0	169.0	169.0	139.0	139.0	-10.0	-7
Total government contribution for innovation	3145.0	3593.3	3916.4	4127.0	4320.8	4222.7	3940.1	795.1	25
Aid for innovation as % of government contribution for R&D and innovation	39.2	39.6	40.6	42.5	43.1	42.6	41.2		

Source: Rathenau Instituut, TWIN figures 2020-2026.

Note: the WBSO is an instrument for R&D, but it concerns innovation-relevant R&D. The amounts in the multi-year forecast are usually subject to annual wage and price adjustments in the budget.

3. Other public R&D and innovation expenditure: Europe and provinces

Besides the Dutch national government, regional and international authorities are also investing in R&D and innovation in the Netherlands. To get an accurate picture of the public investment in R&D and innovation in the Netherlands, it is important to look at this spending as well.²⁴ For example, the European Union is becoming an increasingly important funder of R&D in the Netherlands, mainly through the European Framework Programme for Research and Innovation. Regional funding comes from provinces, European funds, regional development agencies, municipalities and various semi-public organisations.

3.1. European funding at national level: H2020 and Horizon Europe

The European Union funds most R&D and innovation through the Framework Programme. The eighth framework programme, Horizon 2020 (H2020), ran from 2014-2020 with a total budget of EUR 77 billion.²⁵ The new framework programme, Horizon Europe, runs from 2021-2027. The budget of this framework programme is EUR 95.5 billion, commencing in mid-April 2021.

Of the H2020 funds, 7.9% went to researchers affiliated to Dutch knowledge and research institutes and companies. Table 5 shows that Dutch researchers and companies have been very successful as part of H2020. Only five countries have a larger share of the funding allocated. The share of H2020 funding that the Netherlands receives is one and a half times larger than the share that the Netherlands contributes to the EU budget (5.3% of the total EU budget comes from the Netherlands). In addition, the acceptance rate is relatively high at 16%, the EU average being 12%.

²⁴ The OECD's Frascati Manual, which provides the basis for collecting data on R&D in EU and OECD countries, also recommends including relevant provincial funds in the data collected on government budgets where such funds are significant.

²⁵ http://ec.europa.eu/newsroom/horizon2020/document.cfm?doc_id=17607, amount excluding Euratom.

Table 5 Horizon 2020 funding allocated, as a share of total allocations and contribution to the overall budget.

	Allocated from H2020 (m EUR)	Share of total allocations	Contribution to EU budget 2014-2020 (percentage)	Rate of return	Acceptance rate
GER	9,967	14.7%	20.5%	0.72	14.9
UK	7,746	11.5%	12.3%	0.93	14.7
FRA	7,342	10.9%	15.7%	0.69	15.3
SPA	6,337	9.4%	8.1%	1.15	12.9
ITA	5,619	8.3%	11.8%	0.70	11.8
NL	5,328	7.9%	5.3%	1.48	16.0
BEL	3,389	5.0%	4.2%	1.20	17.2
SWE	2,291	3.4%	2.8%	1.23	14.6
AUS	1,923	2.8%	2.3%	1.25	16.1
DEN	1,757	2.6%	1.9%	1.36	15.1

Source: Rathenau Instituut, calculations based on data from Horizon 2020 Dashboard (reference date 7 February 2022), for all data except contribution to EU budget 2014-2020: European Commission, EU expenditure and revenue tables 2014-2020.

Note 1: As data on each country's actual contribution to H2020 is not available, we have assumed that it is comparable to the share that each one contributes to the EU budget.

