EU-INDIA PARTNERSHIP ON RESEARCH AND INNOVATION

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Foreword

The European Union and India share the same values of democracy and pluralism. We both believe in multilateralism and in a cooperative approach to international relations. These commonalities are very relevant for the global crisis we find ourselves in today due to COVID-19, which requires a global response.

The EU and India have in common priorities that will be central in shaping the world's agenda in the wake of COVID-19. We will continue to work on better preparedness and resilience, but we also need to join forces to combat climate change and to foster green, digital, just and resilient economies. This is reflected in the EU-India Strategic Partnership, which sets the pace for our cooperation up to 2025. To achieve this common agenda, increased efforts on R&I will be necessary.

EU-India cooperation on research and innovation is a success story. It started in 2001 with the conclusion of the Science and Technological cooperation agreement, and renewed in May 2020 for another five years. Both scientific communities value each other and there is ample scope for future cooperation.

Global crises, such as the COVID-19 pandemic, require research and international cooperation. Strengthening international partnerships is crucial to tackle challenges such as the fight against climate change or protecting biodiversity.

> **At EU level, we have pledged to become a climate-neutral region by 2050. This commitment will be underpinned by increased efforts on research, developing green technologies, through our next framework programme 'Horizon Europe' (2021-2027). Science has no borders and we trust that in the coming years we will be able to strengthen our engagement with India on issues such as resource efficiency, circular economy or sustainable agriculture. In this context, it will be important to build on the European Indian Network of Incubators and tap into each other's innovation ecosystems.**

Cooperation on R&I between the EU and India has also resulted in supporting more than 1,200 Indian researchers in the last five years, who have developed their scientific career in one of the top European universities with a Marie Sklowdoswka Curie grant. More than 50 Indian researchers have also obtained a prestigious European Research Council (ERC) grant allowing doing frontier research in Europe.

The success of EU-India cooperation on research and innovation would not have been possible without the good cooperation of all the EU Member States and countries associated to the EU's R&I programmes.

I hope that this brochure will show the importance of working closely together and building upon each other's expertise to achieve our common goal of a sustainable future for the next generations.

Ugo Astuto

Ambassador of the
European Union to India

The European Union Key Facts*

Population: 446 million

Population density: 108.8 persons/km²

Land area: 4 million km²

GDP: €13.9 trillion

GDP per capita: €31,100

The European flag features a circle of 12 gold stars on a blue background. They stand for the ideals of unity, solidarity and harmony among the peoples of Europe. The European flag symbolises both the European Union and, more broadly, the identity and unity of Europe.

+ The European Union (EU) is an economic and political union of 27 EU countries;
+ The EU has developed an internal single market through a standardised system of laws that apply in all Member States. EU policies aim to ensure the free movement of people, goods, services, and capital within the internal market;
+ The Member States delegate sovereignty to the EU institutions to represent the interests of the European Union as a whole. There are common policies for trade, agriculture, energy, environment, fisheries, competition, research, external relations and regional development;
+ The EU's main bodies are: the European Parliament, the Council of the European Union, the European Commission, and the European Court of Justice;
+ The guiding values of the EU include human dignity, freedom, democracy, equality, rule of law, and human rights;
+ The EU has delivered more than half a century of peace, stability and prosperity, helped raise living standards and launched a single European currency: the euro. More than 340 million EU citizens in 19 countries now use it as their currency and enjoy its benefits;
+ The EU is the largest trade bloc in the world, and the biggest exporter of manufactured goods and services and the biggest import market for over 100 countries;
+ The EU has a diverse and rich culture, with 24 official languages and over 60 indigenous regional or minority languages;
+ Collectively, the EU and its constituent countries are the world's leading donor of humanitarian aid;
+ In 2012, the EU was awarded the Nobel Peace Prize for advancing the causes of peace, reconciliation, democracy and human rights in Europe;
+ The motto of the EU is "united in diversity" which first came into use in 2000.

*Eurostat figures for EU27 (GDP and GDP per capita in current prices)

Key Dates

1950
On 9th May 1950, French Foreign Minister Robert Schuman gave a speech which publicly proposed the establishment of a European Coal and Steel Community (ECSC).

1951
The ECSC is founded by six countries (Belgium, the Federal Republic of Germany, France, Italy, Luxembourg and the Netherlands).

1957
The six countries set up the European Economic Community (EEC), for wider cooperation. One of its core objectives is to develop a common market offering free movement of goods, services, capital and people. Border checks and customs duties would be gradually removed.

1969
At the Hague Summit, the EEC's political leaders decide to move further ahead with European integration.

1973
Denmark, Ireland and the United Kingdom join the European Communities, bringing their membership to nine.

1981
Greece joins the European Communities, bringing their membership to 10.

1986
Spain and Portugal join the European Communities, bringing their membership to 12.

1991
The Maastricht European Council adopts a Treaty on European Union. It lays the basis for a common foreign and security policy, closer cooperation on justice and home affairs and the creation of an economic and monetary union, including a single currency. The inter-governmental cooperation in these fields added to the existing Community system creates the European Union (EU). The EEC is renamed the 'European Community' (EC).

1992
The Treaty on European Union is signed at Maastricht. It enters into force on 1 November 1993.

1993
The Single Market is created.

1995
Austria, Finland and Sweden join the EU, bringing its membership to 15.

1999
The currencies of 11 EU countries are replaced by the euro. The single currency is launched on the money markets. From this point onwards, the European Central Bank (ECB) has responsibility for the EU's monetary policy, which is defined and implemented in euro.

2002
People in the euro area countries begin using euro notes and coins.

2004
Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia join the European Union.

2007
Bulgaria and Romania join the EU.

2013
Croatia joins the European Union as its 28th member state.

2020
The United Kingdom withdraws from the European Union.

Elements for an EU Strategy on India

The European Union and India upgraded their long-standing relationship to a strategic partnership in 2004, acknowledging their common goals and principles. Nowadays, in a challenging international environment, the EU and India share the same values of democracy, human rights, fundamental freedoms and support the rules-based global order.

Pursuant to this, in November 2018, the European Commission and the High Representative of the Union for Foreign Affairs and Security Policy adopted a Joint Communication that sets out the EU's vision for a strategy to strengthen cooperation and the partnership with India. Through the strategy, the EU places an emphasis on reinforcing cooperation in foreign policy and developing security and defence cooperation with India, promoting effective multilateralism, and building on common values and objectives.

This Joint Communication replaces the last Commission Communication on India of 2004, recognising that India has emerged as the fastest-growing large economy and has acquired an important geopolitical role.

The Strategy aims to strengthen the EU-India Strategic Partnership by focusing on sustainable modernisation and on common responses to global and regional issues, and will provide the policy framework for the EU's deeper and broader engagement with India over the coming years.

EU-India: Partners in Progress

MODERNISATION

+ Investment in India's sustainable modernisation
+ New business opportunities
+ Enhanced connectivity and data protection
+ Sustainable urbanisation

ENVIRONMENT, ENERGY AND CLIMATE CHANGE

+ Implementation of the Paris Agreement
+ Clean energy transition, energy efficiency and renewable energy
+ Addressing major environmental challenges
+ India-EU Water Partnership
+ Joint Declaration on Resource Efficiency

TRADE & INVESTMENT

+ Balanced, ambitious and mutually beneficial agreements on trade and investment
+ Sound, transparent, non-discriminatory regulatory and business environment in India

INNOVATION

+ More people-to-people exchanges, utilising societal diversity
+ Cooperation on education and skills, mutual recognition of qualifications, mobility of talent
+ Innovation initiatives

Strengthening the Political Partnership

REINFORCING COOPERATION ON FOREIGN POLICY

+ Coordinating on the most relevant foreign policy issues
+ Working for stability and security in the overlapping neighbourhoods
+ Engaging India more on sustainable connectivity both at strategic and operational levels

DEVELOPING SECURITY AND DEFENCE COOPERATION

+ Fighting terrorism and radicalisation
+ Exchanging expertise on maritime and cyber security, non-proliferation / disarmament and hybrid threats
+ Military relations via personnel exchanges and trainings

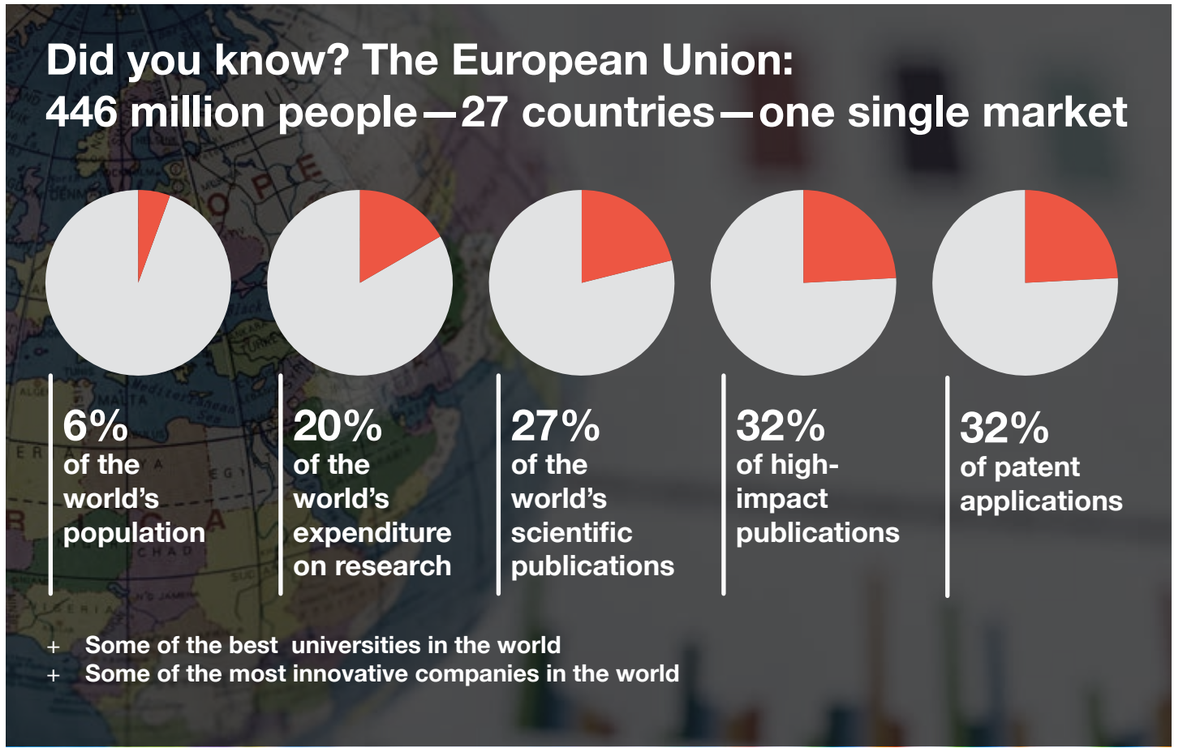
PROMOTING EFFECTIVE MULTILATERALISM

+ Promoting the rules-based global order and trading system
+ Improving coordination in the United Nations, World Trade Organization and G20
+ Working on strong, sustainable, balanced and inclusive global growth

BUILDING ON COMMON VALUES AND OBJECTIVES

+ Promoting gender equality and women's empowerment, human rights and democracy, and the inclusion of young people
+ Coordinating on humanitarian and disaster relief operations
+ Delivering the UN Sustainable Development Goals and Agenda 2030

Why Cooperate on Research & Innovation with Europe?



The EU employs more than 1.8 million[1] researchers and puts gender high on the agenda to achieve its targets and objectives on scientific excellence[2]. For the EU, science has no borders. This is in the first place reflected in its intrinsically highly diversified scientific landscape consisting of 27 Member States and 24 official languages[3]. This explains that European researchers are not only familiar and open to cultural and linguistic diversity, but are also actively engaged in international collaborations, making the European research landscape highly networked. European research organisations are establishing offices abroad and companies are investing outside their home countries.

