

Horizon 2020

In a nutshell

Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020) – is the main instrument financing research and innovation in the European Union and the successor to seven previous Framework Programmes. It is an ambitious, flexible programme, unique in the world in terms of budget, duration, budgetary stability and scope. Since 2014 it has supported more than 13 000 projects in more than 130 participating countries and helped to respond to urgent societal challenges, such as the Ebola crisis.

EU's multiannual financial framework (MFF) heading and policy area

Heading 1 – Smart and Inclusive Growth

Subheading 1a – Competitiveness for growth and jobs

2014-2020 financial envelope (in current prices and as % of total MFF)

Commitments: €79 401.83 million (7.33 %)

2016 budget (in current prices and as % of total EU budget)

Commitments: €9 539.43 million (6.14 %)

Payments: €10 069.14 million (7.37 %)

2017 budget (in current prices and as % of total EU budget)

Commitments: €10 345.93 million (6.53 %)

Payments: €10 196.30 million (7.58 %)

Methods of implementation

Direct management (European Commission) and *indirect management* (implementing bodies).



In this briefing:

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EU role in the policy area: legal basis

Title XIX of the [Treaty on the Functioning of the European Union \(TFEU\)](#) is devoted to Research and Technological Development and Space. [Article 179](#) declares that 'The Union shall have the objective of strengthening its scientific and technological bases by achieving a European research area ... and encouraging it to become more competitive', while [Article 181](#) is the basis for the coordination of national and European Union policies to ensure they are consistent.

[Article 182](#) describes the procedure for adopting the legislative acts. The European Parliament and the Council, using the ordinary legislative procedure and after consulting the Economic and Social Committee, adopt a **multiannual framework programme** that sets out all related activities, establishes the scientific and technological objectives, indicates the broad lines of the activities and fix the overall amount and the rules for the Union's financial participation. The Council, for its part, adopts the **specific programmes** by means of a special legislative procedure after consulting the European Parliament and the Economic and Social Committee. The specific programme will describe the specific objectives and the detailed rules for implementing the framework programme, fix its duration and provide for the means deemed necessary.

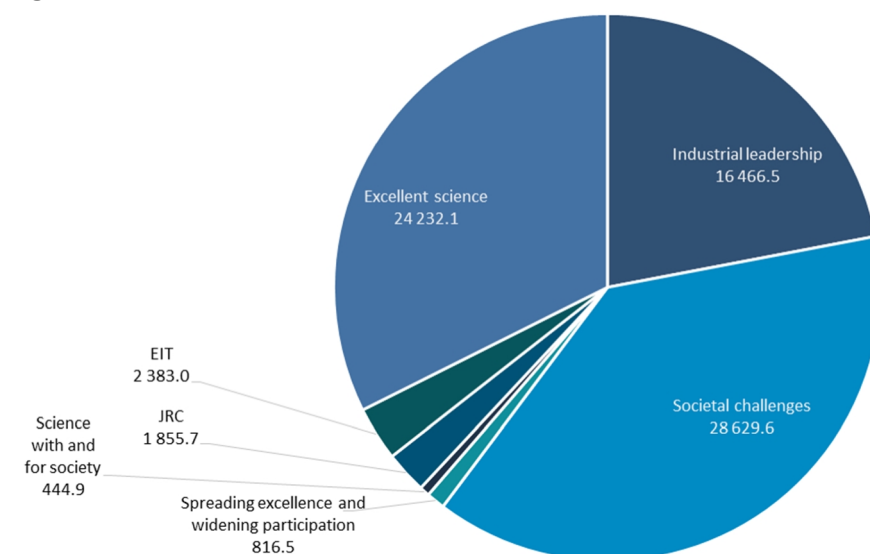
On the basis of this last article, [Regulation \(EU\) No 1291/2013](#) (Horizon 2020 regulation) established Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020), while [Council Decision 2013/743/EU](#) established the specific programme. Finally, in accordance with [Article 183](#), [Regulation \(EU\) No 1290/2013](#) laid down the rules for participation and dissemination.

