

THE EVOLUTION OF SCIENTIFIC ADVICE IN EU INSTITUTIONS

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ABSTRACT

Scientific advice to policymaking plays a central role in modern technoscientific societies, informing and legitimizing policymaking. Yet the appropriate role of scientific advice and how to best institutionalize it remain problematic, with a fundamental tension existing between appeal to scientific authority and the neutrality of science, and the need for policy relevance and democratic accountability. These concerns are particularly prominent in the context of European Union (EU) policymaking, where technical decisions form the core of its mandate and scientific expertise and advice play a central role. This paper traces the historical development of scientific advice in EU policymaking from the late 1990s to the most recent developments, zooming in on the functioning of the European Commission's Scientific Advice Mechanism (SAM) and the recent developments in the EU science for policy ecosystem. The paper explores the tensions between independence and policy relevance, and discusses the limitations of sectoral advisory bodies and the fragmented nature of the EU's scientific advisory landscape, identifying a need for strategic cross-cutting advisory bodies and adequate resources.

Keywords: *Scientific Advice, Science Advice, European Union, European Commission, Science for Policy*

1. INTRODUCTION

Science plays an important role in informing policymaking on a wide range of issues, ranging from healthcare to climate change to the regulation of new technologies. In recent years, there has been growing recognition of the importance of scientific advice to policymaking by both policymakers and scholars. Although science plays an increasingly important role in all areas of policy (OECD, 2015), the provision of effective scientific advice remains challenging (Gluckman, 2014). Scientists can play multiple and sometimes controversial roles in policymaking (Pielke, 2007), spanning from “honest brokers” to advocates, and the issues they are called to deal with often pertain to what has been referred to as “*post-normal science*”: where “*facts are uncertain, values in dispute, stakes high and decisions urgent*” (Funtowicz & Ravetz, 1993). The appropriate role of scientific advice in democratic societies, and how to best institutionalize it remains problematic, with a fundamental tension existing between its appeal to scientific authority and the neutrality of science on the one hand, and the need for policy relevance and democratic accountability on the other (Pamuk, 2021).

These concerns are particularly prominent in the context of European Union (EU) policymaking, where scientific expertise and advice play a central role. The EU is a particularly interesting locus for the study of scientific advice, as it comprises a diverse polity that nevertheless strives to reconcile plural values in common decisions over technoscientific issues, to achieve epistemic and normative consensus despite underlying differences of both epistemologies and values. This paper traces the historical development and evolution of scientific advice in EU institutions from the late 1990s to the most recent developments until the end of 2025, zooming in on the functioning of the recently established European Commission’s Scientific Advice Mechanism (SAM).

This paper is based on the author’s doctoral thesis on the division of labour within scientific advisory bodies in the EU (Allegra, 2024). Building on the empirical and analytical foundations of the dissertation, this article focuses specifically on the historical development of scientific advisory arrangements in the EU, highlighting how the SAM represents a novel

instance of institutional experimentation in this landscape and a shift from sectoral to cross-cutting advisory bodies. The article further expands on the dissertation by presenting the latest developments of 2024-2025, and explores the further shift from individual advisory mechanisms to a more holistic conception of science for policy ecosystems, and its significance for understanding the role and institutionalization of scientific advice in EU policy.

2. SCIENTIFIC ADVICE IN TECHNOSCIENTIFIC SOCIETIES

In a broad sense, scientific advice can be understood as the “practices involving individuals, organisations and structures that mobilise natural and social scientific and engineering knowledge into public decision-making”.¹ More specifically scientific advice normally refers to the institutionalised processes through which scientific knowledge is synthesised and presented to support governmental or intergovernmental decision-making (Gluckman, 2014; Jasanoff, 1990; Pielke, 2007), operating through institutional channels—formal appointments, procedures, and accountability mechanisms—where advice is commissioned, vetted, and often recorded in official outputs. Scientific advisory organizations take multiple institutional forms, the most common are individual scientists personally advising politicians and senior policymakers, either informally upon request or in formal roles such as Chief Scientific Adviser (Doubleday & Wilsdon, 2012; Gluckman, 2014); advisory councils or committees; in-house research agencies, centres and offices; and scientific academies (Lentsch & Weingart, 2011). The issues on which scientific advice is sought by policymakers vary broadly, from technical and regulatory issues such as food safety and environmental standards, to long-term strategic issues such as energy transitions and climate change, to emergency response in situations like pandemics or hydrogeological disasters (OECD, 2015).

1 <https://www.sciencecampaign.org.uk/membership/guest-blog/capacities-for-dealing-with-complex-and-uncertain-evidence/> (retrieved on 31/03/2026).