Europe also has:

» Some of the best universities in the world: according to the QS world university ranking, 263 universities from EU (27) are in the top 1,000 best universities in the world[4].

» Some of the most innovative companies in the world: 577 firms based in the EU ranked within the 2,500 world's top industrial R&D players and account for more than a quarter (27%) of global investment[5].

» Exceptional opportunities for researchers from all over the world to collaborate with European research teams through its research and innovation framework programmes which are based on the principles of 'Open Science, Open Innovation and Open to the World'.

The 2020 European Innovation Scoreboard[6] also shows that the EU's innovation performance continues to improve with an average increase of 8.9% since 2012.

The innovation performance has improved most in the areas of broadband penetration, human resources, and the attractiveness of research systems, especially through international co-publications.

The EU's political priority is to remain a major global actor and for this, it is fully realised that continuous efforts are needed to increase its scientific excellence base and state-of-the art infrastructure, as well as means to stimulate deep tech and disruptive innovation and engage in international collaboration to jointly address global challenges.

India, as one of the fastest growing economies in the world, is also putting science and innovation high on its agenda[7]. Most importantly, both the EU and India are putting science at the heart of society which shows that also in the field of research and innovation, the EU and India are natural partners.

Indicators	Year	India	EU27
R&D intensity (GERD as % of GDP)	2017	0.69	2.07
Researchers (FTE) per 10,000 population	2015	4.00	78.00
Position in R&D spending globally	2017	6.00	3.00
Global publication output %	2016	4.80	27.50

Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research and Innovation Policies

1. Science, Research and Innovation Performance of the EU 2020
2. https://ec.europa.eu/info/policies/justice-and-fundamental-rights/gender-equality
3. https://europa.eu/european-union/topics/multilingualism_en
4. https://www.topuniversities.com/university-rankings/world-university-rankings/2020
5. 2018 Industrial R&D Scoreboard: EU
6. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1158
7. http://psa.gov.in/pmstiac-missions

EU and India Cooperation on R&I: A Success Story

EU-India S&T Agreement
The EU-India Agreement on Scientific and Technological Cooperation concluded in 2001, was renewed in 2010, 2016 and 2020, and is the cornerstone of the EU's research and innovation cooperation with India. Under the S&T Agreement, a Joint Steering Committee on Science and Technology (JSCST) has been established, allowing for regular meetings in which the topics and modalities for joint cooperation are being identified.

The last JSCST took place in New Delhi on 1 March 2019, co-chaired by Prof. Ashutosh Sharma, Secretary of the Department of Science and Technology (DST) and the Director-General for Research and Innovation, European Commission, Mr Jean-Eric Paquet. Both sides took stock of the very good progress made since the last meeting in June 2017 and confirmed their willingness to upscale cooperation under the next EU R&I programme 'Horizon Europe' (2021-2017). There was also a strong common interest to enhance cooperation on innovation.

12th India-EU Joint Steering Committee on S&T Cooperation, New Delhi, 1 March 2019

EU-India Summit in October 2017
Research and innovation is also an integral part of EU-India high-level meetings and sectoral dialogues. The EU-India Summit in New Delhi on 6 October 2017 brought new dynamism to EU-India relations. Leaders reconfirmed that the EU and India are natural partners and set out a common vision for further strengthening and broadening the scope of bilateral relations in several fields. The leaders agreed to work towards an enhanced cooperation on innovation and technology development aiming at actions strengthening cooperation between European and Indian industries and startup ecosystems, and welcomed India's efforts to promote economic and social development.

Out of the 53 points of the Joint Declaration, 7 points referred to research and innovation:

- Scaling up of cooperation in research and innovation, notably through the extension of the co-funding mechanism under Horizon 2020 across all areas of mutual interest, and in particular health and clean energy;
- Launch a joint flagship call in the order of €30 million to address India's water stress;
- Recognise the role of R&I for the development and deployment of renewable energy;
- Enhance two-way mobility of researchers. As a first step, an Implementing Arrangement between the European Commission and the Indian Science and Engineering Research Board (SERB) was signed, allowing Indian scientists to join ERC teams in Europe;
- Enhancing cooperation on innovation and technology development;
- Building on the strong partnership in the development of fusion energy;
- Concluding the Agreement between Euratom and the Indian Atomic Agency on the peaceful use of nuclear research.

In addition, in all sectoral policy dialogues, the importance of R&I is recognised:

- In the **India-EU Water Partnership (IEWP)**[8] , focusing on water law and governance, based on the EU's cross-border experience, the role of R&I to overcome complex situations is recognised.
- In the **Joint Declaration on Climate Change and Energy**, the EU and India recognised the global dimension of technological and scientific collaboration. They reaffirmed their cooperation in the frame of the Clean Energy Ministerial and will explore pathways to enhance their cooperation in the frame of Mission Innovation (MI) and the International Solar Alliance (ISA), in particular regarding its aim to accelerate the clean energy transition.
- In the **Joint Declaration for a Partnership for Smart and Sustainable Urbanisation**, the role of joint research and innovation opportunities was explicitly mentioned and will be part of the implementation of this partnership.

The EU Strategy on India Adopted in November 2018

The Strategy fully recognised the role of research and innovation in EU-India relations and calls upon strengthening it to achieve the overall objectives of supporting India's modernisation process and contributing to the Sustainable Development Goals (SDGs).

In the intervening months, the broad objectives have to be translated into concrete actions. Areas of cooperation on research and innovation will be identified together with the Government of India in areas of mutual interest. Through joint research, India could gain from Europe's technological expertise, such as on waste management, circular economy, marine sciences and blue growth or cultural heritage, which in turn would help speeding up the implementation of its national missions. The Strategy also envisages the setting up of an Innovation Centre to stimulate and take advantage of each other's innovation ecosystem.

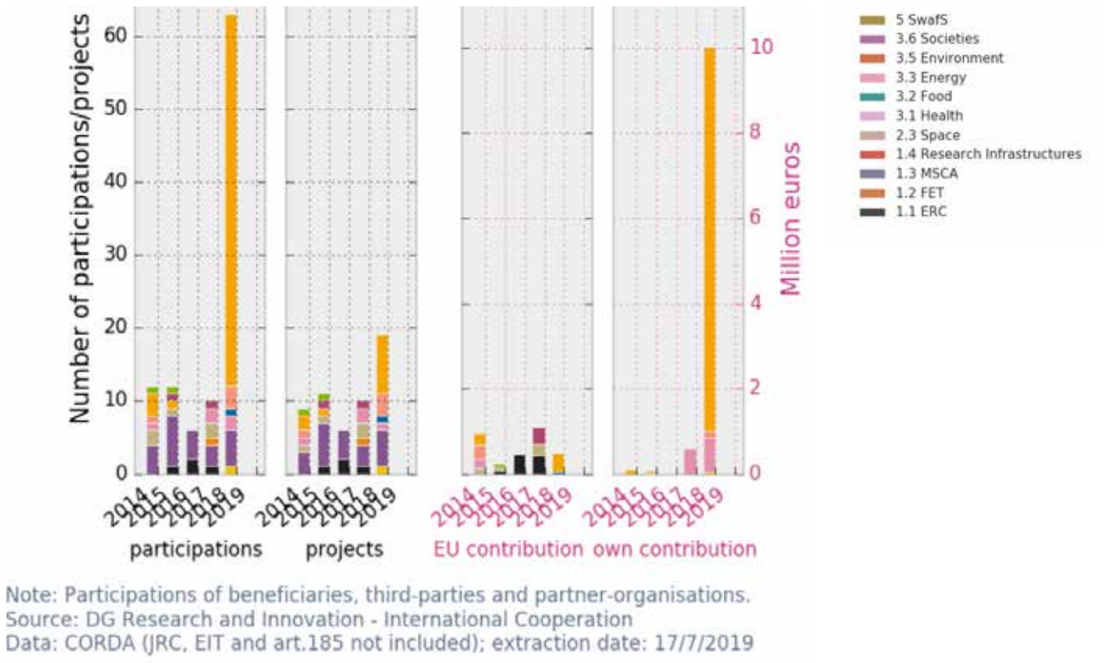
8. https://www.eip-water.eu/india-eu-water-partnership-iewp

EU-India R&I Cooperation under Horizon 2020: Key Figures

Collaborative Research

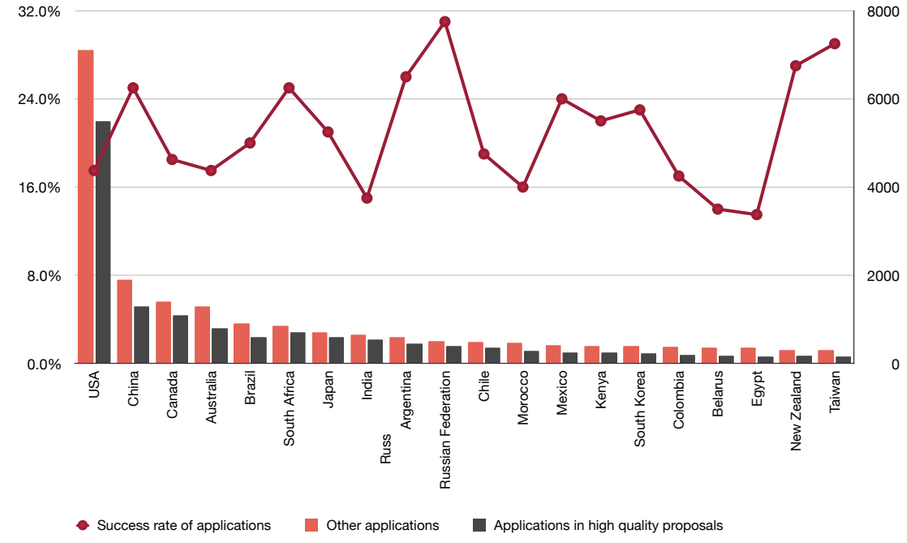
Since the start of Horizon 2020 (up to February 2020), Indian applicants have been involved 510 times in 183 eligible proposals of which 28 were selected for funding. When considering participation in collaborative research projects only, India's success rate has substantially increased since 2018, which is due to the successful joint calls on water and influenza vaccines, as well as co-funding provided by DBT and MoES. This resulted in a success rate of 15.1%, compared to a success rate of 17.1% of the other international partners. Overall, this means that India ranks eight among all of the EU's international partners (non-associated third countries).

India: Participation in signed projects of H2020



Note: Participations of beneficiaries, third-parties and partner-organisations.
Source: DG Research and Innovation - International Cooperation
Data: CORDA (JRC, EIT and art.185 not included); extraction date: 17/7/2019

No. of applications (left axis) and success rate (right axis) of the non-associated third countries



Source: European Union commission, DG RTD, based on CORDA data, cut-off date 1st January 2019

Robust Cooperation on Water

Demonstrating Europe's Potential for Tackling India's Water Problems

Many water challenges are common to Europe and India, but of course scale and scope are very different.

Under the EU Seventh Framework Programme for Research and Innovation (FP7) (2007-2013), Indians participated in nine collaborative research projects representing in total about €82 million funded by the EU/FP7. In addition, a coordinated call was organised with the Government of India (DST and DBT) in which India and the EU funded five projects (NAWATECH, SARASWATI, SWINGS, ECO-INDIA and WATER4INDIA) for a total amount of €44 million. Cooperation through these projects has allowed development of appropriate waste water treatment systems, recycling and reuse strategies as well as water reclamation in various parts of India. This cooperation has also strengthened the research capacity on water while supporting deployment of technologies.

The EU Member States individually, or through the FP7 project INNO INDIGO, have also selected water as a topic for cooperation. Between 2012 and 2013, a total of 16 field establishments were carried out in different parts of India, with a waste water treatment volume capacity varying between 100 m^3 to 500 m^3 on wastewater.

