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An Comhchoiste um Ghnó, Fiontair agus Nuálaíocht

An Cás ar son Chomhaltas na hÉireann de CERN

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Joint Committee on Business, Enterprise and Innovation

The Case for Irish Membership of CERN

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Joint Committee on Business, Enterprise
and Innovation



Chair's Foreword



Mary Butler TD
Committee Chair
(FF)

Research and innovation is vital for the Irish economy and membership of international research organisations is an important part of increasing our own research output. Innovation 2020 is Ireland's five-year strategy on research and development, science and technology. Published in 2015, it identified four international research bodies that Ireland would benefit from joining. We have since joined three of the four bodies – the European Southern Observatory, ELIXIR and LOFAR – with CERN the only one Ireland is yet to join.

Currently, Ireland is one of only three European countries that do not have any formal agreement with CERN. Innovation 2020's vision is for Ireland to be a global innovation leader driving a strong sustainable economy and a better society. If Ireland is to deliver on this vision, membership of organisations such as CERN, which are at the forefront of innovation, is critical.

In October 2018, the Committee heard from a number of stakeholders who are involved with CERN, or work in areas related to CERN's work. They highlighted the range of potential benefits that could be derived from membership of CERN. Direct benefits are split between access to formal training schemes, staff positions and fellowships, and access to CERN contracts. Indirect benefits include the potential for international collaboration, knowledge transfer, and attracting students into STEM subjects.

While concerns have been raised that Ireland may not be in a position to take advantage of all the potential benefits of membership of CERN, the Committee believes that joining CERN even as an associate member would create an environment that would encourage Irish researchers and businesses to take maximum advantage of these opportunities.

The Committee has made a number of observations and recommends that negotiations start with CERN with a view to becoming an associate member as soon as possible.



On behalf of the Committee, I would like to thank the witnesses for their input and engagement - which helped the Committee understand the work of CERN and the potential benefits of Irish membership - and the Department of Business, Enterprise and Innovation for its submission on the topic.

I would also like to thank the members of the Committee for their input and engagement, and on behalf of the Committee, I would like to thank former members of the Committee, Deputies Maurice Quinlivan and Billy Kelleher, for their input into the Committee's engagement. Finally, I would like to thank the staff of the Committee's Secretariat for the work involved in producing this report.



Mary Butler T.D.

Chair

Joint Committee on Business, Enterprise and Innovation



Introduction

Published in December 2015, [Innovation 2020](#) is Ireland's five year strategy on research and development, science and technology. It sets out Ireland's vision to become a global innovation leader while driving a strong sustainable economy and a better society.

Innovation 2020 highlights the importance of research and innovation to Ireland's economy, and states that the impacts of research and innovation include:

- increased competitiveness;
- maintaining high-value jobs;
- attracting foreign direct investment;
- developing human capital; and
- ensuring a culture of evidence-based policy, processes and practices in both public and private sectors.

Innovation 2020 also states that participation in international research organisations is an important component of being a global innovation leader. Ireland is a member of a number of international research organisations, and Innovation 2020 identified four additional organisations from which Ireland could potentially derive benefits as a member:

1. CERN - the European Organization for Nuclear Research;
2. European Southern Observatory (ESO) - European Organisation for Astronomical Research in the Southern Hemisphere;
3. ELIXIR - an intergovernmental organisation that brings together life science resources from across Europe; and
4. The Low Frequency Array (LOFAR) – an international network of state-of-the-art telescopes used to observe the Universe at low radio frequencies.

Since the publication of Innovation 2020, CERN is the only one of these organisations that Ireland has not joined.

Ireland's potential membership of CERN has been raised a number of times in Committee meetings and in the Dáil. Minister of State Halligan stated to the Committee¹ that he is fully supportive of Ireland joining CERN. The cost of joining CERN has been outlined as the main barrier to Ireland becoming a member.

¹ Select Committee on Business, Enterprise and Innovation (20 June 2018). Available at: https://www.oireachtas.ie/en/debates/debate/select_committee_on_business_enterprise_and_innovation/2018-06-20/



Overview of CERN

CERN, established in 1954, is one of the world's premier scientific laboratories. CERN states that its mission is to²:

- provide a unique range of particle accelerator facilities that enable research at the forefront of human knowledge;
- perform world-class research in fundamental physics; and
- unite people from all over the world to push the frontiers of science and technology, for the benefit of all.