A key defining feature of scientific advisory organizations is that they span the boundary between the domain of science and the domain of policy, providing a space where both scientific and political considerations can be taken into account in the production of policy-relevant scientific advice. Regardless of their specific institutional setup, scientific advisory organizations are often described and conceptualized as “boundary organizations” (Gustafsson & Lidskog, 2018), i.e. organizations providing a site, and sometimes the incentives, for actors from the scientific and policy domains to work together and collaborate (dual agency or dual participation) to co-produce scientific and social order (Jasanoff, 2005), and create and use boundary objects (Star & Griesemer, 1989). Boundary organizations stabilize the boundary between science and policy by internalizing its negotiation “at the lowest level and the greatest nuance within the confines of the organization” (Guston, 2001). While demarcation between the scientific and policy domains is an important part of the work of boundary organization, its stability and effectiveness come not from isolating itself from external political authority, but rather from its coordination between, and responsiveness and accountability towards, both domains. Boundary organizations thus engage in both coordination and demarcation at the same time, and have to manage the tensions between the two activities. Scientific advice is thus both an epistemic and a political activity (Jasanoff, 1990), and its effectiveness rests on carefully constructing and managing the boundary between science and policymaking (Cash et al., 2002; Bijker, Bal, & Hendriks, 2009; Owens, 2015). To be effective, scientific advice needs to combine scientific credibility, policy relevance, and political legitimacy (CRELE) (Cash et al., 2003).

3. THE CENTRAL ROLE OF SCIENTIFIC ADVICE IN EU POLICYMAKING

Scientific advice plays a particularly central role in the policymaking processes of the EU. Due to the supranational nature of the EU and its history of integration, EU policymaking tends to cover a large number of technical areas relying heavily on expert advice, such as setting common

standards (Kaiser & Schot, 2014) and regulations for the integration of the common market (Alemanno, 2008). Some scholars even describe the EU as a “regulatory state” (Majone, 1997) which exercises its power mainly through regulations, rather than through providing its citizens with services as in the traditional contemporary model of welfare state. Advice from scientific and technical experts therefore plays a central role in EU policymaking (Alemanno, 2014), making it an especially interesting site for research on scientific advice. As recognized by former Chief Scientific Adviser to the EU President, Anne Glover, “EU policies are much more technical than national policies; this is because the bulk of them are about standardisation and harmonisation, which at the end of the day boils down to scientific-technical matters. Science is therefore crucial at the EU level” (Glover, in Wilsdon & Doubleday, 2015).

The EU institutions themselves recognize the centrality of scientific evidence and expertise in EU decision- and policy- making. For example, the 2002 *Communication on the Collection and use of expertise* sets out the Commission’s guidelines and principles for improving the knowledge base for better policies, aiming to “encapsulate and promote good practices related to the collection and use of expertise at all stages of Commission policy-making”.² More recently, in the 2021 *Communication on the “better regulation” agenda*, the overarching framework for good policymaking at the EU level, scientific evidence is explicitly recognized as a “cornerstone” of good policymaking, “vital to establishing an accurate description of the problem, a real understanding of causality and therefore intervention logic; and to evaluate impact”.³

Despite its appeal to universal notions of science, scientific advice is deeply contextual, and the structures and practices through which knowledge is produced, validated, and used to inform decisions tend to be shaped by

2 European Commission Communication on “the collection and use of expertise by the Commission: principles and guidelines - Improving the knowledge base for better policies” (2002) - <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52002DC0713#:~:text=This%20Communication%20seeks%20to%20encapsulate,stages%20of%20Commission%20policy%2Dmaking.%20It> (retrieved on 31/03/2026).

3 European Commission Communication on “Better Regulation: Joining forces to make better laws” (2021) - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52021DC0219> (retrieved on 31/03/2026).

the political and institutional cultures from which the scientific advisory system emerges. These public reasoning styles are referred as civic epistemologies, “the institutionalized practices through which members of a given society test and deploy knowledge claims used as a basis for making collective choices” (Jasanoff, 2005, p. 255). Such practices include the ways to produce, express, validate and challenge public knowledge claims; the availability and functioning of accountability mechanisms; the accepted standards of objectivity; and the criteria concerning what counts as expertise and it is publicly performed.

As a unique multi-level governance structure without a well-defined common polity or political sphere, the EU does not necessarily have a single cohesive culture of how scientific knowledge and evidence is used in policymaking, and its many diverse national civic epistemologies still play a prominent role. The EU is characterised by both a broad political and cultural diversity among its constituent parts, and the need for common policy decisions to be taken. This tension is well captured in its motto “United in Diversity”.⁴ While “objective” (and therefore shared) factual knowledge is often appealed to in the attempt to reconcile these diverging and sometimes conflicting values and reach common decisions, the challenges emerging from this diversity are well-recognised. The 2001 *White paper on European governance*⁵ recognizes the principle of plurality as one of the key tenets of expert advice in EU policymaking, while the 2002 *Communication on the Collection and use of expertise* acknowledges that “Acting at the European level introduces additional challenges. European approaches must accommodate the diversity of national situations. Questions of comparison, harmonization, validation, and interoperability are often key elements in the policy process”.⁶

4 https://europa.eu/european-union/about-eu/symbols/motto_en (retrieved 31/03/2026).

5 European governance - A white paper (2001) - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52001DC0428> (retrieved 31/03/2026).

6 European Commission Communication on “the collection and use of expertise by the Commission: principles and guidelines - Improving the knowledge base for better policies” (2002) - <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52002DC0713#:~:text=This%20Communication%20seeks%20to%20encapsulate,stages%20of%20Commission%20policy%20making.%20It> (retrieved on 31/03/2026).