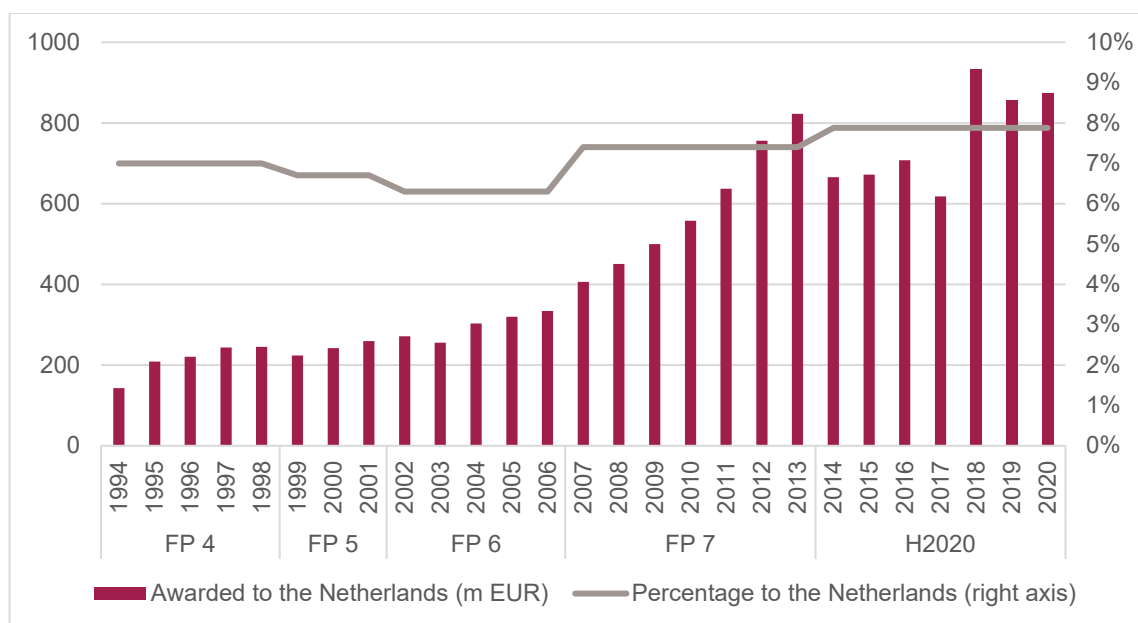
Note 2: At 3.5%, Switzerland receives a higher percentage of H2020 funds than Denmark, Austria and Sweden but is not included in the table as it participates in H2020 as an associated country.

Note 3: Figures for Horizon 2020 refer to the work programme's revenue only. Part of the budget for H2020 has been set aside for other purposes, such as various forms of public-private and public-public partnerships and the European Institute of Innovation and Technology (EIT). These are not included.

The EU's importance to the Netherlands as a funder of scientific research and innovation has not only increased in monetary terms, but also proportionally. When we add up the direct Dutch government contribution to R&D and EU public funding, the rate of EU funding increased from 9% during the seventh Framework Programme to 13% during Horizon 2020. The Rathenau Instituut website contains more details of Dutch participation in EU Framework Programmes.²⁶

²⁶ See: <https://www.rathenau.nl/nl/wetenschap-cijfers/geld/europese-financiering>

Figure 9 Trends in the amounts allocated to the Netherlands from the Framework Programmes (m EUR).



Source: Rathenau Instituut, adapted from data from European Commission, *Development of Community research commitments*: total expenditure on framework programmes (FP) over 1994-2013; Evaluations of 5th and 6th framework programmes of Senter (2003) and SenterNovem (2006); Horizon 2020 Dashboard based on "call year" 2014-2021. 2021 has been merged with 2020.

Note: figures for Horizon 2020 refer to the work programme's revenue only. Part of the budget for H2020 has been set aside for other purposes (such as various forms of public-private and public-public partnerships and the European Institute of Innovation and Technology (EIT)). These are not included.

Dutch researchers and companies raised EUR 5.3 billion in H2020 funding, an average of EUR 760 million a year. Figure 9 appears to show the amount of money allocated to the Netherlands varying widely during H2020. This is partly because the total amount of H2020 varied from year to year. The Netherlands obtained between 7% and 9% of the total funds each year. EUR 95.5 billion has been earmarked for the new framework programme, Horizon Europe. This means a slightly larger budget for European research funds compared to H2020. This and more information about the new framework programme can be found in the fact sheet *Nederland en Horizon 2020* (The Netherlands and Horizon 2020).²⁷

3.2. European regional funds

In addition to the framework programmes, the European Regional Development Fund (ERDF) is a European source of income for R&D and innovation. The ERDF is a structural fund aimed at strengthening economic and social cohesion in Europe. Stimulating research and innovation is a major part of this. Of the funds for regional investment in R&D and innovation (provincial funds and ERDF combined), about a quarter comes from the ERDF. The ERDF consists of two types of programmes:

- Country-specific programmes, divided into North, East, South and West.