Its primary focus is on fundamental research in particle physics, but it also plays a vital role in developing the technologies of tomorrow. CERN has been involved in major discoveries, including the discovery of the Higgs boson in 2012. Discoveries and developments at CERN have helped develop technology that is now found in, for example, MRI machines and radiation therapy in hospitals. The world wide web and touch-screens are other examples of products that have their genesis in fundamental research carried out at CERN.

As of June 2019, there were 23 countries that were full member of CERN, with two additional countries in the pre-stage to full membership. A number of other countries are associate members or have observer status.³

Stakeholders

The Committee held one day of hearings in October 2018. A submission was also received from the Department of Business, Enterprise and Innovation ("the Department"). The following table identifies the witnesses that appeared before the Committee.

16 October 2018	
Professor Ronan McNulty	University College Dublin
Dr. Sheila Gilheany	Institute of Physics in Ireland
Prof. Brendan McClean	St. Luke's Hospital, Rathgar
Prof. Val O'Shea	University of Glasgow
Prof. Sinead Ryan	Trinity College Dublin
Mr. Ed Hendrick	Sonru

The transcripts of the meetings of [16 October](#)⁴ are available online. The opening statements and submissions are also available [online](#)⁵.

² <https://home.cern/about/who-we-are/our-mission>

³ Further detail is available at: <https://home.cern/about/who-we-are/our-governance/member-states>



Advantages of joining CERN

The Committee heard that there are major advantages to joining CERN. The advantages outlined by the witnesses can be broken into general scientific advances and direct returns for Ireland, and these are considered in more detail below.

It should also be noted that the Department published a *Review of Irish Membership of International Research Organisations* in July 2015, prior to the launch of Innovation 2020. It highlighted many of the same advantages that were outlined to the Committee in October 2018.

However, it also raised some concerns with the potential return for Ireland, as the mechanism for determining member countries' contributions appears to favour larger countries with larger numbers of academics in the field. The review therefore considers that associate membership may be a better option. Associate membership would allow Ireland to have a reduced contribution, however, this would also limit the available return and Ireland would not have a say in major decisions taken by CERN.

Full membership of CERN would give Ireland representation on the CERN council, which has responsibility for making all major decisions within CERN. Each member country has one vote on the Council.

The department's submission also highlights, that while the potential benefits are significant, it is important to ensure that Irish researchers and businesses are in a position to optimise these benefits.

Scientific Benefit of Joining CERN

Membership of CERN would allow Ireland to be at the **forefront of innovation**. A number of industries in the Irish economy are well matched to the work being carried out at CERN. For example, the Tyndall Institute manufactures microelectronics and sensors that are used in the Large Hadron Collider tunnel at CERN.

Big Data is another area of potential benefit that was outlined to the Committee by the witnesses in October 2018. It was highlighted that a report commissioned by the then Department of Jobs, Enterprise and Innovation, found that Ireland's lack of Big Data skills was a significant barrier to

⁴ Joint Committee on Business, Enterprise and Innovation (16 October 2018). Available at: https://www.oireachtas.ie/en/debates/debate/joint_committee_on_business_enterprise_and_innovation/2018-10-16/

⁵ Submissions and presentations. Available at: <https://www.oireachtas.ie/en/committees/32/business-enterprise-innovation/documents/>



Ireland becoming a market leader in Big Data. The Committee heard that CERN is one of the largest data stores in the world. Members of CERN have access to this data, to the development of machine learning, and to data mining tools.

The potential of **knowledge transfer** from the work being done at CERN can lead to major scientific breakthroughs. For example, CERN is developing technology that will be used to treat cancer, through what is essentially a small version of the Large Hadron Collider. The Committee heard that particle accelerators are used in radiotherapy and work is ongoing at CERN to reduce the size and cost of these devices.

Science is increasingly global and CERN offers the opportunity for **international collaboration**. The witnesses informed the Committee that CERN can also help receive funding from other sources, including the EU's [Horizon 2020](#) funding⁶. Projects associated with CERN have a 35% success rate in receiving Horizon 2020 funding, well over the average of 12%. Membership of CERN could therefore lead to an increase in EU funding for Ireland.

There is also a **reputational element** to be considered. Ireland is one of only three European countries, as seen in Figure 1, that does not have any formal agreement with CERN. It was put to the Committee that Ireland's non-membership of CERN is at odds with promoting a knowledge economy and could affect Ireland's attractiveness for high-tech companies.