Despite these challenges and complexities, however, as recognized by Joly (2016) some unique characteristics of a distinct civic epistemology emerging in the context of EU-level policymaking can be identified, namely a primacy of “laboratory science” over “regulatory science” (Jasanoff, 1990) in risk assessment, and an inclusive and pluralistic approach to expert assessment. This civic epistemology puts a strong emphasis on the independence of scientific advisors from policymaking, and is the product of a historical evolution outlined below.

4. THE CO-EVOLUTION OF FOOD SAFETY AND SCIENTIFIC ADVICE IN THE EU

The institutional arrangements that underpin scientific advisory mechanisms are historical products, which continuously evolve to adapt to a dynamic scientific and political landscape. The EU institutional ecosystem of scientific advice, and the conception of the science-policy relationship and the civic epistemology on which it is based, have been evolving since the establishment of the EU. In particular, the evolution of food safety policy has played a major role in shaping the broader normative and institutional development in the use of scientific knowledge and expertise in EU institutions.

Historically, the creation of a common market for food and agricultural products has been a key component of the process of EU integration and required among other things the harmonisation of food safety standards to enable the free flow of products within the Union. For this reason, EU food policy is considered a key constituent area of EU policy, and its development and evolution are considered to offer an interesting window on EU regulation and EU policymaking more generally (Alemanno, 2008, p. 24). The food and chemical safety crises in the late 1980s and 1990s are commonly recognized as representing a watershed separating two distinct periods in the evolution of risk management in the EU, and eventually led to a broader shift in the institutionalisation of expert advice and its relationship with the public in the EU (Millstone & Van Zwanenberg, 2002; Stilgoe et al., 2006).

In particular, in the late 1990s and early 2000s, a shift away from the technocratic model of science-policy relationship took place in Europe, largely in response to these crises (Millstone, 2007). In the old advisory setup, the functions of risk assessment and risk management were normally in the hands of the same institutions, and scientific uncertainties were downplayed and often concealed from the public. Millstone and Van Zwanenberg (2002) identify several structural and procedural features characterising food safety policymaking and advisory systems until the 1990s. These included the conflation of consumer protection and industrial and trade promotion; a lack of openness and accountability; advice being provided by small group of scientists with industry ties; policy decisions presented as being based on “sound science” (Jasanoff, 2011) alone, concealing almost all of the conflicting policy objectives, implicit framings, uncertainties, and residual risks; policymakers hiding behind scientific experts; and more generally a conflation of risk assessment and risk management. These arrangements meant that food policy decisions “could be, and were, taken to advance commercial and political ends as distinct from the ostensible policy goal [of food safety]”. These factors severely undermined the democratic legitimacy of such systems (Millstone & Van Zwanenberg, 2002).

A number of food safety crises in the late 1980s and 1990s, most notably the 1996 Bovine spongiform encephalopathy (BSE, also known as the Mad Cow disease) outbreak in the UK, provoked serious loss of public confidence in food safety and the policy institutions governing it, undermining the legitimacy and trustworthiness of the old system and leading to the establishment of the current food safety policy regime (Millstone & Van Zwanenberg, 2002). This has led to a “range of structural and procedural reforms to the ways in which public policies are decided, legitimated and communicated” (Millstone & Van Zwanenberg, 2002). As a key element of these reforms, the provision of scientific advice on food safety (risk assessment) was separated from the process of making policy decisions about it (risk management).

5. THE EUROPEAN FOOD SAFETY AUTHORITY (EFSA) AND THE PARADIGM OF INDEPENDENCE

The 2000 *White paper on food safety* published by the European Commission (Commission of the European Communities, 2000) following a further crisis over dioxin in animal feed proposed establishing a separate entity to provide independent scientific advice, a European Food Authority, to act as a separate risk assessment body to advise the European Commission, with the latter retaining the function of risk manager. After lengthy political negotiation, this led to the adoption of the 2002 *General Food Law Regulation* and the establishment in 2004 of the European Food Safety Authority (EFSA), thus enshrining a separation between the advisory function of risk assessment and the policy function of risk management in the institutional architecture of the EU (Alemanno, 2008). This institutional shift was also followed by a change in the rhetoric used to legitimize food safety policy (Millstone & Van Zwanenberg, 2002): the emphasis was on “independency” of the agencies and of the experts involved in the process, without however clarifying what previous dependencies they were now free from. This could be interpreted as independence from commercial and industrial interest, but also as independence from political pressures from politicians and government officials.

This post-2000 model of scientific advice in EU policymaking is exemplified by the European Food Safety Authority (EFSA). As argued by Joly (2016) the authority of the scientific advice produced by EFSA rests on the centrality given in the risk assessment process to a committee of “laboratory scientists” drawn mostly from the academic sector, who are assisted by the EFSA staff in the evidence collection and analysis. This is markedly different from other contexts such as for example the US FDA. While EFSA committee members had “another day job” and were assisted in the evidence collection and analysis by the EFSA staff, FDA work was done in-house by fully dedicated regulatory science experts, with external peer review of the outputs. The authority of EFSA’s experts, and thus of the advice produced by the agency, is therefore based on drawing a rigid boundary between the scientific and regulatory/policy domains, relying on the experts scientific credentials and their research

expertise in a laboratory setting, which is then brought to relevance onto the regulatory domain, rather than on the in-depth expertise on the topic at stake or regulatory science more broadly. This choice was made when the EFSA was being designed because “it was thought that by involving the ‘best scientists’ (rather than experts in regulatory science), the confidence of the European public would be regained” (Joly, 2016, p. 302).