Accomplishments:

- In situ treatment of drinking water systems;
- Integrated management of drinking water supplies and waste water treatment;
- Optimisation of use of freshwater in agriculture
- Relatively low O&M costs;
- More than 80,000 people were directly benefitted.

For more information see:

- ECO INDIA: www.eco-india.eu
- NaWaTech: www.nawatech.net
- SWINGS: www.swingsproject.com
- SARASWATI: www.project-saraswati.net
- Water4Crops:www.water4crops.org

Building upon this past collaboration and enhanced knowledge the EU has acquired on water technologies and waste water management, it was agreed at the EU-India Summit in October 2017 to upscale the cooperation on water with a focus on innovative and affordable solutions through the transfer of European technology.

> **Both the EU and Government of India (DST and DBT) agreed to jointly invest an amount of €30 million (`240 crore) which was later increased to €40 million allowing to fund in total seven projects in the coming four years (2019-2023).**

The seven selected and funded projects are:

- **India-H20** (Bio-mimetic and phyto-technologies designed for low-cost purification and recycling of water);
- **LOTUS** (Low-cost innovative technology for water quality monitoring and water resources management for urban and rural water systems);
- **PANI WATER** (Photo-irradiation and absorption based on novel innovations for water-treatment);
- **PAVITR** (Potential and validation of sustainable natural and advance technologies for water and waste water treatment, monitoring and safe water reuse);
- **PAVITRA GANGA** (Unlocking waste water treatment, water reuse and resource recovery opportunities for urban and peri-urban areas);
- **SARASWATI 2.0** (Identifying best available technologies for decentralised wastewater treatment and resource recovery for India);
- **SPRING** (Strategic planning for water resources and implementation of novel biotechnical treatment solutions and good practices).

The aim of these projects is to develop new or adapt the most suitable existing innovative and affordable solutions for Indian conditions through improved combinations of natural and engineered components, both in urban and rural areas, thus providing solutions to urgent water challenges.

About 130 entities, both from Europe and India are involved in these projects, ranging from universities and research labs to companies/SMEs and municipalities and NGOs.

Amongst others, IITs of Delhi, Bombay, Guwahati, Bhubaneswar and Roorkee, and CSIR-National Environmental Engineering Research Institute (CSIR-NEERI) are part of it.

To anticipate the deployment of solutions to the market, from the very start of the work the representatives of the India-EU Water Partnership (IEWP) have been introduced to the R&I consortia. This should help in assessing the market readiness of solutions and bring researchers, technological developers and businesses (SMEs and startups) together in view of market deployment.

Kick-off meeting of joint water projects, New Delhi, 14-15 February 2019.
From L to R: Prof. P. Rajendra Prasad (DST Expert), Tania Friederichs (Science Counsellor EU Delegation), Dr Shailja Vaidya Gupta (Director International Cooperation DBT), Henriette Faergemann (Environment Counsellor at EU Delegation); Sadhana Relia, Director Multilateral relations at DST; Dr Sanjay Bajpai, Energy research DST and Arnoldas Milukas (EASME, Brussels)

EU-India Joint Action to Develop the Next-Generation Influenza Vaccine

Seasonal influenza is a major health burden, with an estimated 500,000 deaths around the world each year. In the EU it is estimated that vaccination against seasonal influenza alone prevents up to 37,000 deaths each year. Given the increased mobility of people, a pandemic is not to be excluded. Today, vaccines against the flu are only moderately effective. In addition, current influenza vaccines need to be developed every year.

To address this global public health challenge, the EU and India joined forces with a flagship call aiming at developing the next generation of vaccines against influenza. In total, €40 million (`340 crore) has been allocated for research and innovation actions, which aims at advancing the efficacy, safety, duration of immunity and reactivity against an increased breadth of influenza strains.

Given the importance of the topic, and unique expertise which the consortia members brought together, it was decided to fund three projects:

» **ENDFLU** (Evaluation of rationally designed influenza vaccines);
» **INCENTIVE** (Indo-European Consortium for Next Generation Influenza Vaccine Innovation);
» **INDIGO** (Effective and Affordable Flu Vaccines for the World).

From L to R: Tomasz Kozlowski, then EU Ambassador; Dr Renu Swarup, Secretary Department of Biotechnology; Dr Finnian Hanrahan, European Commission, Brussels; Dr Shailja Gupta, Director International Cooperation DBT and Tania Friederichs, Science Counsellor, EU Delegation

Europe and India have a long and successful tradition of vaccine development in both public and private institutions. Both are also home to many of the world's largest vaccine manufacturers.

Joining Forces to Combat COVID-19
Committed to the need for a 'global response to a global crises', which requires more scientific research and innovative solutions, the EU and India have agreed to step up efforts on international cooperation on COVID-19 aiming at finding rapid solutions and a higher preparedness to the pandemic. Cooperation takes place in the form of exchanging information (international network for matchmaking), adhering to the principles of Open Science and to the principle of accessibility and affordability, especially when it comes to finding and developing a vaccine. The Department of Biotechnology (DBT) has also agreed to co-fund four topics in the Horizon 2020 specific fast track call on COVID-19 which closed on 11 June 2020. The results of these calls are expected by the end of August 2020.

EU-India Cooperation on Tuberculosis

EU-India cooperation on Tuberculosis (TB)
Tuberculosis is one of the world's deadliest diseases; it infects one third of the world's population in developing countries and is becoming very dangerous in developed countries as well. The high costs, long duration and poor compliance with therapy, may lead to the development of multi-drug resistant bacterial strains, that make it much harder to eradicate this disease. Several leading Indian Institutes, could thanks to the co-funding support from DBT, join top international teams working on TB.

The 'Horizon 2020' project STriTuVaD (In Silico Trial for Tuberculosis Vaccine) (2018-2022), a consortium of European, American and Indian partners (for India, AIIMS, New Delhi) are exploring the future of tuberculosis drugs testing. The aim is to develop computer simulations to test the efficacy of new therapies, which should significantly reduce the costs and duration of human clinical trials.

The 'Horizon 2020' project ARREST-TB (Accurate, Rapid, Robust and Economical Diagnostic Technologies for Tuberculosis) (2019-2020) consists of a research team that spans across Europe with academic and industry partners from the UK, Spain, Italy, as well as Russia and India (National Institute for Research in Tuberculosis, Chennai) and Shanmukha Innovation Startup from Bengaluru). The team tests out new methods to diagnose and cure TB at fast and affordable conditions.

EU-India Cooperation on Energy - Mission Innovation

Mission Innovation (MI) is a global initiative of 24 countries and the European Commission (on behalf of the European Union) working to reinvigorate and accelerate global clean energy innovation with the objective to make clean energy widely affordable. MI was launched on 30 November 2015, during COP21 in Paris, where world leaders came together to commit to combat climate change.

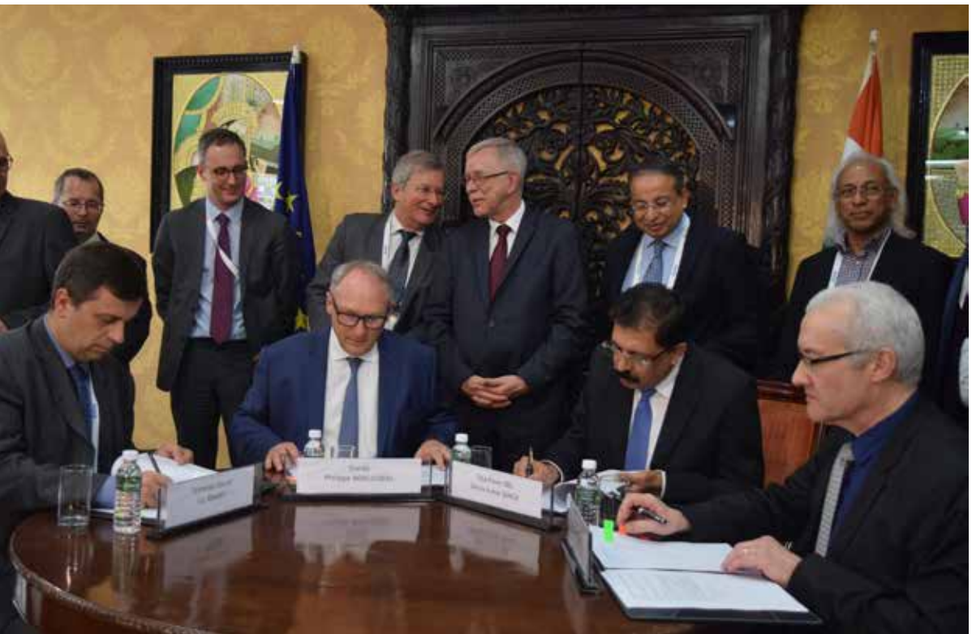
> **Energy being a major factor in the rise of global temperatures, a group of countries launched MI in which they committed to doubling their public investment in clean energy R&D over five years**.

At the international level, the EU pushes the acceleration of energy innovation through MI initiatives in its R&I programme 'Horizon 2020'.

As a founding member, India has committed to double its governmental clean energy research, development and demonstration (RD&D) investments from €64 million (`500 crore) in 2015 to €130 million (`1011 crore) in 2020.

India co-leads three MI Innovation Challenges (IC) on (1) Smart Grids, (2) Off-grid Access to Electricity and (3) Sustainable Biofuels in which also the European Commission is very active.Indian experts are also actively involved in the two ICs co-led by the EC on (1) Converting solar light into storable fuels and (2) Affordable heating and cooling of buildings. In addition, experts of the EC and DST, serving in the Analysis and Joint MI Subgroup, successfully cooperate in drafting the MI paper on 'Collaborative Models of International cooperation in Clean Energy RD&D'.

Both India and Europe regularly organise calls for proposals to address the gaps identified under MI. On 1 May 2020, a flagship call between the EU and India (DST) was launched aiming at increased energy storage through innovative smart and integrated energy systems. In total, a budget of €18 million is foreseen. The closing date is 1 September 2020.



Signing ceremony in New Delhi on 15 March 2019, of the Cooperation Agreement between ENEDIS, France and Tata Power India as part of Horizon 2020 project iElectrix, in presence of consortia members and then EU Ambassador Tomasz Kozlowski

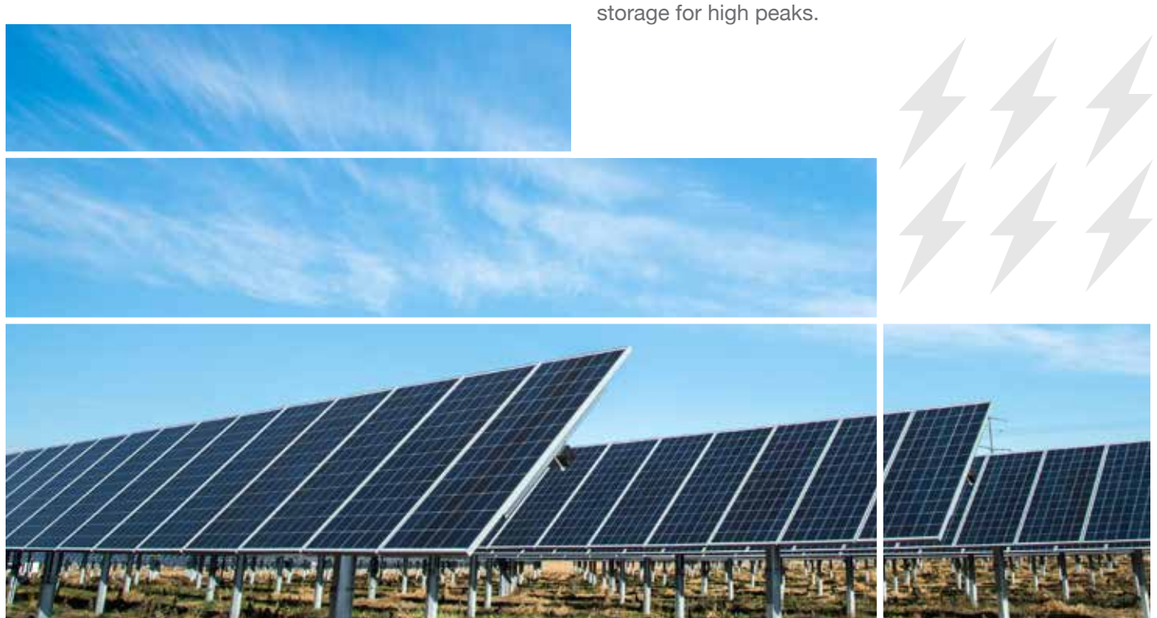
So far, EU-India cooperation on energy has led to the successful, direct or indirect, participation of Indian entities in four Horizon 2020 projects:

Muse Grids (2018-2022) project, aims to transform weakly connected areas into local energy communities where engagement of citizens will allow their energy needs to be met, whilst also reducing their carbon footprint. MUSE GRIDS involves the development of two large-scale pilot projects (Italy and Belgium), and includes partners from universities, research centres and leading EU companies from the energy sector. The consortium consists of 18 partners from seven countries, including universities, research centres and leading EU companies of the energy sector. In this project, India is indirectly participating as the project will also be promoted on a wider scale through the establishment of virtual demo-sites in India, Israel and Spain.

iElectrix (2018-2020) aims to demonstrate several technical options (including local storage) to increase the distribution network's hosting capacity for distributed renewable electricity (rooftop solar) in the Delhi area. To this end, it will use EU technologies and approaches. The total value of the project is €11 million out of which €8 million is granted by Horizon 2020 and the remaining budget is financed by Enedis (France) and Tata Power (mainly in kind contribution) through a side cooperation agreement (signed in New Delhi on 15 March 2019). The Tata Power Centre in New Delhi will be used as a demonstration site. The topics addressed in this collaboration are smart grids, planning and operation of distributed energy resources, representative electricity networks and applications, and regulation of energy network infrastructures.

Merlon (2019-2021) is a consortium of 12 partners from Europe and Smart Grid Forum from India (with own funding), to improve the integration of local energy islands and make them more secure and affordable.

E-LAND (2018-2022) aims to offer novel solutions for decarbonised energy to isolated villages, small cities, urban districts and rural areas which often have issues with weak or non-existing grid connections. The main concept is the E-LAND toolbox—a modular set of methodologies and ICT tools to optimise and control multi energy islands and isolated communities. E-land will have pilot sites in Norway, Romania, Spain and India. In India BSES Yamuna Power Limited (BYPL) and Tata Power look into integration of solar rooftop and storage for high peaks.



EU-India Cooperation on Polar Sciences

Information and Networking event in Goa on 19 November 2018 on cooperation on polar sciences in collaboration with National Centre for Polar and Ocean Research and in the presence of Mr Nils Ragnar Kamsvåg, Ambassador of Norway, Dr M Rajeevan, Secretary for Ministry of Earth Sciences and Dr Vivek Dham, Policy Officer at the R&I Section at the EU Delegation

The EU attaches great importance to polar sciences as a means to better understand and combat climate change. India shares the same objectives. Since the start of India's Antarctic scientific programme in 1981 and the Artic programme in 2007, interest and capacity on polar sciences has been growing, and shifting from specific research areas to research and studies aiming at contributing to the global community's effort to understand climate change phenomena and processes.

This shared interest and knowledge resulted in January 2018 in the conclusion of a Co-Funding Mechanism with the Ministry of Earth Sciences (MoES), allowing for co-funding of successful Indian entities in Horizon 2020 projects.

So far, one project called COMFORT, has been selected and retained for funding, including the Nansen Environmental Research Center (NANSEN) in Kochi, together with 30 European partners led by Norway. This project aims at closing the gap for key ocean tipping elements under anthropogenic physical and chemical climate forcing through an inter disciplinary research approach. It will provide added value to decision and policy makers in terms of science based safe marine operating spaces, refined climate mitigation targets, and feasible long-term mitigation pathways. The project started in October 2019.

In November 2018, an information and networking event on the Horizon 2020 Arctic call (LC-CLA-07 on the changing cryosphere, aiming at developing innovative approaches to address amongst others, sea-level changes; changes in Arctic biodiversity and sustainable opportunities in the changing Arctic) took place in Goa.

Europe-India Innovation Partnership

Launch of EU-India Network of Incubators and Accelerators in Bengaluru on 9 October 2018, in the presence of Signe Ratso, Deputy Director-General of Directorate-General Research and Innovation, European Commission, Brussels

Today, India has one of the fastest growing startup communities in the world. Against this background, it was agreed at the Summit in New Delhi in October 2017 that both the EU and India should work towards an enhanced cooperation on innovation aiming at strengthening cooperation between European and Indian industries and startup ecosystems.

In October 2018, the EU launched a two-year pilot initiative to facilitate collaboration and co-creation among both innovation ecosystems. The initiative consists of a two-pronged approach:

» EU-India Network of Incubators/Accelerators;
» EU Platform on Innovation.

Network of Incubators and Accelerators
The 'EU-India Incubators and Accelerators Network' facilitates matchmaking of incubators and accelerators from Europe and India in view of co-creation. The first network event took place in October 2018 in Bengaluru, and the second meeting in Tallinn (Estonia) on 14-15 May 2019. In total, about 50 incubators from both regions are now connected.

Participants are encouraged to establish Plan of Actions, including exchanges of staff and startups themselves. The overall aim is to kick-start a self-sustaining ecosystem that fosters high-level interactions and technology and innovation partnerships that benefit both regions.

EU Innovation Platform in India
The EU Innovation Platform in India is a forum which brings together European innovation actors active in India, both from the private and the public sectors. The main objective is to better understand each other's innovation ecosystems and create synergies among the innovation initiatives undertaken by European and Indian stakeholders. The Platform aims also at facilitating cooperation among members and encourage them to launch joint initiatives open to all members and beyond, under an 'EU banner'.

The launch event in New Delhi in October 2018 gathered 60 participants from EU MS/AC countries, representatives from European public authorities and the corporate sector. The members proposed a series of joint activities, amongst which: organising a Joint Open Innovation Hackathon; leveraging co-funding schemes and address jointly thematic challenges, notably on clean-tech, robotics and Artificial Intelligence (AI) and smart cities.The Platform is also an ideal way to interact with Indian institutional stakeholders (the National Science & Technology Entrepreneurship Development Board (NSTEDB) within DST; the Biotechnology Industry Research Assistance Council (BIRAC) within DBT, Atal Innovation Mission (AIM) within NITI Aayog and Startup India within Invest India.

Ultimately, this Platform should pave the way to a self-sustainable EU Innovation center in India.

How to Cooperate with the EU on Research & Innovation?

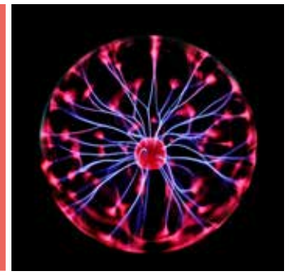
The EU framework programmes for research and innovation are the main vehicles to realise the EU's policy agenda, objectives and targets through funding of research and innovation in a large range of scientific disciplines, from the most exploratory stages of research to the commercialisation of innovative products or services.

The EU's framework programmes for R&I are also the instruments to implement the EU's international agenda as it enables collaboration between EU researchers and innovators and their best counterparts worldwide.

Framework programmes are established for a period of seven years and are implemented by work programmes. All funding is allocated on a competitive basis through calls of proposals and evaluated by an independent experts peer review.

The current programme called **'Horizon 2020'** runs from 2014 to 2020 and has a budget of nearly €80 billion. It covers science and innovation, grouped in three pillars:

Horizon 2020 is the programme of the EU's 27 Member States and 16 countries associated to the framework programme:



Excellent science

Industrial leadership

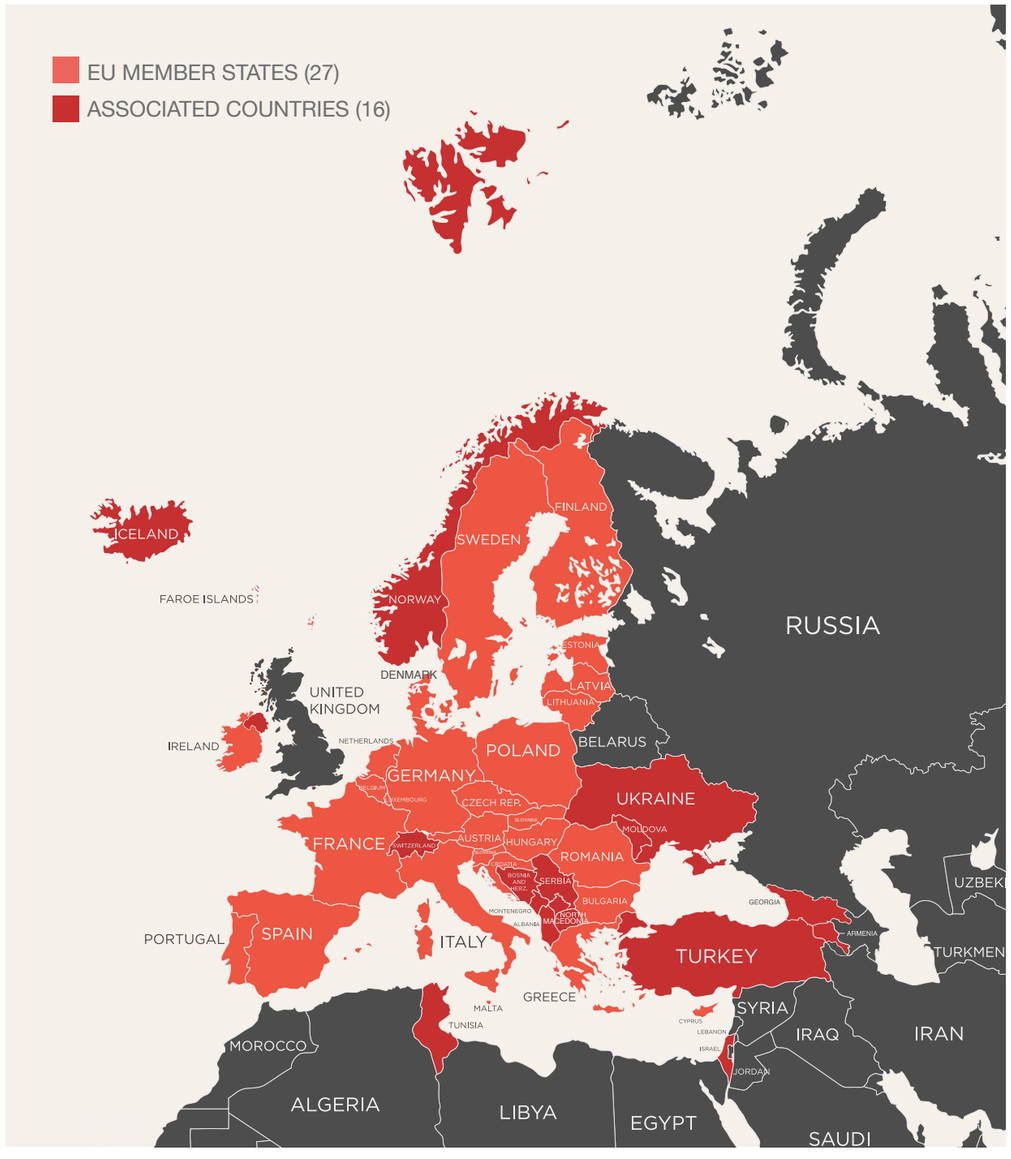
Societal challenges

The 27 EU Member States are*:
Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden.

*Following the withdrawal agreement between the EU and the United Kingdom (UK), the UK is since 1 February 2020 no longer a Member State. For participation in the EU's framework programme Horizon 2020, however, UK entities remain eligible for grants and procurement procedures as if the UK was a Member State for the entirety of the Horizon 2020 framework programme.