⁶ <https://ec.europa.eu/programmes/horizon2020/en>

Figure 1: Countries that currently have agreements with CERN



Source 1: Presentation made before Committee, 16 October 2018

Aside from direct benefits, it was impressed upon the Committee that as the work carried out by CERN is at the border of our knowledge; there is potential for a significant development that will have a huge impact on the world. The opportunity of a **scientific breakthrough** and technological advances are significant benefits to CERN membership that do not necessarily give a quantifiable return.

Direct Return of Joining CERN

According to the witnesses, CERN aims for a return coefficient of 0.9 for its full members (i.e. a member country would see 90% of its investment being returned in some form). Some smaller countries have a return coefficient exceeding 1.

Ireland's investment in CERN would be redistributed, on a roughly equal basis, to the Irish economy in three strands:

- Training and placements for Irish university students, teachers, scientists, engineers and computer scientists;
- Fellowships and staff positions at CERN;
- Contracts for Irish products.



Irish citizens would gain access to the wide range of **formal training schemes** on offer at CERN. This includes Masters and Ph.D programmes, but also apprenticeships, a graduate engineering training scheme, internships for computer scientists and engineers, and technical training experience.

The Committee also heard that the undergraduates would get the opportunity to attend the CERN Summer Student Programme, while secondary school teachers would have access to CERN's High School Physics Teacher Programme. The witnesses stated that CERN attracts students into STEM (Science, Technology, Engineering and Mathematics) subjects in general. CERN's education programmes for primary and secondary level supports an ecosystem for technology and IT skills within the economy.

Irish citizens would also be eligible for **staff positions and fellowships** at CERN. Around a third of Ireland's financial contribution would be allocated for these positions. CERN staff members can then return to their home country and bring with them the experience, knowledge and contacts they have gained while working at CERN. Professor Val O'Shea informed the Committee that he worked with CERN for 6 years before going to the University of Glasgow, but he was still able to access technologies through CERN.

Irish companies would have **access to CERN contracts**, capped at one third of the Irish financial contribution if Ireland were an associate member. There is no cap for full members. Around 20 Irish companies currently have contracts with CERN. However, as CERN prioritises companies from its member countries Irish companies are at a competitive disadvantage. The Committee heard from Mr Ed Hendrick, whose company Sonru has a contract with CERN. Mr Hendrick outlined the benefits that being a CERN supplier has had on his business, and highlighted CERN's willingness to promote the products they use and share what they learn, which has led to the company securing significant contracts with other clients.

Mr Hendrick also explained that Ireland not being a member of CERN is a challenge for the company, with new competitors entering the market giving CERN more options, including within its member countries.

It was noted during the Committee's engagement that CERN contracts are not just in science related areas, but also include areas such as accountancy and translation services, and beef and dairy for its restaurants.

There is also a multiplier effect for investment in CERN that should be taken into account. While there is no definitive figure, the Committee heard that depending on how the calculation is done,



the multiplier on investments in CERN is between three and ten. The witnesses also highlighted that a survey of companies that work with CERN found that 40% had developed new products, 40% had increased international users, and 40% increased technology learning.



Cost of Joining CERN

On previous appearances before the Committee and in answers to parliamentary questions, Ministers have raised the cost of joining CERN as the primary reason Ireland has not become a member.

The Department stated that the cost of full membership, which is determined by the country's GDP, would currently be around €12.5 million per year. However, the Committee understands that Ireland would first have to join as an associate member, where the minimum contribution is 10% of the full membership and scales up to full membership over a number of years (usually between two and five years).

The Department clarified that the 'associate membership in the pre-stage to membership' phase was for a minimum of two years and a maximum of five. The initial contribution would have to be at least 25% of the full membership cost (around €3.1 million), increasing to 100% the year of full membership.

Minister Heather Humphreys clarified, during a subsequent meeting on the Revised Estimates 2019⁷, that there would also be once-off payment of €17 million, due on the day Ireland became a full member. The Department's submission of October 2019 has provided an updated figure. This figure would currently be around €15.6. The submission also highlights that there are options for this payment, and it could be paid over a period (possibly 10 years). There is also the possibility of up to 20% of the contribution being made through "in-kind contributions".

If Ireland were to join as an associate member, the minimum contribution would be in the region of €1.25 million. There would be no commitment to become a full member and Ireland would have the discretion to increase or reduce its contribution as an associate member (once it remains above 10% of the full membership cost).

During the Committee's engagement, some witnesses outlined that joining at the 10% minimum for associate members would likely be too low and, therefore, it may be preferable to join at 20% or 30%. As previously outlined, it would remain open to scale up or down this investment in subsequent years.