These shifts in the institutionalization of scientific advice in the context of food safety policy influenced the broader conception of the relationship between science and policy in the EU, and motivated the development of the 2001 *White paper on European governance* and the 2002 *Guidelines on the collection and use of expertise*, referred as the “manifesto” of the EU’s regulatory epistemology (Morvillo, 2020). These documents further enshrine the paradigm of independence and reinforce a narrative of separation between science and policy, by noticing for example that “It is often unclear who is actually deciding - experts or those with political authority. At the same time, a better informed public increasingly questions the content and independence of the expert advice that is given”.⁷

Beyond EFSA, the EU has established several other specialized agencies that provide scientific advice in their respective domains, forming a decentralized network of expertise. The European Environment Agency (EEA), established in 1990 and operational from 1994, represents an earlier model of EU scientific advisory capacity, providing independent information on the environment to support policy development and implementation across Member States (Waterton & Wynne, in Lentsch and Weingart, 2011). Unlike regulatory agencies such as EFSA, the EEA’s mandate explicitly excludes regulatory functions, positioning it primarily as an information and assessment body that synthesizes environmental data and produces regular reports on the state of Europe’s environment.⁸ The European Medicines Agency (EMA), established in 1995, provides

7 European governance - A white paper (2001) - <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52001DC0428> (retrieved 31/03/2026).

8 Regulation (EC) No 401/2009 of the European Parliament and of the Council on the European Environment Agency and the European Environment Information and Observation Network (2009). See also Waterton and Wynne (2011) on the EEA’s deliberately “non-regulatory” positioning.

scientific advice on the quality, safety, and efficacy of medicines, combining regulatory decision-making with scientific assessment in ways that parallel EFSA's structure. The European Chemicals Agency (ECHA), created in 2007 to implement the REACH regulation, similarly merges scientific evaluation with regulatory oversight of chemical substances.⁹ More recently, the European Centre for Disease Prevention and Control (ECDC), established in 2005, emerged as a crucial source of scientific advice during the COVID-19 pandemic, though its coordination role revealed gaps in the EU's capacity for rapid cross-sectoral scientific advice during emergencies (Jordana & Triviño-Salazar, 2020). These agencies share EFSA's emphasis on independence from political and economic interests, but their narrow sectoral mandates mean they cannot address cross-cutting, strategic scientific questions highlighting the fragmented nature of the EU's scientific advisory landscape.

6. THE FIRST EU CHIEF SCIENTIFIC ADVISOR AND THE EMERGENCE OF STRATEGIC SCIENTIFIC ADVICE

In parallel to the regulatory scientific advice provided by EFSA and other EU agencies, a more strategic scientific advisory function has been developing in the context of EU policymaking in recent years. In 2009 the then President of the European Commission, José Manuel Barroso, announced his intention, during his second term to review “the way European institutions access and use scientific advice” and “to set up a Chief Scientific Adviser who has the power to deliver proactive, scientific advice throughout all stages of policy development and delivery”.¹⁰ In 2010, he established the post of Chief Scientific Advisor (CSA) to the President of the Commission, appointing the Scottish microbiologist Professor Anne Glover to the role.

9 Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

10 Speech by José Manuel Durão Barroso President of the European Commission “Passion and responsibility: Strengthening Europe in a Time of Change” European Parliament Plenary Strasbourg, 15 September 2009 - https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_09_391 (retrieved on 31/03/2026).

The post was directly attached to the President's office, with a broad mandate which included provision of direct advice to the President; provision of scientific analysis and opinion on policy development and guidance on the interpretation of scientific uncertainties; involvement in strategic emergency planning; building relationship with advisory bodies and the EU and Member States level; scientific foresight; and acting as a public champion and ambassador of the value of science.¹¹ However, the post was not adequately resourced and institutionalized within the machinery of government of the Commission, leaving the incumbent with limited means to fulfil the mandate and leading to frictions with departments such as the Joint Research Center (JRC) and the Directorate-General for Research and Innovation whose mandate it overlapped (Glover, in Wilsdon & Doubleday, 2015).

While specialized agencies like EFSA provide regulatory scientific advice in specific domains, the European Commission has long relied on its in-house science service, the Joint Research Centre (JRC), as a key source of scientific and technical expertise. Established in 1957 as part of the European Atomic Energy Community (Euratom) to conduct nuclear research, the JRC has evolved into a multi-site research organization employing thousands of scientists across multiple institutes covering diverse fields from energy and transport to health and consumer protection.¹² Unlike external advisory bodies, the JRC operates as a Directorate-General within the Commission structure, providing direct scientific and technical support to EU policymaking through research, monitoring, and evidence synthesis. Its institutional position as an internal service gives it privileged access to policymakers but has also raised questions about its independence and the extent to which it can provide advice that challenges Commission positions (Wilsdon & Doubleday, 2015). The establishment of additional strategic advisory mechanisms such as the Chief Scientific Advisor and later the SAM thus created potential

11 Press release, 5 December 2011, Appointment of Chief Scientific Advisor - https://ec.europa.eu/commission/presscorner/detail/en/IP_11_1497 (retrieved on 31/03/2026).