The 16 countries associated to Horizon 2020 are:
Albania, Armenia, Bosnia and Herzegovina, Faroe Islands, Republic of North Macedonia, Georgia, Iceland, Israel, Moldova, Montenegro, Norway, Serbia, Switzerland, Tunisia, Turkey and Ukraine.

Together they constitute the European partners and will be referred to hereafter as **'Europe'.**



Countries associated to the EU's framework programme enjoy the same opportunities in Horizon 2020 as the Member States, and hence the entities from associated countries are eligible in all calls for proposals and are automatically funded. This offers additional opportunities to find partners and form consortia for the Indian scientific community as well.

Strategy on International Cooperation
The EU's strategy for cooperation in research and innovation is guided by European Commissioner for Research, Science and Innovation, Carlos Moedas' policy on research and innovation, which can be summarized in three goals: Open Innovation; Open Science and Open to the World (or the so-called three O's).

Open Innovation
Open Innovation is about combining diverse sources of knowledge to innovate, underpinned by networked, multi-collaborative teams bringing researchers, entrepreneurs, investors, users, governments and civil society together.

To achieve this, it is also important to look beyond the current thinking to ensure innovation-friendly regulation and financing, such as: increasing the use and purchase of innovative products and services through public procurement; rolling out financial instruments to boost private investment and venture capital or facilitate public funding of innovation, including blending of EU and national funds.

Open Science
To increase the circulation and exploitation of knowledge, the EU is committed to the principle of 'Open Science' which includes open access to scientific publications and research data. Open science also means strengthening research integrity for policy makers, research funders, research institutions and researchers. The EU firmly believes that open access is a fair return of the public investment as it allows for others to have access to that knowledge and avoids duplication.

At EU level, Open Access (OA) is taken very seriously: all projects receiving Horizon 2020 funding are required to make their peer-reviewed publications open access. OA requirements do, however, not imply an obligation to publish results. The decision to publish is entirely up to the grant beneficiaries. OA becomes an issue only if publication is chosen as a means of dissemination. To meet this requirement, beneficiaries must, at the very least, ensure that any scientific peer-reviewed publications can be read online, downloaded and printed.

The European Commission is also very supportive of the initiative launched by Science Europe in September 2018 called '**Plan S**'[9], which sets the principles on how to achieve OA so that after 1 January 2020, all scientific publications funded with public grants by national and European bodies and funding agencies, are published in compliant open access journals or open access platforms.

The success of Plan S depends also on the number of public funders adhering to the principles. India joining Plan S, as announced by India's Principal Scientific Advisor Prof. K Vijay Raghavan on 12 February 2019, is making the coalition more global.

9. https://www.coalition-s.org/

Open to the World
Horizon 2020 is fully promoting cooperation with international partners based on common and mutual interest. This is why 'Horizon 2020 - Open to the World' allows engagement in global scientific and technological collaboration and in science diplomacy to remain relevant and competitive, and to lead the way in developing global research and innovation partnerships to address global challenges and contributing to the achievement of the Sustainable Development Goals (SDGs).

Science Diplomacy
For the EU, a stronger Union requires investing in all dimensions of foreign policy, from trade and investment to research and climate change and mobility and culture.

> **The role of science is also important to address the EU's foreign affairs objectives related to security, integrated approach on conflict and crises and regional cooperation in, for example, the Arctic or Africa. In particular, in ungoverned spaces, like the Arctic, actions should be scientifically based to avoid abuse of natural resources.**

The EU has S&T cooperation agreements with about 20 countries including with India. As India is a strategic partner for Europe, the EU has nominated a scientific counsellor in the EU Delegation to India with the main role of fostering cooperation on R&I between the two countries. This presence in the country allows for a better understanding and direct engagement with public and private stakeholders.

Also for India, science diplomacy is part of its international relations. The Research and Information System for developing countries (RIS), together with the National Institute of Advanced Studies (NIAS), Bengaluru launched a major project on Science Diplomacy in 2018 which is funded by the Department of Science and Technology (DST)[10] .

At the launch of the Science Diplomacy Programme in New Delhi on 7 May 2018, it was fully acknowledged that countries with a science counsellor/attaché in their embassies, had managed to substantially increase R&I cooperation in areas of mutual interest with India. The robust cooperation between the EU and India on water and on health was seen as a concrete and positive example of science diplomacy.

Sadhana Relia, Head, International Cooperation (Multilateral / Regional), DST and Tania Friederichs, Counsellor, Head of Section Research and Innovation at the EU Delegation to India at the launch event of the Science Diplomacy Programme in Delhi on 7 May 2018

10. http://fisd.in/

Horizon 2020: How Does it Work?

The most relevant actions for international cooperation and conditions depend on the nature and objective of the activities funded. Summarized:

1. Collaborative research to tackle societal challenges (RIA/IA)
2. Coordination and Support Actions (CSA)
3. Grants from the European Research Council for Frontier Research (ERC)
4. Support for training and career development - MCSA

Collaborative Research to Tackle Societal Challenges
Collaborative research, requiring a consortium of at least three entities established in Europe, aims at finding a solution to a set problem in the scope of the call, through:

Research and Innovation Actions (RIA):
Funding for research projects tackling clearly defined challenges which can lead to the development of new knowledge or new technology.

» **Who:** Consortia of partners from three different European countries and as many additional entities as necessary to execute the project, including international partners. Mix of industry and academia.
» **Funding:** 100% of all eligible costs, both for entities from public and private sector. Indirect eligible costs (e.g. administration, communication and infrastructure costs, office supplies) are reimbursed with a 25% flat rate of the direct eligible (directly related to the implementation of the action).

Innovation Actions (IA)
IA funding is more focused on closer-to-the-market activities. For example, prototyping, testing, demonstrating, piloting, scaling-up, all aiming at new or improved products, processes or services.

» **Who:** Consortia of partners from three different European countries and as many additional entities as necessary to execute the project, including international partners. Mix of industry and academia.
» **Funding:** 70% of all eligible costs, both for entities from public and private sector, but this may be increased to 100% for non-profit organisations. Indirect eligible costs (e.g. administration, communication and infrastructure costs, office supplies) are reimbursed with a 25% flat rate of the direct eligible (directly related to the implementation of the action).

Coordination and Support Action (CSA)
Funding covers the coordination and networking of research and innovation projects, programmes and policies (e.g. training, dissemination, exploitation, standardisation, policy dialogues, etc.). Funding for research and innovation per se not covered.

» **Who:** Single entities or consortia of partners from different countries, industry and academia.

Sharing Results while Protecting IPR
Each participant must disseminate the results it produces – and therefore owns – as early as possible. Exceptions only apply to protect intellectual property rights (IPR), security or legitimate interests. When publishing results in scientific publications, open access to the publication must been ensured. This guarantees that research results funded by EU taxpayers are available for free to everyone.

IPR belongs to the team that generates the results. In very specific circumstances, joint ownership may apply. Once if results have been generated, the joint owners may agree on a different ownership system.

Ethics and Research
Ethics is an integral part of research and a driver for research excellence. All activities funded under Horizon 2020 shall comply with ethical principles and relevant national legislation. The ethical principles include the need to avoid breaches of research integrity, in particular any form of plagiarism, data fabrication or falsification.

Who is eligible for funding?
Although researchers from all over the world may participate in Horizon 2020 projects, they are not always eligible for Horizon 2020 funding. The EU distinguishes between countries that are automatically eligible for funding and those that are not.

» **Automatically funded:**
Research organisations in about 130 developing countries are eligible for funding (see Annex A of the Horizon 2020 Work Programmes)[11] , except where this is explicitly excluded in the call text.

» **Not automatically funded:**
Industrialised countries and emerging economies - participants from these countries have themselves to determine the sources of funding and find the resources for their part of the action. Several countries have created mechanisms to co-fund their successful participants in Horizon 2020 actions selected by Horizon 2020 peer review. The following countries have made arrangements to support their entities in Horizon 2020 projects[12] :

- Countries with jointly agreed co-funding mechanism covering most or all thematic areas: China, Hong Kong, Macao, Republic of Korea, Mexico, Russia, Taiwan;
- Countries with jointly agreed co-funding mechanism covering selected thematic areas: Australia, India, Japan;
- Countries with co-funding by a region: Brazil, Canada;
- Countries without jointly agreed co-funding mechanism: New Zealand, USA.

11. http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-a-countries-rules_en.pdf
12. http://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/international-cooperation_en.htm

Funding Modalities for Indian Participants

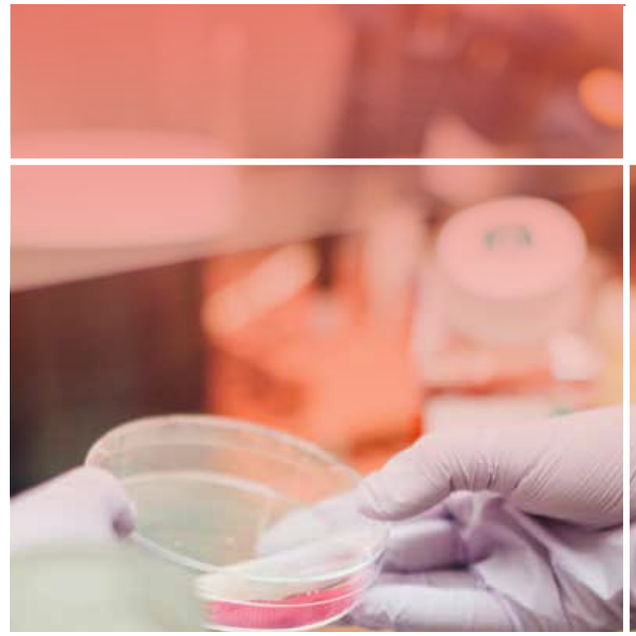
Under Horizon 2020, participants from India, just like the other emerging economies (Brazil, Russia, India, China - BRIC) are no longer automatically eligible for funding for collaborative projects. Indian participants have therefore to find the financial resources for their participation. These could be own funds or funds from the Government of India (GoI), foundations and other organisations that fund international research and innovation activities. Contributions can also be made in kind. In exceptional circumstances, funding can be received if the participation is essential for the execution of the project.

To encourage participation of Indian entities in the call of proposals open to the world, based on the general opening principle, the EU has established with several Indian funding departments a Co-Funding Mechanism (CFM) which sets the conditions under which the successful Indian participants in a selected Horizon 2020 project will be funded by the Government of India.

As of May 2019, a CFM has been established with the Department of Science and Technology (DST), the Indian Department of Biotechnology (DBT) and the Ministry of Earth Sciences (MoES) for a number of pre-identified calls of proposals in the Horizon 2020 Work programmes.

In addition, the EU and India have also launched joint calls in water and influenza vaccines. The principle of such a mechanism is that both sides agree on the content of a call and publish simultaneously the same call text on their respective websites. Proposals are jointly evaluated and the EU, through Horizon 2020, funds the successful European applicants and the GoI/relevant department, the successful Indian applicants.

For updates of co-funded or joint calls, check on a regular basis the country page uploaded on the Horizon 2020 website[13] .

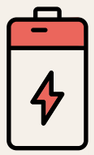


Horizon 2020 - Success Stories

Did you know? EU funded research is shaping your future.