The return for Ireland (see previous section) would be capped at the amount contributed. Each of the three strands would also see the return capped at around a third of the total contribution. For

⁷ Joint Committee on Business, Enterprise and Innovation (27 March 2019). Available at: https://www.oireachtas.ie/en/debates/debate/select_committee_on_business_enterprise_and_innovation/2019-03-27/



example, if Ireland were to join at €1.25 million, the value of contracts Ireland could receive would be capped at one third of the amount invested. There is no cap on each strand for full members.



Committee Observations and Recommendations

Committee Observations

Having considered the contributions made during its engagements, and the submission it received from the Department, the Committee makes the following observations:

- The Committee notes that membership of CERN would allow:
 - Irish based companies to compete for CERN contracts;
 - Irish citizens to apply for positions at CERN;
 - Irish students at all levels to access CERN training programmes.
- The Committee notes and emphasises that the benefits of CERN are not limited to the direct financial return from CERN but include the benefits that would arise from the discoveries and advances made at CERN.
- The Committee notes the significant advantage membership of CERN could have in attracting young people towards STEM subjects.
- The Committee notes the concerns raised by the Department that Irish researchers and businesses may not be in a position to take full advantage of the potential benefits of CERN membership. However, the Committee believes that membership of CERN would encourage researchers and businesses to position themselves to do so.
- The Committee notes that Innovation 2020 identified four international research organisations from which Ireland could potentially derive benefits as a member; CERN is the only one of the four that Ireland has not joined.
- The Committee notes that Ireland is one of only three European countries that do not have any formal agreement with CERN.
- The Committee is of the opinion that the cost of joining CERN as an associate member does not appear to be prohibitive, and that there are options to pay the additional joining fee, for full membership, over a number of years.

Committee Recommendations

- The Committee recommends that negotiations start with CERN immediately with a view to Ireland becoming an associate member as soon as possible.



- The Committee recommends that after three years as an associate member of CERN, the Department conduct a cost-benefit analysis of Ireland's associate membership of CERN and assess whether there is a case to be made for moving towards full membership.
- The Committee recommends that efforts should be made to fund the annual fee for associate membership of CERN from within the Business, Enterprise and Innovation Vote.



Appendices

Appendix1: Committee Membership

Chairperson: Mary Butler (FF)

Deputies: Lisa Chambers (FF)
James Lawless (FF)
Imelda Munster (SF)
Tom Neville (FG) (vice-chair)
Noel Rock (FG)
Robert Troy (FF)

Senators: Aidan Davitt (FF)
Kevin Humphreys (LAB)
Pádraig Mac Lochlainn (SF)
James Reilly (FG)

Notes:

1. Deputy Billy Kelleher ceased to be a member of the Committee on 1 July 2019 due to his election to the European Parliament.
2. Deputy Robert Troy was appointed as a member of the committee on 11 July 2019.
3. Deputy Imelda Munster replaced Deputy Maurice Quinlivan on 11 July 2019.



Appendix 2: Terms of Reference

a. Functions of the Committee – derived from Standing Orders [DSO 84A; SSO 71]

- (1) The Select Committee shall consider and report to the Dáil on—
 - (a) such aspects of the expenditure, administration and policy of a Government Department or Departments and associated public bodies as the Committee may select, and
 - (b) European Union matters within the remit of the relevant Department or Departments.
- (2) The Select Committee appointed pursuant to this Standing Order may be joined with a Select Committee appointed by Seanad Éireann for the purposes of the functions set out in this Standing Order, other than at paragraph (3), and to report thereon to both Houses of the Oireachtas.
- (3) Without prejudice to the generality of paragraph (1), the Select Committee appointed pursuant to this Standing Order shall consider, in respect of the relevant Department or Departments, such—
 - (a) Bills,
 - (b) proposals contained in any motion, including any motion within the meaning of Standing Order 187,
 - (c) Estimates for Public Services, and
 - (d) other mattersas shall be referred to the Select Committee by the Dáil, and
 - (e) Annual Output Statements including performance, efficiency and effectiveness in the use of public monies, and
 - (f) such Value for Money and Policy Reviews as the Select Committee may select.
- (4) The Joint Committee may consider the following matters in respect of the relevant Department or Departments and associated public bodies:
 - (a) matters of policy and governance for which the Minister is officially responsible,