12 European Commission, "The Joint Research Centre: 60 Years of Science for Policy," Publications Office of the European Union, 2017.

overlaps and tensions with the JRC's existing mandate, requiring careful delineation of roles between in-house scientific capacity and external independent advice (Alemanno, 2014; Glover, in Wilsdon & Doubleday, 2015). This tension reflects broader questions about whether scientific advice is more effective when provided by external independent experts or by embedded institutional expertise with deeper knowledge of policy processes and constraints.

Moreover, the incumbent got embroiled in a number of public controversies with Members of the European Parliament and NGOs regarding pesticides, endocrine disruptors, and Genetically Modified Organism (GMOs), leading to the Commission publicly distancing itself from her views and testing the limits of the independence of the role from the Commission itself (Wilsdon & Doubleday, 2015). The advisory model centred on an individual CSA, inspired by the UK and US, also lead to controversies regarding the appropriateness for the EU of what was perceived as a typically "Anglo-Saxon" model of scientific advice. In particular, several NGOs publicly criticized the model and called for its scrapping on the grounds that it was untransparent and concentrated too much power into a single unaccountable individual.¹³

At the end of Barroso's presidency in 2014, the incoming Juncker Commission decided not to renew the CSA post. However, under pressure from the scientific community it created instead a new Scientific Advice Mechanism (SAM). In this process, the European Commission sought to explore "how to better institutionalise future independent scientific advice to the Commission, based on the experience made in all Member States" (Juncker, 2015). Established in 2015, the SAM's function is to provide strategic and cross-cutting scientific advice to the political leadership of the European Commission distinguishes it from other advisory bodies operating at the EU level. While the advice provided by specialized bodies like EFSA is clearly targeted at informing a specific

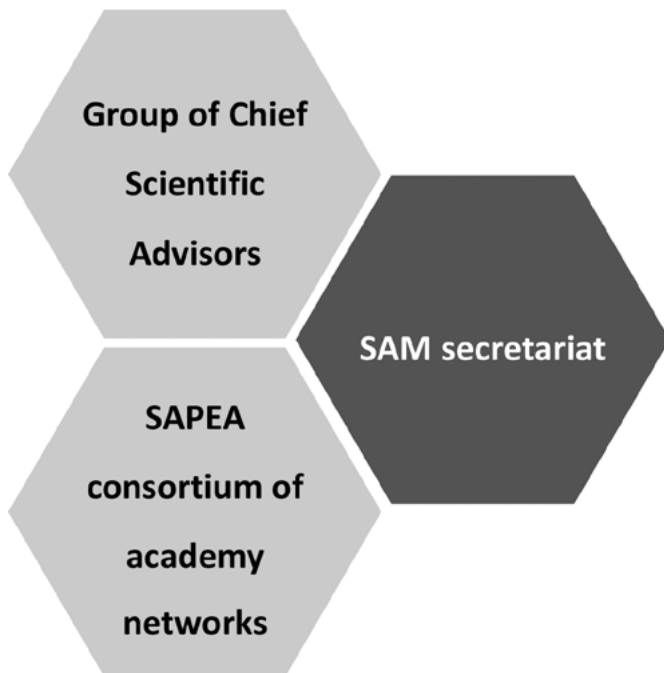
13 Letter from European NGOs to the President on the European Commission on "The position of Chief Scientific Advisor to the President of the European Commission", 22 July 2014 - https://corporateeurope.org/sites/default/files/attachments/ngo_letter_on_chief_scientific_adviser_-_final.pdf (retrieved on 31/03/2026).

piece of regulation or policymaking, SAM's advice is often more open-ended and systemic, cutting across several policy areas.

7. THE SCIENTIFIC ADVICE MECHANISM (SAM)

The SAM presented a novel and peculiar institutional architecture with a tripartite structure: a Group of seven Chief Scientific Advisors (GCSA), a consortium bringing together academies of sciences from across Europe (SAPEA), and a professional secretariat hosted by the Commission.

The structure of the European Commission's Scientific Advice Mechanism (SAM)



Source: Own elaboration

The central element of the SAM, and the main element of continuity with other EU scientific advisory bodies, is the Group of Chief Scientific Advisors (GCSA). Its main task is to “provide the Commission with independent scientific advice on specific policy issues where such advice is critical to the development of EU policies or legislation and does not duplicate advice being provided by existing bodies”.¹⁴ The Group is composed of “up to seven, but no less than five members, with an outstanding level of expertise and collectively covering a wide range of scientific fields and expertise”. Members are “independent experts, appointed in their personal capacity and who act independently and in the public interest”¹⁵ for a period of 3 to 5 years, and their mandate is not linked to working on a specific topic. They remain employed by their university and only work 20-40 days a year for the Commission. Given the breadth of policy domains on which the SAM might be called to provide advice, subject matter expertise in a specific domain is less important than general scientific standing, as reflected in their selection criteria. The GCSA and the SAM as a whole are supported by a professional secretariat composed of a small number (5-8) of European Commission officials, often referred to as “the SAM unit” or simply “the Unit”.