New planets have been discovered

Major advances have been made in cancer treatments



A battery 100 times more powerful than ordinary ones has been developed

1.6 million Ebola vaccine doses are available

Hydrogen fuel cell powered buses are being tested in our cities

WHAT NEXT?
3D print your dream house

13. http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020_localsupp_india_en.pdf

Protection Against Ebola
1.6 million Ebola vaccine doses are available to save lives
New life-saving treatments, diagnostics, and a vaccine have been developed thanks to funding the EU mobilised for emergency of the recent Ebola outbreak. Thousands of people have been protected against Ebola with a vaccine developed by Johnson & Johnson working with the EU-funded 'EBOVAC' project. Over 1.6 million doses of the vaccine are stockpiled for use in case of emergency.
Read more about the Ebola vaccine projects https://www.ebovac.org/

Beyond Our Earth
Seven new planets have been discovered
The most extraordinary space discovery in decades that currently represents our best chance of detecting alien life was made by European Research Council grantee Michaël Gillon of the University of Liège. His EU-funded project discovered seven potentially habitable planets that orbit an ultra-cool dwarf star just 40 light years from Earth.
Read more about the SPECULOOS project: http://europa.eu/!Rf76hJ

Antibiotics Or Not?
A revolutionary device detects bacteria
A breakthrough medical device that can diagnose bacterial infection in less than 10 minutes from a single drop of blood has received a €1 million EU 'Horizon Prize' for innovation. The 'MINICARE HNL' system will reduce the amount of antibiotics prescribed, and so help tackle increasing antimicrobial resistance which is becoming a global health problem.
Read more about the Horizon Prize on Better Use of Antibiotics: http://europa.eu/!cH38jh

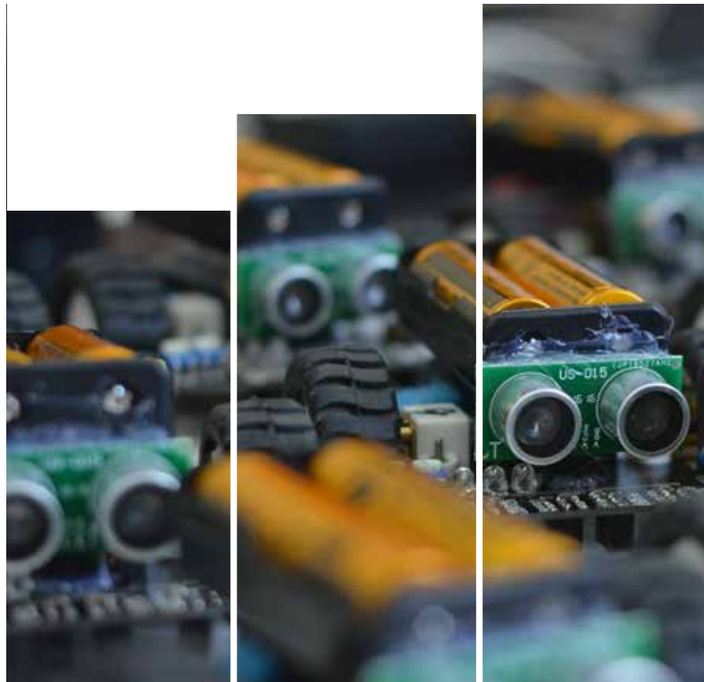
Clean Air In Cities
Fuel cell powered buses for clean public transport
Road traffic pollution is a major problem in many cities. One carbon free approach being tested in cities across Europe is a fleet of hydrogen fuel cell powered buses. They are just like normal buses but are powered by electricity generated using fuel cell technology developed by industry with EU support. These cells only need hydrogen and air and emit harmless water vapour.

Read more about how the EU's partnership with industry is putting zero emission buses on European streets: http://europa.eu/!JM38Rx

No Entry For Mosquitos
Saving children's lives in Africa
90% of all malaria deaths occur in Africa, mostly affecting very young children. Malaria infected mosquitoes usually enter houses through open air vents in the eaves, attracted by the scent of the occupants. An EU-funded project has developed a simple, inexpensive tubular ventilation device with an electrostatic 'sticky' mesh coated with insecticide. Local construction companies have already installed the device in more than 1,800 households in Tanzania with many more to follow.
Read more on how EU-funded research fights malaria: http://europa.eu/!VT84Cn

Never Ending Battery
EU funding made possible the development of a super battery
EU funding has helped an Estonian company produce an energy storage device called ultracapacitor, which is 100 times more powerful than an ordinary battery, and can withstand one million recharge cycles. Skeletons of ultracapacitors are based on graphene – a two dimensional form of carbon with remarkable properties. The company has raised €13 million to build a manufacturing facility in Germany capable of producing millions of these new ultracapacitators a year.
Read more about the SKLCarbonP2 project: http://europa.eu/!xD37bv

Smarten Up
EU-funded project has shown how to make smartphones even smarter
The way you hold your smartphone, how you swipe its screen, and even how you move when it's in your pocket says something very personal about you. An EU-funded project has demonstrated how sensor technology embedded in smartphones can add an extra layer of security to fingerprint readers, facial recognition software and iris scanners. The new feature will make mobile banking services even more secure.
Read more about the AMBER project: http://bit.ly/2zurFDR

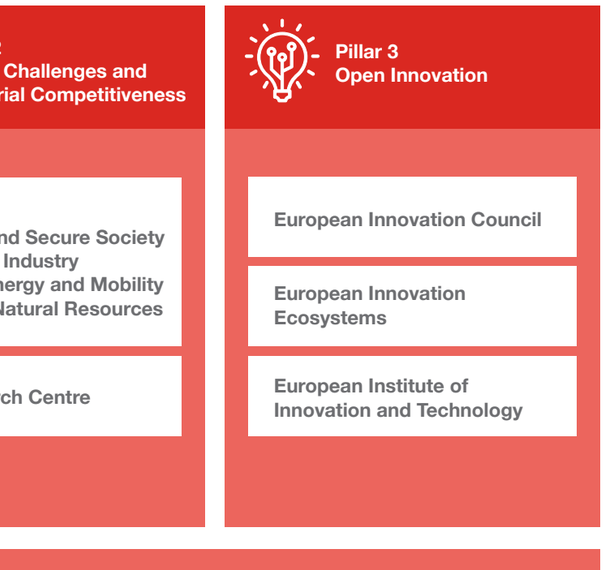


Horizon Europe (2021-2027)

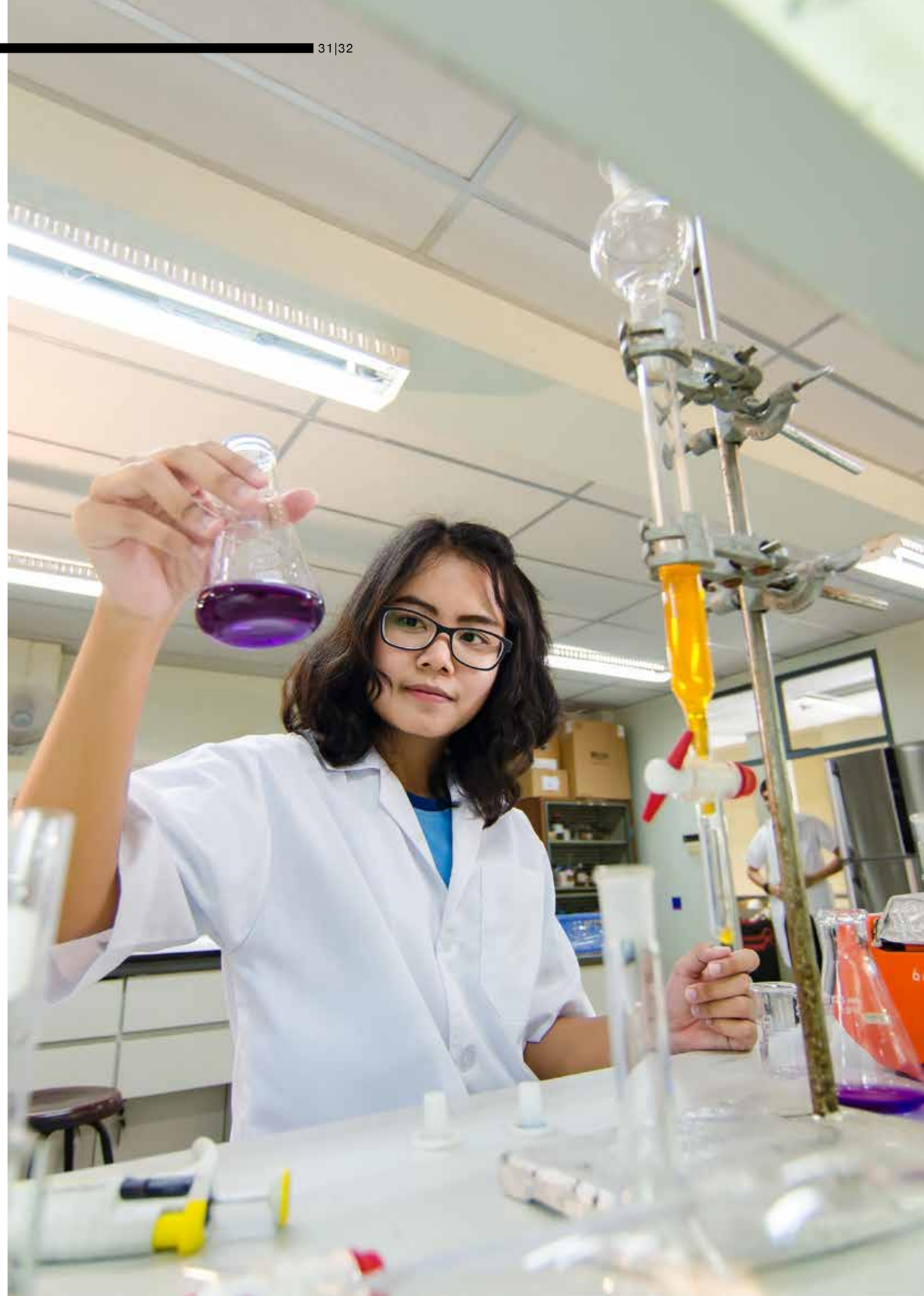
In June 2018, the European Commission proposed the next framework programme to succeed Horizon 2020, which will be called Horizon Europe (2021-2027) with an indicative budget of €100 billion.

On 17 April 2019, the European Parliament endorsed the provisional agreement reached by the co-legislators (European Parliament and Council) on Horizon Europe, which paved the way to advance with the implementation of the new programme. The proposed budget is still subject to further discussions, as part of the EU's overall budget negotiations for all policies and programmes at EU level for the period 2021-2027.

Horizon Europe will build on the achievements and success of the current programme Horizon 2020. It will strengthen EU science and technology, boost the EU's innovation performance, and improve the daily lives of people in Europe and beyond.



Proposed Structure for Horizon Europe
Image Credit: European Commission



Marie Skłodowska-Curie Actions

Driving innovation, cultivating excellence in doctoral and postdoctoral training

Marie Skłodowska-Curie Actions (MSCA) are part of Horizon 2020, the EU Framework Programme for Research and Innovation 2014-2020. With a budget of €6.16 billion for this period, MSCA will support 65,000 researchers in Europe and beyond, promoting collaboration between academic, scientific and business communities, boosting the careers of scientists and developing excellent doctoral programmes.

The Actions

Any research field may qualify for funding. The researcher and host institution decide.

1 Innovative Training networks (ITN):

Joint research training or doctoral programmes bring together universities, research institutes and other sectors from across the world to train researchers to doctorate level and develop excellent doctoral programmes.

2 Individual Fellowships (IF):

Fellowships for postdoc researchers of any nationality enabling them to move across borders within and outside Europe, sectors and disciplines.

3 Research and Innovation Staff Exchanges (RISE):

Short-term exchanges of personnel between universities, research institutes and other sectors throughout the world.

4 Co-funding of regional, national and international programmes (COFUND):

Provides organisations in Europe with financial support for their own doctoral, postdoctoral and career development programmes.

5 The European Researchers' Night (NIGHT):

Annual public event promoting research that takes place in September and attracts 1.5 million visitors in over 370 cities across Europe and beyond.

For researchers who want to:

> Undertake a research project in Europe through a doctorate or a postdoc programme, in an academic or other (e.g. business) setting;

> Spend their time at the leading labs in Europe or beyond;

> Be part of a well-established and prestigious European Union programme;

> Benefit from good working conditions.