²⁷ <https://www.rathenau.nl/nl/wetenschap-cijfers/nederland-en-horizon-2020>

- Interreg, for cross-border (A), transnational (B) and European (C) cooperation between and within regions for regional development.

The programming period 2014-2020 has applied in recent years. The programming period 2021-2027 commenced in 2021. Up to and including 2023, grant decisions and payments and any changes to them can still be made as part of the 2014-2020 programming period.

Budget for country-specific programmes fully allocated

Within the country-specific programmes, a budget of EUR 510 million of EU funds has become available for the Netherlands for the programming period 2014-2020, of which EUR 454 million is for knowledge and innovation. This means that an average of EUR 65 million in ERDF funding is available annually for R&D and innovation over the 2014-2020 period.²⁸ To be eligible for ERDF funds, a project must be co-financed by at least 50% from national public or private funds. The funds for knowledge and innovation are mainly concentrated within the priorities "research and innovation" and "the low-carbon economy". Table 6 shows that by the end of 2020, 7% more had been allocated than was available in the national ERDF budgets (excluding co-funding) reserved for knowledge and innovation.²⁹ The fact that more than 100% is allocated does not mean that more than 100% is actually spent, because programmes do not always use up their entire budget.

A budget of EUR 506 million is available to the Netherlands for the country-specific programmes in the period 2021-2027. The programmes for the four ERDF country districts for this programming period have been submitted to the European Commission. If they are approved, implementation can begin.

²⁸ This is comparable to the knowledge and innovation component in ERDF 2007-2013, which amounted to EUR 62 million per year.

²⁹ The co-funding from provincial budgets is part of the amounts shown in Table 7; co-financing from the national government is part of the EZK budget, shown in Table 2.

Table 6 Budgets and allocations of ERDF country-specific programmes for knowledge and innovation in the Netherlands (m EUR)

	Research and innovation (m EUR)		Low-carbon economy (m EUR)		Total ERDF for priorities related to innovation (m EUR)		
	Budget 2014-2020	Allocated up to 2020	Budget 2014-2020	Allocated up to 2020	Budget 2014-2020	Allocated up to 2020	% allocated
North	78.7	99.7	20.7	17.3	99.4	117.0	118%
East	66.0	78.8	30.0	32.5	96.0	111.3	116%
South	75.0	82.6	34.1	30	109.1	112.9	103%
West	113.0	119.8	36.0	31.6	149.0	151.4	102%
Total	332.7	374.7	120.8	111.6	453.5	486.3	107%

Source: Rathenau Instituut, calculations based on the operational programmes of the districts for 2014-2020 and RVO.nl. Note: budgets for priorities not directly related to knowledge and innovation are not included in this table. For this reason, the amounts for the priorities in the tables do not add up to the total EU amount available for ERDF.

Interreg budget fully allocated to projects

For Interreg for the 2014-2020 programming period, EUR 390 million of EU funding was made available for the Netherlands, of which 94% was earmarked for project implementation. The share of projects in the field of knowledge and innovation in the Netherlands is estimated to be approximately EUR 30 million annually.³⁰ By the beginning of 2021, more than 100% of the available budget for knowledge and innovation from Interreg A had been allocated to projects.³¹ Of the innovation-related priorities under Interreg B and C, more than 100% of the budget had also been allocated to projects by the end of 2021.³² More has been committed than is available because projects do not always use up their entire budget. The actual spend at programme closure is expected to be around 100%.

For Interreg, EUR 379 million is available for the Netherlands in the programming period 2021-2027. For these, too, programmes have been submitted to the European Commission and are going through a process of approval.

3.3. Provincial resources

Decentralised parties, such as provinces, regional development agencies and other organisations at regional and municipal level, also spend money on R&D and innovation. Some decentralised funds are used to co-finance ERDF (see Section 3.2). Because the regional landscape is complex, with overlapping funding streams, it is difficult to obtain a complete, clear-cut picture of regional investment.³³

³⁰ Fact sheet Cross-border cooperation programmes (EZK) and overview Interreg B and C (31-12-2016).

³¹ Source: Interreg A State of affairs budget January 2022 (EZK), calculation by Rathenau Instituut.

³² Source: RVO

³³ Vennekens, A. & J. van Steen (2016). Total investment in research and innovation (TWIN) 2014-2020. The Hague, Rathenau Instituut.