- (b) public affairs administered by the Department,
 - (c) policy issues arising from Value for Money and Policy Reviews conducted or commissioned by the Department,
 - (d) Government policy and governance in respect of bodies under the aegis of the Department,
 - (e) policy and governance issues concerning bodies which are partly or wholly funded by the State or which are established or appointed by a member of the Government or the Oireachtas,
 - (f) the general scheme or draft heads of any Bill,
 - (g) any post-enactment report laid before either House or both Houses by a member of the Government or Minister of State on any Bill enacted by the Houses of the Oireachtas,
 - (ag) scrutiny of private members' Bills in accordance with Standing Order 148B, or detailed scrutiny of private members' Bills in accordance with Standing Order 141,
 - (h) statutory instruments, including those laid or laid in draft before either House or both Houses and those made under the European Communities Acts 1972 to 2009,
 - (i) strategy statements laid before either or both Houses of the Oireachtas pursuant to the Public Service Management Act 1997,
 - (j) annual reports or annual reports and accounts, required by law, and laid before either or both Houses of the Oireachtas, of the Department or bodies referred to in subparagraphs (d) and (e) and the overall performance and operational results, statements of strategy and corporate plans of such bodies, and
 - (k) such other matters as may be referred to it by the Dáil from time to time.
- (5) Without prejudice to the generality of paragraph (1), the Joint Committee appointed pursuant to this Standing Order shall consider, in respect of the relevant Department or Departments—
- (a) EU draft legislative acts standing referred to the Select Committee under Standing Order 114, including the compliance of such acts with the principle of subsidiarity,
 - (b) other proposals for EU legislation and related policy issues, including programmes and guidelines prepared by the European Commission as a basis of possible legislative



- action,
- (c) non-legislative documents published by any EU institution in relation to EU policy matters, and
 - (d) matters listed for consideration on the agenda for meetings of the relevant EU Council of Ministers and the outcome of such meetings.
- (6) Where a Select Committee appointed pursuant to this Standing Order has been joined with a Select Committee appointed by Seanad Éireann, the Chairman of the Dáil Select Committee shall also be the Chairman of the Joint Committee.
- (7) The following may attend meetings of the Select or Joint Committee appointed pursuant to this Standing Order, for the purposes of the functions set out in paragraph (5) and may take part in proceedings without having a right to vote or to move motions and amendments:
- (a) Members of the European Parliament elected from constituencies in Ireland, including Northern Ireland,
 - (b) Members of the Irish delegation to the Parliamentary Assembly of the Council of Europe, and
 - (c) at the invitation of the Committee, other Members of the European Parliament.
- (8) A Select Committee appointed pursuant to this Standing Order may, in respect of any Ombudsman charged with oversight of public services within the policy remit of the relevant Department or Departments, consider—
- (a) such motions relating to the appointment of an Ombudsman as may be referred to the Committee, and
 - (b) such Ombudsman reports laid before either or both Houses of the Oireachtas as the Committee may select.



b. Scope and Context of Activities of Committees (as derived from Standing Orders) [DSO 84; SSO 70]

- (1) The Joint Committee may only consider such matters, engage in such activities, exercise such powers and discharge such functions as are specifically authorised under its orders of reference and under Standing Orders; and
- (2) Such matters, activities, powers and functions shall be relevant to, and shall arise only in the context of, the preparation of a report to the Dáil and/or Seanad.
- (3) The Joint Committee shall not consider any matter which is being considered, or of which notice has been given of a proposal to consider, by the Committee of Public Accounts pursuant to Standing Order 186 and/or the Comptroller and Auditor General (Amendment) Act 1993; and
- (4) any matter which is being considered, or of which notice has been given of a proposal to consider, by the Joint Committee on Public Petitions in the exercise of its functions under Standing Orders [DSO 111A and SSO 104A].
- (5) The Joint Committee shall refrain from inquiring into in public session or publishing confidential information regarding any matter if so requested, for stated reasons given in writing, by—
 - (a) a member of the Government or a Minister of State, or
 - (b) the principal office-holder of a body under the aegis of a Department or which is partly or wholly funded by the State or established or appointed by a member of the Government or by the Oireachtas:

Provided that the Chairman may appeal any such request made to the Ceann Comhairle / Cathaoirleach whose decision shall be final.

- (6) It shall be an instruction to all Select Committees to which Bills are referred that they shall ensure that not more than two Select Committees shall meet to consider a Bill on any given day, unless the Dáil, after due notice given by the Chairman of the Select Committee, waives this instruction on motion made by the Taoiseach pursuant to Dáil Standing Order 28. The Chairmen of Select Committees shall have responsibility for compliance with this instruction.