For organisations to

> Build and strengthen strategic partnerships with leading research groups, universities and industry worldwide;

> Develop excellent doctoral programmes;

> Increase the number of researchers;

> Host and train leading and promising researchers at no cost.

India and the MSCA (2014-2019)

(statistics extracted on 17.06.2020)

Main collaborative links with UK, Germany, France, Italy, the Netherlands and Spain.

1,545 Indian researchers funded **31** % of whom are women

Top Indian participating organisations (number of participations)

#1 Jawaharlal Nehru University
#2 National Institute of Oceanography
#3 Indian Institute of Science
#4 Indian Institute of Technology Bombay
#5 Society for Promoting Participative Ecosystem Management

All in all, 23 Indian organisations involved in

12 Research and Innovation Staff Exchange
6 Innovative Training Networks
5 COFUND projects

Main scientific areas:

MSCA Researchers' voices

Dr Charuta Kulkarni

Dr Himanshu Jena

"The fellowship offers me time and resources to develop a high-impact, policy-oriented work for my home country and has provided immense opportunities to exchange knowledge and ideas with a variety of stakeholders – from scientists to policymakers – through open-access publications, conferences, public events."

Dr Charuta Kulkarni is an Indian citizen, with academic training in natural and social sciences across three continents. In 2018, she started as a MSCA Individual Fellow, hosted by two leading universities in her area of competence: The Open University (OU) in London (UK) and l'Institut des Sciences de l'Evolution de Montpellier (ISEM) in France. She did her PhD at the Earth and Environmental Sciences Programme at the City University of New York (US). As a broadly trained earth scientist, she is interested in examining India's age-old agroforestry landscapes in relation to monsoons and historic use of fires by people.

"I want to thank Marie Skłodowska-Curie fellowship for giving the independence and flexibility to work on my area of competence in an excellent scientific environment. The generous financial support helped me and my family to work hard while enjoying also Europe. Throughout my life I will remain obliged to MSCA. I encourage others to apply: it is so worth the effort."

Since January 2017, Dr Jena is working as an MCSA fellow at the Department of Chemistry, University of Ghent (Belgium). The focus of his research is on the development of smart materials for sustainable and green chemistry. He holds a PhD in chemistry from Indian Institute of Technology, Guwahati, India. He comes from a small village, Raisar, in the Kendrapara district of Odisha (India), belonging to a middle-class family, dependent on farming.

Funding Opportunities

Opening and closing dates of MSCA calls in 2020

1 Individual Fellowships (IF):

Opening date: 08 April 2020
Closing date: 09 September 2020
Budget: €324.00 million

On 8 April 2020, the MSCA Call for Individual Fellowships was launched and the deadline for applying is set on 9 September 2020 (17:00:00 Brussels time).

This call is open to postdoc researchers from all over the world, who have a doctoral degree or at least four years full-time research experience. Applicants have the choice to apply for a European Fellowship if they are moving within the EU or associated countries or if they are interested to come to the EU or an associated country from any other country in the world. Researchers based in the EU or associated countries can also apply for a Global Fellowship for a position outside Europe (thus in India).

MSCA Individual Fellowships offer favourable employment conditions, including the allowance to cover living, mobility and family costs, the possibility to work part-time and, for example, work on creating a startup or follow advanced studies in parallel.

For more information: http://ec.europa.eu/research/mariecurieactions/actions/individual-fellowships_en

More info: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cpart/h2020-hi-list-ac_en.pdf

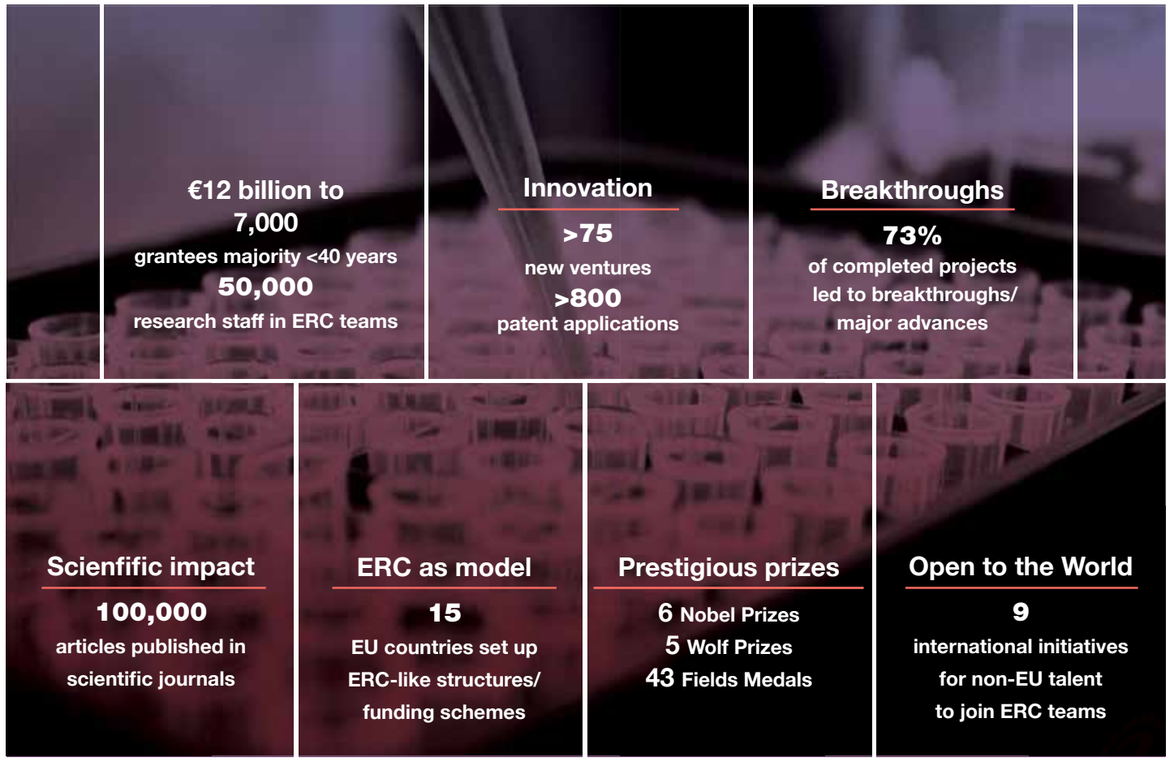
Marie Curie Alumni Association (MCAA)

The Indian Chapter is part of the MCAA and encourages local networking, recruits and attracts new members to the Association, and generally enhances the image of the MCAA within the pan-Indian region. Membership of the Indian Chapter is open to all MCAA members of Indian nationality, or who are currently residing in India. Membership is free of cost. The aim is to promote the interests of Marie Curie Fellows and Alumni in India.

- Chapter Chair: Dr Praveen Kumar
- Board Members: Dr Kiran Kumar Chereddy, Dr Amit Zodge, Dr Shikhar Agrawal, Ms Arthi Kizhedath and Dr Praveen Kumar
- Chapter Secretary: Dr Neelam
- More info: indian.chapter@mariecuriealumni.eu; mcaaindianchapter@gmail.com
- Webpage: https://www.mariecuriealumni.eu/groups/indian-chapter

Frontier Research: Grant from the European Research Council (ERC)

The European Research Council supports frontier research, cross disciplinary proposals and pioneering ideas in new and emerging fields which introduce unconventional and innovative approaches. The ERC's mission is to encourage the highest quality research in Europe through competitive funding and to support investigator-driven frontier research across all fields of research, on the basis of scientific excellence. ERC funds excellent young, early-career researchers, already independent researchers and senior research leaders. Researchers can be of any nationality and their projects can be in any field of research including social sciences and humanities.



ERC and India: Testimonials

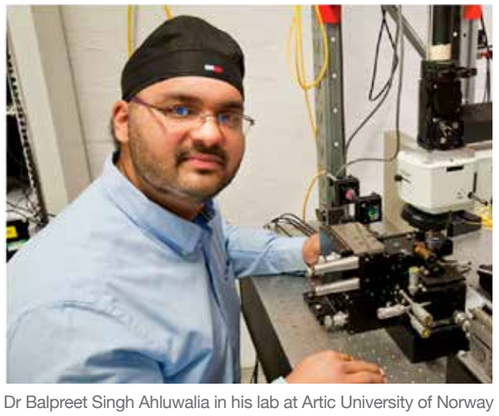
Dr Balpreet Singh Ahluwalia

Dr Balpreet Singh Ahluwalia is an Indian national born in the city of Varanasi based on the banks of the Ganga. Being raised in a city known for educational and spiritual values, his parents taught him the importance of education and hard work. After pursuing his undergraduate studies in India, he was offered a PhD scholarship at Nanyang Technological University, Singapore. In 2007, he moved to Europe to work at UiT –the Arctic University of Norway, as a post-doctoral research fellow. During his stay at UiT (2007-2013), he was involved in several mobility schemes as a visiting fellow at the University of Southampton, UK and the University of California, Davis, USA.

We asked him about his experience which he testified as follows:

In 2013, I obtained an ERC Starting Grant which allowed me to start my academic journey in 2014 at the crossroads of physics and biology. The funding I received from the ERC allowed me to establish a cross-disciplinary research team comprising of experts in nano-fabrication, integrated optics, instrumentation, computational nanoscopy and cell biology. Under my leadership, the team is developing novel optical microscopy technologies and translating their impact on biological and clinical applications in close collaboration with cell biologists and medical doctors.

The invention of super-resolution optical microscopy has enabled researchers to the visualise nanoscale bio-system inside a living cell. This invention was credited with the Nobel Prize in Chemistry in 2014. Although the invention of super-resolution microscopy is bound to change the field of life science and biology, its true impact is hindered due to the fact that present-day super-resolution optical microscopes are costly (€0.5-1 million) and complex.



Dr Balpreet Singh Ahluwalia in his lab at Artic University of Norway

With my ERC grant, I proposed to develop on-chip optical nanoscopy harnessing nanotechnology. The photonic-chip developed within my ERC project can be retrofitted with any standard microscope converting them into super-resolution microscopy. When mass-produced, such a photonic chip would cost a few euro only, enabling widespread penetration of this cutting-edge technology. Due to the high-impact of this EU funded research, two patent applications on chip-based nanoscopy were submitted. During my research work, I also published in high-impact journals. With a subsequent ERC grant called Proof of Concept, I am now able to test the exploitation values of the invention and commercialisation possibilities. A university spin-off is being created to facilitate the invention from the lab to the market, generating high-tech jobs.

I also acknowledge the support from the Norwegian Research Council that has helped me to apply the new imaging tools in different biological applications, with a strong focus on cancer and pathology.

The best thing about ERC is that it is ready to fund high-risk research of young people (and also of more established scientists) and make funding available irrespective of the nationality of the investigator. The funding is also generous, allowing to work in full freedom and for a long period (€1.5 million starting grant for 5 years). ERC brings also good international recognition.
I am pleased that more and more Indian nationals are getting ERC funding and encourage Indian investigators to apply. Europe is an excellent place to carry out research, a great place for raising kids and has exceptional work-family balance. ERC is one of the most successful funding programmes in the world, so it is worth a shot!

Dr James Mallinson

Dr James Mallinson received an ERC Consolidator Grant in October 2015, for his research on mapping Indian and Transnational Traditions of Physical Yoga through Philology and Ethnography- the Hatha Yoga Project (hyp.soas.ac.uk). We asked him about his views.

I heard about the ERC at its inception and as soon as I got my position as a lecturer in Sanskrit at SOAS University of London, I applied for an ERC Consolidator Grant. I was overjoyed to be successful: an ERC grant is the best way to enable the kind of large collaborative interdisciplinary project essential for ground breaking research. The Hatha Yoga Project started in October 2015 and will run until September 2020. Its aim is to chart the premodern history of physical yoga practice through textual and ethnographic sources: Sanskrit texts on yoga and interviews with traditional ascetic practitioners of yoga.