The provincial figures are shown in Table 7. It should be noted that they only concern public funds for research and innovation recorded in the provinces' own budgets and that the provinces are authorised to spend.³⁴ The figures in Table 7 have a financial basis and system different from the figures in Sections 3.1 and 3.2 and therefore cannot simply be added together.

Table 7 Provincial expenditure on knowledge and innovation (m EUR).

m EUR	Earmarked					Budgeted			
	2016	2017	2018	2019	2020	2021	2022	2023	2024
Groningen	18.2	11.8	8.1	12.0	18.5	19.6	25.9	14.5	14.2
Friesland	15.9	14.6	14.6	11.0	14.2	16.9	16.6	12.6	(Yet tbd)
Drenthe	19.9	20.0	13.9	11.2	6.9	12.3	6.3	6.3	6.0
Utrecht	5.1	4.1	4.2	5.0	13.0	6.0	14.4	4.9	4.9
North Holland	10.5	6.4	3.0	4.2	16.7	11.8	19.9	19.9	18.9
South Holland	4.6	13.5	16.3	25.5	29.5	37.5	34.2	28.1	24.9
Flevoland	12.2	1.0	1.0	3.0	3.3	2.7	3.1	(Yet tbd)	(Yet tbd)
Overijssel	8.5	7.6	9.2	20.9	36.0	37.7	18.4	16.0	9.3
Gelderland	21.7	7.7	20.8	14.5	64.7	53.7	53.7	35.3	17.8
North Brabant	18.0	25.4	18.5	23.9	20.2	28.2	27.3	22.0	6.0
Limburg	33.0	20.0	22.4	32.5	24.7	15.2	11.3	8.5	5.8
Zeeland	4.5	4.9	8.0	8.4	22.0	21.4	11.5	3.2	1.5
Total	172.2	136.9	139.8	172.1	269.7	262.9	242.4	171.2	109.1

Source: Rathenau Instituut, TWIN figures for provinces.

Notes: in the multi-year budget, some amounts are yet to be determined (tbd) for a number of provinces. This is mostly due to the fact that budgets are only agreed upon for the current coalition period. A breakdown by project and scheme is usually not possible at the Province of Drenthe, as they are often implemented at a northern level (not specifically Drenthe).

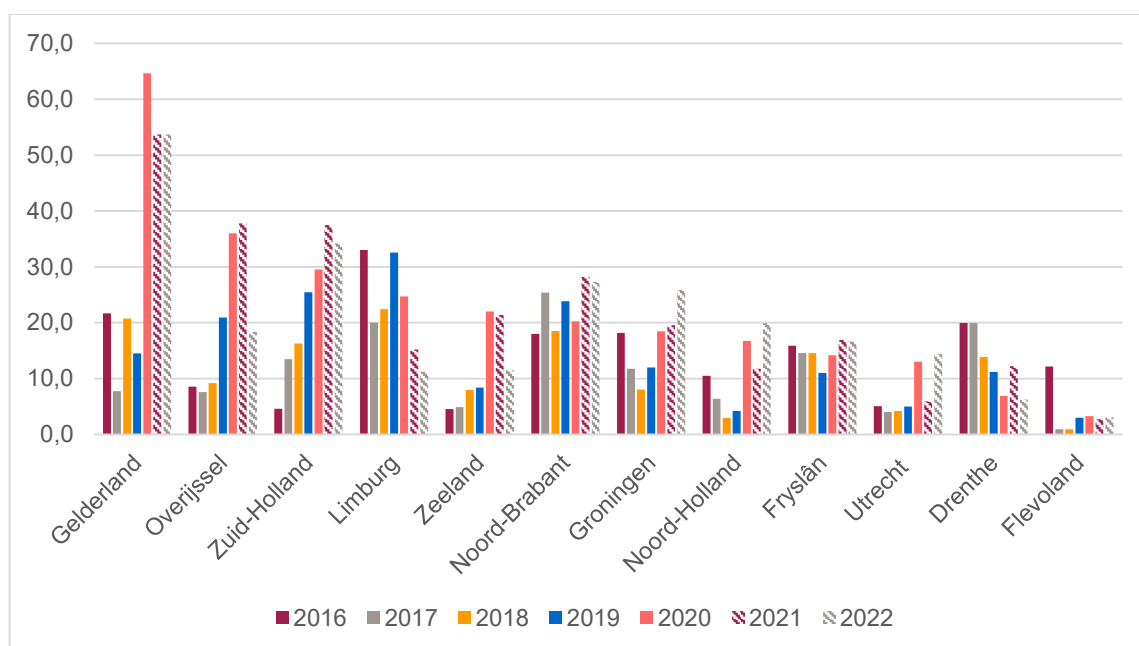
Table 7 shows that the budgets that provinces annually earmark and budget for knowledge and innovation vary between EUR 136.9 and EUR 269.7 million. The higher amounts in 2020, 2021 and 2022 compared to other years are partly due to additional funds being made available to tackle COVID-19, but also by new projects and initiatives. The amounts appear to be declining sharply in 2024. One reason for this is