The financial allocation of Horizon 2020

The original envelope for Horizon 2020 proposed by the European Commission (EC) in 2011 was €87 740 million, of which €86 198 million was to be allocated to activities under Title XIX TFEU and €1 542 million would be an initial allocation to the [European Institute of Innovation and Technology \(EIT\)](#).¹ During the negotiations of the 2014-2020 MFF, this envelope was modified, so the final decision – reflected in Article 6(1) of Regulation (EU) No 1291/2013 – set the financial envelope at €77 028.3 million, of which €74 316.9 million was allocated to Title XIX TFEU activities and €2 711.4 million to the EIT. The specific flexibility to strengthen research included in Article 15 of [the MFF Regulation](#) enabled €200 million to be frontloaded to Horizon 2020 for the 2014 to 2015 period.²

[Regulation \(EU\) No 1017/2015](#), which established the [European Fund for Strategic Investments \(EFSI\)](#), amended the Horizon 2020 Regulation and transferred €2 200 million from its envelope to finance a new EU guarantee fund to cover the European Investment Bank's risks in EFSI operations. The final financial envelope of Horizon 2020 was thus reduced to €74 828.3 million (€72 444.3 million for TFEU activities and €2 383 million for the EIT).³

In the [Mid-term review/revision of the multiannual financial framework 2014-2020](#), and owing to the strong take-up of the programme, the Commission proposed to reinforce it by €400 million for the 2017 to 2020 period. The European Parliament and the Council agreed [in a joint statement](#) to lower this amount to €200 million.

Figure 1 – Financial allocation of Horizon 2020, 2014-2020, in € millions.

Data Source: [Regulation \(EU\) No 1017/2015](#).

Objectives of the programme

The general objective of Horizon 2020 is to help to build a society and an economy based on knowledge and innovation, to provide funding for research, development and innovation, and to contribute towards the target of spending 3 % of EU gross domestic product (GDP) on research and development, as set out in the Europe 2020 strategy. Horizon 2020 is the main financing arm of the Europe 2020 strategy and the European Research Area (ERA).

Box 1 – The European Parliament's position

The EP's priorities for Horizon 2020 are:

- increased participation for small and medium sized enterprises (SMEs) in Horizon 2020, with a dedicated budget for the SME instrument;
- the Fast Track to Innovation scheme (FTI);
- Horizon 2020's contribution to the European Research Area (ERA) in terms of 'researcher careers and researcher mobility';
- a guaranteed budget allocation for the 'Spreading excellence and widening participation' (SEWP) and the 'Science with and for society' (SwafS) programmes, as well as for e-infrastructure and for achieving EU climate and energy goals;
- for 85 % of the 'Energy Challenge' budget to be earmarked for non-fossil fuel energy research;
- the transparency and openness of public-private partnerships (PPPs) and the European Institute of Technology (EIT);
- synergies between Future and Emerging Technologies (FET) and other parts of Horizon 2020.
- open access (OA) to scientific publications and research data;
- gender balance;
- balance between small, medium and large projects; and
- synergies between Horizon 2020 and cohesion policy.

Source: [Scrutiny on Horizon 2020 focusing on the European Parliament's priorities](#), Policy Department for Economic and Scientific Policy, European Parliament, 2016.

The programme has three main priorities, each with a set of specific objectives. There are also two independent specific objectives. The whole schema can be seen in Table 1.

The 'Excellent science' priority aims to help individual researchers and teams work in subjects at the frontier of science and on new high-risk ideas, improve training, and exchange and career opportunities for researchers, and develop excellent research infrastructures with the objectives of reinforcing the EU science base, consolidating the ERA and making Europe's research and innovation system more competitive globally.

The 'Industrial leadership' priority aims to support the development of new technologies and innovations that will enable the companies of the future, facilitate access to venture capital, and help innovative small and medium-sized enterprises (SMEs) become world-leading enterprises.

The 'Societal challenges' priority targets the policy priorities and societal challenges of the Europe 2020 strategy. It supports research and innovation in those areas that will become critical in the near future or will strongly affect the lives of EU's citizens.

The Joint Research Centre (JRC), which is the European Commission's science and knowledge service, and the European Institute of Innovation and Technology (EIT) meanwhile also contribute to the general objective and the priorities, the first by providing independent scientific and technical advice to support EU policy and the second by completing the 'knowledge triangle' of higher education, research and innovation by means of knowledge and innovation communities (KICs).