The second leg of the SAM is composed by the consortium of European Academies of Sciences, SAPEA (Science Advice for Policy by European Academies). The consortium brings together a pan-European academy (*Academia Europaea*), and four networks of European scientific academies, representing the natural, medical, engineering, and social & human sciences respectively (in some countries one academy covers several of all disciplinary areas, while in others there is one academy for each area). The main function of SAPEA is to provide, at the request of the European Commission, “targeted scientific evidence in a timely and transparent manner to inform the production of science advice by the Group of Chief Scientific Advisors while ensuring the highest scientific

14 Commission decision on the setting up of the High Level Group of Scientific Advisors (2015, amended in 2023) - Commission decision on the setting up of the High Level Group of Scientific Advisors (europea.eu) (accessed on 31/03/2026).

15 Ibid.

quality, developed by complete and independent evidence analysis and synthesis.” To fulfil this function, “SAPEA assembles interdisciplinary Working Groups of scientific experts” to “produce Evidence Review Reports or other scientific inputs for the Chief Scientific Advisors”.¹⁶ SAPEA thus provides the main link between the SAM and the scientific and research community across Europe.

The transition from a single CSA to a committee model represented a better alignment with the Commission existing practices and structures. The so-called “high-level expert groups” are a common feature of the Commission use of external expertise¹⁷, and existing administrative frameworks and practices could be easily adapted to enable the creation of the GCSA. The Committee structure of the GCSA is an important feature of the SAM and contributes to its legitimacy in the eyes of the EU policy community. Such structural feature better reflects the “collective” style of decision-making in the EU and its pluralistic civic epistemology and mitigates against the risk of individual advisors holding idiosyncratic views or close ties to political or economic interest, thus addressing some of the criticism and controversies off the previous CSA post. From a legal and administrative perspective, the SAM is firmly centred on the GCSA, with the secretariat and the SAPEA consortium of academies representing ancillary support structure.

The SAM has its legal basis in the “Commission decision on the setting up of the High Level Group of Scientific Advisors”¹⁸ (henceforth referred to as “Commission decision”), and the process through which it produces its advice is described in the “Rules of Procedure of the Group of Chief Scientific Advisors” and its annex “From questions to answers - How the European Commission’s Scientific Advice Mechanism produces scientific

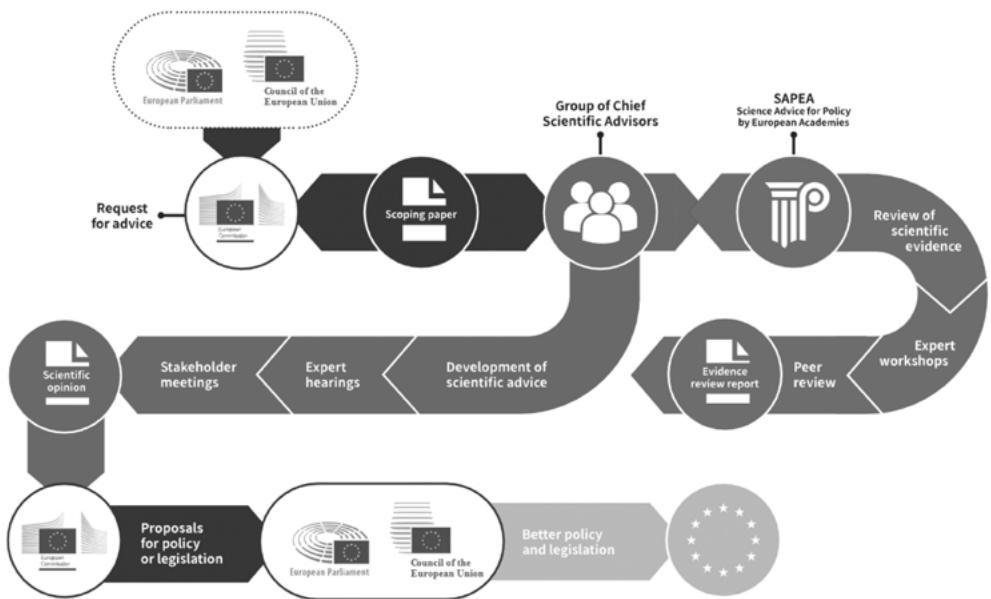
16 SAPEA grant agreement, quoted in the SAPEA Guidelines on advising policymakers and society (2023) - <https://scientificadvice.eu/reports/quality-assurance-guidelines-and-procedures-on-science-advice-for-policy-and-society/> (retrieved on 31/03/2026).

17 See the Register of Commission Expert Groups and Other Similar Entities - <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups-explained?lang=en> (accessed on 31/03/2026).