³⁴ Does not include projected public or private co-financing whose funds are in the budget of other organisations (managing authorities, national, EU, municipalities or private). The figures do include projected co-financing by the province itself for schemes and projects within national or Interreg programmes.

that budgets have often been agreed for the current coalition period only. These amounts are therefore likely to increase in future.

Figure 10 shows the trends over the period 2016-2020 and the budgeted expenditure for 2021 and 2022. There are large differences between the provinces, both in terms of actual expenditure on knowledge and innovation and in terms of planned expenditure in the coming years. For example, expenditure on knowledge and innovation in 2020 ranges from EUR 3 million to EUR 65 million.

Figure 10 Annual provincial expenditure on knowledge and innovation in 2016-2020 and budgeted expenditure in 2021 and 2022 (m EUR)



Source: Rathenau Instituut, TWIN figures for provinces.

Notes: ranked on the basis of actual expenditure in 2020. A breakdown by project and scheme is usually not possible at the Province of Drenthe, as they are often implemented at a northern level (not specifically Drenthe).

Appendix: About the method

The data collection at the ministries

The Rathenau Institute collects data from the Dutch Ministries for its annual TWIN publication (this report). We do this by sending the Ministries a questionnaire surveying the following categories of government expenditure:

- Institutional funding of R&D (fixed amounts allocated to institutes), with the Ministries being asked to indicate the innovation-relevant portion.
- Project funding of R&D (both projects and programmes), with the Ministries being asked to indicate the innovation-relevant portion.
- Other expenditure on non-R&D innovation.
- Tax schemes, for both R&D and innovation.

The ministries make an assessment of this to the best of their ability. The questionnaire also asks where the expenditure ends up (insofar as possible) and the purpose of the expenditure (based on a classification of government objectives). It also asks what proportion of the budget item concerns R&D and/or innovation.

The Rathenau Instituut collects this data on the basis of international agreements on the definition and delineation of the term R&D. These are described in the OECD's Frascati Manual, which has a long tradition.³⁵ Because ministries have built up a great deal of experience and expertise over the years in drawing up R&D reports, we can present robust and internationally comparable data on R&D expenditure by the Dutch government.

So far, no such agreements have been reached or expertise accrued with respect to government budgets for innovation. We therefore make use of the OECD terminology for collecting innovation data in the business enterprise sector. It is difficult to apply this terminology in practice, however, because the definitions are general in nature but must be applied to specific budget lines. This means that the collection of data on government expenditure on non-R&D innovation is still under development. Caution should be exercised when interpreting these data. There are no comparable examples of data sets abroad.

The data set concerning regional funding, which focuses more on innovation than on R&D, starts with the 2014 budget. Once again, this is a data set 'under construction', and some caution is advised when interpreting these data. It is difficult to say how an improved data set will impact the overall picture. It is unclear what the impact of improved data collection will be on total funds available.

³⁵ The first version of the OECD Frascati Manual dates back to 1964. The most recent (seventh) version was published in October 2015: <https://www.oecd.org/publications/frascati-manual-2015-9789264239012-en.htm>.

Data set on R&D and innovation: international agreements and principles

International agreements are being made to govern the data set on R&D and innovation. The two most important principles unpinning that data set are the following

- It should still be possible (in accordance with a EUROSTAT regulation for the provision of data on government expenditure on R&D) to distinguish between R&D expenditure and innovation expenditure that does not involve R&D.
- The definition of innovation expenditure should adhere as closely as possible to international definitions, where these are available (this also applies to the definition of R&D expenditure).