Table 1 – Priorities and specific objectives of Horizon 2020

'Excellent science' priority
European Research Council (ERC)
Future and emerging technologies (FET)
Marie Skłodowska-Curie actions
Research infrastructures
'Industrial leadership' priority
Leadership in enabling and industrial technologies
Access to risk finance
Innovation in SMEs
'Societal challenges' priority
Health, demographic change and well-being;
Food security, sustainable agriculture and forestry, marine, maritime and inland water research, and the bio economy.
Secure, clean and efficient energy
Smart, green and integrated transport
Climate action, environment, resource efficiency and raw materials
Europe in a changing world – Inclusive, innovative and reflective societies
Secure societies – Protecting freedom and security of Europe and its citizens.
Other specific objectives
Spreading excellence and widening participation
Science with and for society
Other activities
Non-nuclear direct actions of the Joint Research Centre (JRC)
European Institute of Innovation and Technology (EIT)

Source: [Regulation \(EU\) 1291/2013](#).

Funded actions

Horizon 2020 allocates the available funds through three consecutive work programmes, the first for the years 2014 to 2015, the second for 2016 to 2017 and the third for 2018 to 2020. It has allocated €28 535.7 million to date and supported 13 643 different projects in 44 coordinating countries and more than 130 participating countries. More than 70 % of the funding goes to the 'Excellent science' and the 'Societal challenges' pillars.⁴

Box 2 – Examples of projects supported by Horizon 2020

The [iMETland](#) project aims to produce a device to treat urban wastewater from small communities without using any energy and without producing contaminated residuals. The project integrates microbial electrochemical technologies (METs) with biofilters and uses a combination of electricity-producing bacteria and a new electro-conductive material to obtain clean water that can be used for irrigation with almost no waste products. The scientists are experimenting with different bacteria and different materials and they estimate that depuration rates will be 10 times higher than when using conventional techniques. The project is coordinated by Fundación Imdea Agua of Spain and other participating countries are Argentina, Belgium, Denmark, Mexico and the United Kingdom (UK). Its total cost will be €3 461 622 with an EU contribution of €2 924 810 and it is scheduled to run from September 2015 to August 2018.

[Children Born of War – Past, Present and Future](#) is a project conducted by young researchers and supported by a scheme under the Marie Skłodowska-Curie programme that aims to promote a new generation of researchers. It studies the lives of children born during wars and their mothers. The project will study systematically the experiences of children born in several 20th century conflicts to improve understanding of their situation and propose policies to help them. The University of Birmingham (UK) is coordinating the project and the other participants include universities and research centres in Czech Republic, Germany, France, Latvia, Lithuania, the Netherlands, Austria and Poland. The total cost will be €3 729 290, financed entirely by Horizon 2020. The project timeframe is from March 2015 to February 2019.

[AtlantOS \(Optimising and Enhancing the Integrated Atlantic Ocean Observing Systems\)](#) is a project that will coordinate all existing Atlantic Ocean observing activities in order to achieve an integrated and efficient observing system for the Atlantic. It will fill existing observing gaps and will ensure that data are readily accessible and useable, with a particular view to increasing the competitiveness of SMEs in the marine sector. It will also contribute to GOOS, the Global Ocean Observing System. The project is coordinated by the Helmholtz Centre for Ocean Research of Kiel (Germany) and there are 62 participant institutions from Belgium, Brazil, Canada, Denmark, Spain, the Faroe Islands, France, Croatia, Ireland, Italy, the Netherlands, Norway, Poland, Portugal, South Africa, the United Kingdom (UK) and the United States (USA). Horizon 2020 finances the total cost of the project, equal to €20 652 921. It started in April 2015 and will run until June 2019.

[SponGES](#) is a project that will study the ecosystem of sponge grounds – one of the most diverse and vulnerable marine ecosystems of the deep-sea – in the North Atlantic in order to preserve and use them in a sustainable way. Sponge grounds have until now received very little research and conservation attention, so the project will map and describe the North Atlantic deep-sea sponge grounds and their evolution. It will also study the potential of sponge grounds for biotechnology and develop a plan for their conservation and management. The University of Bergen in Norway is coordinating the project and universities, marine institutes and other research institutions from Canada, Spain, Germany, Italy, the Netherlands, Portugal, Sweden, the UK and the USA are also participating. The total cost of the project is €10 225 865 and the EU contribution is €9 994 302. The project is scheduled to run from March 2013 to February 2020.