18 Commission decision on the setting up of the High Level Group of Scientific Advisors (2015, amended in 2023) - Commission decision on the setting up of the High Level Group of Scientific Advisors (europa.eu) (accessed on 31/03/2026)

advice to support policy making”, collectively referred to as the SAM guidelines.¹⁹ These guidelines describe five steps in the production of the SAM’s scientific advice: 1) identification of a subject for scientific advice; 2) defining the question (in the form of a “co-defined scoping paper”); 3) gathering evidence; 4) drafting the GCSA advice; and 5) adopting and communicating the advice. The SAM guidelines are complemented by SAPEA’s own “Guidelines on advising policymakers and society” and its “Procedures for quality assurance of scientific advice”.²⁰ The process is also illustrated in an infographic flowchart published on the SAM website and reproduced below:

How the SAM works



Source: SAM website²¹

19 European Commission (2020) - https://research-and-innovation.ec.europa.eu/system/files/2020-10/rules_of_procedure_group_of_chief_scientific_advisors_sep2020.pdf (accessed on 13/11/2023).

20 SAPEA Guidelines on advising policymakers and society (2023) - <https://scientificadvice.eu/reports/quality-assurance-guidelines-and-procedures-on-science-advice-for-policy-and-society/> (retrieved on 31/03/2026).

21 <https://scientificadvice.eu/> (31/03/2026).

In most cases, scientific advice provided to the European Commission by the SAM takes the form of two complementary documents: a longer *Evidence Review Report (ERR)* produced by SAPEA, which presents a synthesis of the state of knowledge on the topic and provides the main scientific underpinning of the advice, and a shorter *Scientific Opinion* produced by the GCSA, which provides policy recommendations. While the process is presented in a linear order, with the production of the ERR preceding logically and chronologically that of the Scientific Opinion, in practice it is largely iterative with many steps taking place in parallel.

Independence remains a key feature of the SAM's self-identity and of its legitimizing narrative. In the context of the SAM, the concept of independence is operationalized as a combination of autonomy of its various parts from each other, independence from private (mostly economic) interests, and from political pressures. Independence is engrained both in the structure of the SAM and in its processes. However, the setup and functioning of the SAM also recognizes that a degree of coordination with policy demand plays an important role in ensuring its relevance, and that trade-offs exist between these two dimensions. This requires careful management by the secretariat, which has to reach across into the policy domain to orchestrate with the policy demand side while at the same time buffering the Advisors to protect their independence.

This shift from an absolute focus on independence to a limited recognition of the importance of coordination across the science-policy boundary can be explained by several factors. First, the newer and more strategic scientific advice mechanism require a different legitimizing narrative than narrower and more technical advisory bodies like agencies. Second, the internal architecture of the SAM introduces a more structured division of labour within the mechanism, which allows to present orderly separation between policy-relevant scientific knowledge (embodied by SAPEA and its Evidence Reviews Reports) and science-informed policy advice (embodied by the Group of Chief Scientific Advisors and its Scientific Opinions), while at the same time allowing for coordination across the science-policy boundary through the work of the secretariat.

8. THE COVID-19 CRISIS AND THE SHIFT FROM MECHANISM TO ECOSYSTEMS

To this day, the provision of scientific advice to EU institutions remains a crucial and contested issue. On the one hand, science is presented as necessary to ensure good policy outcomes, especially in the face of the perceived rise in the politicization of facts and of fake news and misinformation (Group of Chief Scientific Advisors to the European Commission, 2019). Reliance on experts and scientific advice is presented as a necessary bulwark against populism. On the other hand, scholars and civil society groups have denounced how the processes and logic of scientific advice and use of science in regulatory processes have been captured by narrow interest groups (for example Saltelli et al. 2021), thus making them fertile grounds for lobbying in the name of “sound science”.

Despite the efforts put into the institutionalization of EU scientific advice since the 2000s and the recent establishment of the SAM, the provision of scientific advice to EU policy remains fragmented at an institutional level, and its authority often challenged. The explosion of the COVID-19 pandemic in 2020 and the ensuing scramble by governments worldwide to contain and combat it threw scientific advice in the spotlight, and put to test many of the assumptions and frameworks developed to understand the science-policy interface. According to many scholars and commentators (The Lancet, 2020), COVID-19 was probably the biggest test of science advice in decades, with its global nature allowing for large-scale international comparison. The rapid deployment and evolution of scientific advice mechanisms, and the intense public attention and scrutiny they received in many countries, revealed many of the unspoken assumptions underpinning the functioning of the science-policy interface in most countries. The legitimacy of decisions taken on the basis of expert advice has been challenged in many countries, and the inner workings of scientific knowledge productions have been dissected publicly, with scientific uncertainties debated in the media and accusations made of both science being politicized and politics hiding behind the science. The crisis has thrown in sharp relief the many unresolved issues at the interface between science and policymaking,

and the inadequacy in most countries of the scientific advice institutions working at this interface. Countries with existing and well-developed scientific advisory mechanisms, such as the UK with its SAGE (Scientific Advisory Group for Emergencies), found them being stress-tested to a degree never seen before. Others such as Italy, where such mechanisms were not clearly institutionalized before, had to quickly create and scale up them.²² Anecdotal evidence even suggests the hypothesis that pre-existing scientific advisory structures might have constrained and limited the flexibility needed to respond to the pandemic.²³