We defined the term innovation for the first time in the TWIN report 2012-2018. We have used the OECD Conceptual Framework for the data set on corporate innovation: the Oslo Manual.³⁶ The application of the concept of innovation to budget expenditure will be further refined over the coming years in cooperation with Dutch ministries.

We define government budgets for innovation as expenditures committed to funding activities (scientific, technological, organisational, commercial), which are primarily targeting innovation, and the intention is to perform them in the private or public sector, leading to the introduction of

- new or vastly improved products;
- new or vastly improved processes/methods;
- new or vastly improved services;
- administrative or organisational innovation or marketing innovation.

To ensure that the scope of this definition remains manageable, certain constraints have been imposed on the collection of innovation-related budget data. They must be specified government initiatives, measures or interventions that:

1. have innovation as their goal (to strengthen the innovative capacity of the Netherlands); or
2. have innovation as a means, for example, of achieving a specific policy objective; or
3. are a combination of 1 and 2.

The first and third scenarios apply mainly to spending by the Ministry of Economic Affairs and Climate Change (EZK). The second scenario applies more to spending by the various relevant ministries. This definition excludes expenditure that has no clear link to the creation of innovation or only contributes to innovation in the longer term. Examples include expenditure on education and the first funding stream, which goes directly to the universities.

³⁶ The Oslo Manual for innovation was revised in 2018. The revised manual was published in October 2018: <http://www.oecd.org/science/oslo-manual-2018-9789264304604-en.htm>.

Glossary

Below we explain the most important terms used in this publication: research and development (R&D), science, (scientific) research and innovation. Wherever possible, we use the terminology also used by Statistics Netherlands and derived from the international definition agreements as laid down in the OECD Frascati Manual (for R&D) and the OECD Oslo Manual (for innovation). The most recent Frascati Manual dates from 2015 and a revised version of the Oslo Manual was published in 2018.

In the Frascati Manual, **R&D** is a collective term for three types of activities:

- Basic research. This consists of experimental or theoretical work undertaken to acquire new knowledge, without any application or use in view.
- Applied research. This consists of accumulating new knowledge, but directed towards a specific practical aim or objective.
- Experimental development. This involves systematic work drawing on existing knowledge gained from research and/or experience, directed towards producing new materials, products and devices or improving them.

Science encompasses both systematically acquired and ordered objective human knowledge (gained from scientific research) and the process of knowledge acquisition and the community in which this knowledge is acquired. This scientific community has its own principles, methods and conventions, on the basis of which it conducts its research.

Scientific research consists of the research activities of the scientific community. It is mainly associated with basic research, but applied research is also included in the definition of scientific research. Basic research mainly takes place in higher education and non-academic institutes and to a lesser extent in research institutes and the private sector. But universities also carry out applied research and experimental development, albeit to a lesser degree. Conversely, the private sector and research institutes also carry out basic research.

Innovation consists of activities that (must or may) lead to new or vastly improved products, processes and services, or to administrative, organisational innovation within organisations or wider social contexts. R&D can be part of innovative activities and is then labelled as innovation-relevant. Examples of innovative activities that do not qualify as R&D are the purchase of products (such as software or equipment), external knowledge and activities such as industrial design. Innovation can therefore be based on R&D activities, but there are also other forms of innovation.

All in all, it is not always easy to draw a strict line between R&D activities and innovation. Whether an R&D activity can be classed as innovation-related also depends on the intention of the activity.

Methodology behind research expenditure in higher education

Universities receive their annual block grant or GUF from the Ministry of Education, Culture and Science. It is intended for both research and education. The Rathenau Instituut uses an R&D coefficient to calculate how much of the GUF is used to finance research activities. Statistics Netherlands calculates this coefficient on the basis of the research effort of university staff and the proportion of their time that university staff spend on research.³⁷ There is no coefficient for determining the research effort at the universities of applied sciences. For research at universities of applied sciences, we therefore use two identifiable items in the Ministry of Education, Culture and Science budget that are specifically targeted at practice-based research.

The R&D coefficient of universities varies from year to year. The coefficient for 2020 was 0.595. Based on data on completed research, this coefficient is also used for the budget and multi-year figures as specified in the Frascati Manual.

³⁷ For a more detailed description of how the R&D coefficient is calculated, see: Steen, J. van. (2013). Totale Onderzoek Financiering 2011-2017. The Hague, Rathenau Instituut, p.12.

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