Assessment of Horizon 2020

Horizon 2020 is the successor to seven previous Framework Programmes (FPs) for research and technological development. It is the first FP to have a name, which signals a break with the previous FPs in several senses: it aims to support all actors and activities of the innovation process by merging various previous programmes, while streamlining the overall structure and simplifying the application process. An overview of the various evaluations of developments and the results of the first two and a half years follows.

European Commission interim evaluation

In May 2017 the European Commission published a very comprehensive [interim evaluation](#), covering the first three years of the programme. While it is still too early to have a complete picture of the results, the Commission evaluated Horizon 2020 according to five criteria: relevance, efficiency, effectiveness, coherence and EU value added. Effectiveness is in turn measured in terms of scientific impact, innovation and economic impact and societal impact. The conclusions are the following:

Relevance

Horizon 2020's objectives, such as that of securing a 3% share of the EU's GDP for research and development, remain valid and the programme is very attractive to stakeholders, as shown by the increased number of applications compared with the 7th Framework Programme (FP7). It also responds with great flexibility to emerging needs (such as the Ebola and migration emergencies), technology advances and new political priorities.

Efficiency

New management modes, the simplification and harmonised implementation of the rules and lower administrative costs combine to make the programme more efficient than its predecessor. However, there is significant oversubscription (only 11.6% of proposals win funding) resulting in the rejection of many high-quality projects, which could have been avoided with an additional €62.4 billion. There is room for improvement in the evaluation feedback and international cooperation could be strengthened.

Effectiveness

- Scientific impact. Horizon 2020 supports about 340 000 researchers, boosting national and pan-European research infrastructures, producing high-quality scientific knowledge, and forming more scientific collaboration networks; but progress in spreading excellence and making publications and data openly accessible is slow.
- Innovation and economic impact. Compared with previous programmes, there is higher private sector and SME involvement. Other benefits include the creation of networks, access to risk finance for firms, especially SMEs, the generation of high quality, commercially valuable patents, and other intellectual property rights. By supporting prototypes, testing activities and clinical trials there are more market innovations. Every euro invested under Horizon 2020 brings an estimated increase in GDP of €6 to €8.5 (€400 to €600 billion by 2030). The challenge is to address barriers to innovation that hinder full market uptake.
- Societal impacts. Most Horizon 2020 projects are expected to have cross-cutting societal impacts and progress on the 'Societal challenges' pillar is in line with objectives. However, expenditure on sustainable development and climate action is below the targets and there is a need to be clearer on the contribution of research and innovation to solving societal challenges with regard to stakeholders.

Coherence

The internal coherence of Horizon 2020 is greater than in FP7, thanks in part to its three-pillar structure. Its coherence with international obligations is also strong. However, synergies between Horizon 2020 and other EU instruments, such as the Structural Funds, and between Horizon 2020 and national policies could be improved.

EU value added

The [additionality](#) of Horizon 2020 is clear, compared with national and regional support; it makes the EU a more attractive place for research and innovation thanks to the

continental scale of competitions. The creation of transnational, multidisciplinary networks and the pooling of capacities, meanwhile, make it easier to act at global level.

European Parliament studies

An [external analysis](#) carried out for the Policy Department for Economic and Scientific Policy at the request of Parliament's Committee on Industry, Research and Energy (ITRE) focuses on the implementation of Parliament's key priorities in Horizon 2020 and concludes that they are generally well addressed, but identifies some bottlenecks and makes a list of recommendations to overcome them.

Another [external study](#), this time completed for the Policy Department for Budgetary Affairs and requested by the Parliament's Committee on Budgets (BUDG) evaluates the first two years of the programme and finds that oversubscription, underfinancing and a rising budget backlog are the main risks of the programme. As the programme has a high EU added value, it recommends considering the possibility of additional funding.