The 2021 Commission Communication on *“Drawing the early lessons from the COVID-19 pandemic”* recognised that “the early months of the crisis exposed the uneven level of research and advice in different Member States, as well as the different approaches taken to providing and using that advice. This meant that evidence was patchy, sometimes contradictory and often confusing as a result of different messaging in different Member States”. The Communication calls for more coordination at the EU level on scientific advice and points to a “need to bridge the gap between science and policymaking”.²⁴ This fragmentation goes beyond the specific context of COVID and pandemic response and is a more general feature of scientific advisory structures.²⁵

Recognizing this led to the realization that establishing scientific advisory mechanism at the EU level needs to go hand in hand with strengthening broader science for policy capabilities and competences at all levels of governance. This broader approach was first conceptualized in an analysis produced by the European Commission in 2022, which identifies science for policy ecosystems as the “complex of organisational

22 Allegra et al, Italy case study, in Jasanoff et al, *Comparative Covid Response: Crisis, Knowledge, Politics*, 2021 https://compcore.cornell.edu/wp-content/uploads/2021/03/Comparative-Covid-Response_Crisis-Knowledge-Politics_Interim-Report.pdf.

23 European Science Advisor Forum (ESAF) <https://esaforum.eu/wp-content/uploads/2020/07/Highlights-Virtual-ESAF-Meeting-24-june-2020.pdf>. (retrieved on 31/03/2026)

24 European Commission, Communication on “Drawing the early lessons from the COVID-19 pandemic”, 15 June 2021 (31/03/2026).

25 European Commission, Staff Working Document Supporting and connecting policymaking in the Member States with scientific research, 25 October 2022 (retrieved on 31/03/2026).

structures and entities, processes, and networks that interact to support the mobilisation, acquisition, synthesis, translation, presentation for use, and application of scientific knowledge in policymaking processes".²⁶ This was further recognized in the Council Conclusions adopted under Spanish Presidency in December 2023,²⁷ giving political momentum to several initiatives across the EU at all levels. These include for example the inclusion of strengthening science for policy as a key action of the 2025-2027 European Research Area (ERA) Policy Agenda,²⁸ the EU main strategy for research and innovation policy; and the launch of several capacity building activities in Member States to strengthen national public administration's use of scientific evidence and expertise and further institutionalized scientific advice at national and subnational level.²⁹ This marks a shift from an atomistic conception of scientific advice focused on individual advisory structures, to a broader "ecosystem" approach taking into account the institutional, political and cultural context in which these operate.

At the same time, the intrinsically political nature of scientific advice is increasingly recognized explicitly by EU institutions. The 2022 Commission paper on *Supporting and connecting policymaking in the Member States with scientific research* acknowledges that "in this era of complex policy challenges, it is key that policymaking makes best use of scientific knowledge. This is not only a much-needed response to the complexity of climate change, global pandemics, artificial intelligence etc. It also recognises the complex political environment in which policymaking takes place now. A better use of science can help boost public trust in governments and their competence. It can help explain better the policy choices to the public, fight disinformation

26 European Commission, Staff Working Document Supporting and connecting policymaking in the Member States with scientific research, 25 October 2022 (retrieved on 31/03/2026).

27 Council of the European Union, Strengthening the role and impact of research and innovation in the policy-making process in the Union, 8 December 2023 (retrieved on 31/03/2026).

28 <https://european-research-area.ec.europa.eu/era-actions-2025-2027#AdvancingtheEuropeanScienceforPolicy4Pecosystem> (retrieved on 31/03/2026).

29 https://knowledge4policy.ec.europa.eu/news/tsi-capacity-building-eipm-project-reports_en (last consultation 22/11/2025) (retrieved on 31/03/2026).

and improve support and implementation of adopted policies”.³⁰ This message is further reinforced in the 2025 *Commission Communication on the European Democracy Shield*, which emphasizes the link between scientific and defending democracy by highlighting that “Evidence-informed policymaking ensures that institutions, debates and decision-making are rooted in factual, transparent and accountable processes and impartial data based on freedom of scientific research, fostering trust and legitimacy in governance.”³¹

9. CONCLUSIONS

These developments illustrate some important considerations for the development of scientific advice across the EU. Advisory mechanisms operate as part of a broader ecosystem. Sectoral advisory bodies with specific remits, however effective and well-designed, have intrinsic limitations and need to be complemented by others with a more cross-cutting strategic remit, and these various actors need to work in a more integrated manner to overcome the system’s fragmentation. Adequate resourcing, both at the level of individual advisory bodies and of the ecosystem as a whole, including its underpinning research base, is crucial to ensuring their effectiveness. Recognising the political nature of scientific advice implies actively thinking about how to balance the intrinsic tension between independence and policy relevance in the design of advisory structures. As the institutional experiment of the SAM illustrates, a clear division of labour between external advisors and a well-resourced professional secretariat with strong access to policymaking processes can partially mitigate this tension, dynamically balancing the tension and trade-offs between these two dimensions. More broadly, strong ecosystems. Further development in scientific advice in the EU need to take these lessons into account.

30 European Commission, Staff Working Document Supporting and connecting policymaking in the Member States with scientific research, 25 October 2022 (retrieved on 31/03/2026).

31 European Commission, Communication on the European Democracy Shield, 12 November 2025 (retrieved on 31/03/2026).

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