A [European implementation assessment \(EIA\)](#) conducted by the Ex-Post Impact Assessment Unit of the European Parliamentary Research Service (EPRS) includes external analyses that evaluate the three main priorities of Horizon 2020 (Excellent science, Industrial leadership and Societal challenges) from two different perspectives: a research and industry perspective and an economic and financial perspective. Its conclusions are that even if the programme has been fairly successful as regards its priorities, some challenges remain vis-à-vis concentration of funding, gender equality, oversubscription and evaluation.

Assessment of the European Court of Auditors (ECA)

The [ECA's 2015 annual report](#) focuses on performance management systems for Horizon 2020 and the link between Europe 2020 and Horizon 2020. On the positive side, the auditors find that there are real improvements on previous FPs, on account in particular of the simpler funding rules and reduced red tape, but they criticise inter alia the fact that the type of participant targeted (SMEs and new entrants) is more likely to make errors in its cost calculations and that the main measuring indicators of Horizon 2020 are not especially useful in assessing the contribution of the programme to Europe 2020.

The auditors also consider that the Commission should do more to map the three overlapping sets of political priorities for Horizon 2020: the Europe 2020 strategy, the 2014 to 2020 MFF and the Commission priorities for 2015 to 2019. Finally, they see a lack of complementarity between national and European research programmes in some countries (such as Bulgaria and Portugal) and some weaknesses (such as unambitious targets or the absence of baselines) in the performance indicators. These weaknesses limit the Commission's ability to monitor and report on the performance of Horizon 2020.

Other EU programmes and actions in the same field

[EGNOS](#) (the European Geostationary Navigation Overlay Service) and [Galileo](#) (the European Union's Global Satellite Navigation System (GNSS)) are the two European satellite navigation systems; both are under civilian control. Together they have a financial envelope of €7.0 billion for 2014 to 2020.⁵

[Copernicus](#), the European Earth Observation Programme, finances the development of free, open and accessible information services based on satellite earth observation and ground-based, airborne and seaborne measurement systems. It has a financial envelope of €4.3 billion for 2014 to 2020.⁶

[ITER](#), the International Thermonuclear Experimental Reactor is an international research project on the feasibility of fusion energy. The EU contributes about a half of its costs, while the other partner countries (China, India, Japan, South Korea, Russia and the USA) cover the rest. The EU budget financial envelope for 2014 to 2020 is €3 billion.

[COSME](#) is the EU programme for the Competitiveness of Enterprises and Small and Medium-Sized Enterprises. Managed by the European Commission and the Executive Agency for Small and Medium-Sized Enterprises (EASME), its financial envelope for 2014 to 2020 is €2.3 billion.⁷

Main references

[Council Decision \(2013/743/EU\) of 3 December 2013](#) establishing the specific programme implementing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020) and repealing Decisions 2006/971/EC, 2006/972/EC, 2006/973/EC, 2006/974/EC and 2006/975/EC.

[Regulation \(EU\) No 1291/2013](#) of the European Parliament and of the Council of 11 December 2013 establishing Horizon 2020 – the Framework Programme for Research and Innovation (2014-2020) and repealing Decision No 1982/2006/EC.

Reillon V., [Horizon 2020 budget and implementation – A guide to the structure of the programme](#), in-depth analysis, EPRS, European Parliament, November 2015.

Endnotes

¹ The proposal planned a second allocation of €1 652 million for the EIT after the first revision of the programme. This amount was to be provided on a pro-rata basis, from the amount for the specific objective 'Leadership in enabling and industrial technologies' and from the amount for the priority on societal challenges.

² See [the Joint Declaration on Article 15](#) for the distribution of the total amount.

³ For an in-depth analysis of the budget structure of Horizon 2020 and its implementation see Vincent Reillon (2015).

⁴ [EU Open Data Portal, CORDIS – EU research projects under Horizon 2020 \(2014-2020\)](#). Data downloaded 18 August 2017.

⁵ On both programmes, see Vincent Reillon, [Galileo: overcoming obstacles, history of EU global navigation satellite systems](#), EPRS, European Parliament, April 2017.

⁶ See Vincent Reillon, [Securing the Copernicus programme, why EU earth observation matters](#), EPRS, European Parliament, April 2017.

⁷ See Martin Sváček, [Competitiveness of Enterprises and SMEs \(COSME\)](#), EPRS, European Parliament, June 2016.

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