We are affiliated with the Ecole française d'Extrême Orient in Puducherry and have benefitted greatly from this relationship. A workshop in 2018 allowed reading some old texts and the input of the Ecole's pundits and other scholars was very useful in solving some of the texts' problems. Two colleagues are working there full-time: Viswanath Gupta who has been with us from the start and has been transcribing manuscripts in south Indian scripts, and Ramya Raja Gopal, who has been transcribing published texts on yoga, thereby creating a large searchable electronic archive of yoga texts which will be indispensable for scholars around the world.

Our findings so far are already rich: the earliest text on physical yoga was written by Buddhists; there is a clear development in yoga over the last thousand years from ascetic techniques of subduing the body to more wholesome methods of cultivating it; there are suggestions of precursors of modern postural sequences in the latest of the texts we are editing. We also, in a lucky break, discovered the oldest depictions of complex yoga postures, on an early 13th century gate in Gujarat.

We have published various articles in the course of the project and will be producing ten critical editions of Sanskrit texts, four monographs and a film as its primary outputs.

Postdoctoral researchers on the project, Dr Jason Birch and Dr Viswanath Gupta, reading a palm-leaf manuscript of a Sanskrit yoga text from the collection of the EFEO in Puducherry.

Are you the Next Indian ERC Grantee?

The ERC actions are open to researchers of any nationality who intend to conduct their research activity in Europe (EU Member State or Associated Country). Principal investigators may be of any age and nationality and may reside in any country in the world at the time of the application. ERC Principal Investigators do not have to be based full-time in Europe. This table provides information on the last ERC calls under Horizon 2020.

Call Identifier	Opening Date	Deadline
Proof of Concept Grant (ERC-2020-PoC)	14 May 2020	17 September 2020
ERC Advanced Grant (ERC-2020-AdG)	14 May 2020	26 August 2020

EC/ERC - SERB Implementing Agreement (IA)

On 6 October 2017, an Implementing Arrangement (IA) was signed between the European Commission and the Scientific Engineering Research Board (SERB) in New Delhi.

This IA facilitates the mobility of Indian researchers (Early Career Researchers, National Post-doctoral Fellows and Doctoral candidates) for short periods of time (up to one year) to join an ERC team in one of the leading universities and research institutes in Europe.

At the end of 2018, more than 250 ERC grantees expressed an interest in having their team reinforced by scientists from any country (about 11) with whom the ERC has concluded an IA. For India, the IA is implemented by SERB, which publishes on a regular basis the calls for proposals following ERC expressions of interest, on its website, allowing SERB grantees to join an ERC Team.

For more information: http://serb.gov.in/home.php

Then Ambassador of the European Union to India, Mr Tomasz Kozlowski, and the Secretary of Science and Engineering Research Board (SERB), Dr Rajiv Sharma, signing the Implementing Arrangement during the EU-India Summit in New Delhi on 6 October 2017.

EU Member States Cooperation with India

BELGIUM

Belgium is located at the heart of Europe and has a real international competitive research infrastructure driven by its universities and major research facilities. Belgium hosts 16 high-level universities of which 7 are listed in the Shanghai Academic Ranking. Spin-offs and incubators are set up nationwide. The business sector in Belgium is very active and committed to innovation through smart financing and Industry-Academia partnerships.

There's an active intergovernmental S&T cooperation agreement between India's **Department of Science & Technology (DST)** and the **Belgian Federal Science Policy Office (BELSPO)** who has 15 research networks, mostly on fundamental research, paving the way to institutional cooperation on R&D. The **Research Foundation - Flanders (FWO)** and the **Fund for Scientific Research (FNRS)** of Wallonia-Brussels, offer further opportunities for joint research and innovation programmes open to India as well as mobility of students and researchers.

Higher Education Opportunities in Flanders, can be found on the Study in Flanders website www.studyinflanders.be. Information on studying in Wallonia or Brussels can be found on Wallonia-Brussels Campus website www.studyinbelgium.be.

For more information: R&I opportunities in Wallonia and Brussels the Wallonia-Brussels Economic representation of the Belgian Embassy can be contacted by mail newdelhi@awex-wallonia.com. Other inquiries can be sent to NewDelhi@diplobel.fed.be.

CZECHIA

Cooperation in science, research and innovation is increasingly coming to the forefront of Czech-Indian economic and social relations. The year 2019 could even be called 'a golden year': the launching of a call for proposals for joint projects culminated in the adoption of a Programme of Scientific and Technological Cooperation between the Czechia and India.

Cooperation between Czechia and India is focused on Information and Communication Technologies, natural sciences and biotechnology, new materials and nanotechnology, medical sciences (including pharmaceutical sciences), food safety, and research on climate change, environment and energy. In addition, cooperation on innovation is also on the increase with Czech private companies investing in India. In January 2019, the technology centre of Škoda Auto India Pvt. Ltd in Pune was inaugurated by Czech Prime Minister Andrej Babiš during his visit to India.

In September 2018, President Ram Nath Kovind was at the International Laser Research Center near Prague, during his visit to Europe. Increased collaboration in research and science is also evident from the fact that Czechia offered India the chance to nominate an expert in the Czech International Advisory Council for Research, Development and Innovation.

For more information: Embassy of the Czech Republic in India can be contacted at Commerce_Delhi@mzv.cz

DENMARK

STI Collaboration: The strong ties between India and Denmark in science, technology and higher education was cemented in May 2018 with the signing of an agreement between the ministers for science, following which the first joint call of €4 million (`30 crore) in the areas of water and energy was launched.

Innovation: Innovation Centre Denmark is a government agency dedicated to collaboration for research institutions and companies in science, technology and innovation as well as higher education and skill development. It organises delegation visits and workshops and facilitates concrete projects like proof-of-concept and pilot and demonstration projects that involve Danish research institutions and companies. It also assists Danish companies in promoting themselves and their products, services and technologies through collaborative activities and matchmaking mainly in the pre-commercial phase and establishing consortia and identifying funding for Indo-Danish projects.

Innovation Centre Denmark is located in the Danish Embassy in Delhi and at the Danish General Consulate in Bengaluru.

For more information: Dr Jakob Williams Oerberg, Counsellor for Innovation, Research and Higher Education jakorb@um.dk or Web: www.indien.um.dk Twitter: @ICDKIndia @DenmarkinIndia. LinkedIn: @Innovation Centre Denmark- India Facebook: Embassy of Denmark in India
In 2007, India and Spain signed a Memorandum

GERMANY

Germany and India have been partners in education and research for decades. The German Ministry for Education and Research (BMBF) regularly announces calls for funding proposals for Indo-German research projects with its Indian partners, especially with DST, DBT, CSIR and ICMR. In addition, a joint funding platform has been established: the Indo-German Science and Technology Centre which funds application-oriented research projects and activities (www.igstc.org).

Germany's principal funding agency for fundamental research is the German Research Foundation (DFG). With its partner agencies – such as DST, DBT and INSA – DFG has conducted a number of joint funding activities. Examples of current activities: DBT and DFG are inviting Indo-German project proposals in the Life Sciences. (www.dfg.de/india).

India is one of the five countries worldwide where the German government has set up a German Centre for Research and Innovation (DWIH). Its objective is to promote the German research landscape in India, enhance research cooperation and strengthen ties between Indian and German academic and scientific communities (www.dwih.in).

For more information: Science Section at the German Embassy (wiss-1@newd.diplo.de, 011-44199141) or subscribe to our newsletter https://india.diplo.de/in-en/newsletter/bestellen-node

ESTONIA

Estonia is known for its dynamic E-Scene and is home to new and top-notch and disruptive technologies. Despite its small size, cooperation on science and technology with India is considerable and largely determined by the strengths and capacity of both sides in modern technologies such as IT, biotech, cleantech, AI and block chain. Cooperation takes place on an ad-hoc basis, which allows being flexible and enable engagement when both sides identify mutual interest.
Given Estonia's extensive expertise in ICT and startup ecosystems, Estonia has been a strong supporter of the EU-India collaboration on ICT standards and the EU-India Network of Incubators launched in October 2018 in Bengaluru. Linked to this event, Startup Estonia will host 14 Indian startups in Estonia aiming at developing joint research and collaboration leading to new products and solutions for the European and Asian markets.

Estonia has also actively participated in finding collaboration opportunities between the EU and India through the EU-funded project ScanBalt on innovative health. Estonia being a frontrunner in the area of genetic research and personal medicine offers great opportunities for cooperation with India.

For more information: www.newdelhi.vm.ee and www.facebook.com/EstonianEmbassyInNewDelhi

SPAIN

of Understanding for S&T which is the basis for implementing several R&D funding programmes with India (DST, DBT and GITA) aiming at promoting research mobility, academic and innovation-driven R&D collaborative projects and partnerships. Until the end of 2018, 43 joint projects have been funded, amounting to €3.6 million and 3 joint workshops held on ICT, Renewable Energy and Medical Research, respectively.

On innovation, Spain and India have jointly mobilized 36 projects between Spanish and Indian companies, with a budget of €31.6 million across sectors. In 2018, both sides showed renewed commitment to S&T by agreeing to a roadmap scaling up cooperation in areas of mutual interest such as astrophysics, renewable energy, oncology, biotechnology and nanotechnology.

Besides bilateral cooperation, Spain and India also leverage and anchor mobility and R&D cooperation at multilateral level under the EU's programme Horizon 2020. Spain, being the 3rd largest recipient of EU funding, after Germany and France, and particularly, being the 1st EU country by number of enterprises selected under the Horizon 2020 SME Instrument, is well placed to facilitate collaboration with Indian entities or host Indian researchers.

For more information: Adrián Gutiérrez, S&T Counsellor at the Embassy of Spain in New Delhi, India. E-mail: india@cdti.es

FRANCE

The most important tool to promote Indo-French cooperation on S&T is CEFIPRA/ IFCPAR (Indo-French Centre for the Promotion of Advanced Research). It is a collaborative platform for joint S&T programmes co-funded by the French Ministry for Europe and Foreign Affairs and DST in advanced areas of basic and applied science involving academia as well as companies. Successful partnerships have been established in several fields identified as priorities such as water, energies, health, biotechnologies, ICT, climate, environment and earth sciences.

India can also cooperate through the French leading institute 'National Centre for Scientific Research (CNRS) established in 1939, which is among the world's best research institutions. CNRS has a long standing and impactful cooperation with India. It has signed several framework agreements with DST, DBT and IITs, IISc, IISER and established two International Joint Laboratories in applied mathematics (Bengaluru) and computer science (Chennai).

Horizon 2020 is also a way to scale-up and enlarge bilateral to multilateral cooperation, notably on water and red biotechnology. Given CNRS scientific excellence, it is one of the most successful hosting institutes for ERC grantees. For more information contact: French Institute in India Delhi, Embassy of France (msi@ifindia.in) and CNRS, New Delhi (derci.newdelhi.office@cnrs.fr) and http://www.cnrs.fr/en/cnrs.

ITALY

Scientific and technological cooperation between Italy and India has recently been strengthened by a series of new initiatives including the opening of new funding schemes and the development of closer interactions in some strategic areas of mutual interest. The new initiatives are coordinated within an 'Indo-Italian Platform for Science and Innovation' and include a wide range of activities, such as co-financing of joint research projects, support for research mobility, creation of joint research centres, scholarship programmes, and grants for innovative SMEs and the organisation of joint workshops. Currently, the main areas of cooperation are: life sciences, energy, physics and astrophysics, geo-hazards and technologies for cultural heritage.

The new platform was announced by the two PMs - Conte and Modi at the Italy-India Technology Summit in October 2018 and will be fully operational from 2020 with the renewal of the Executive Program in S&T developed together with the Department of Science and Technology, Government of India.

Bilateral initiatives are complemented by multilateral research activities and joint efforts at the policy level such as sharing the coordination of Challenge 1 on Smart Grids within the Mission Innovation initiative. Italy, as an EU Member State, is also offering R&I opportunities with India through the EU's research and innovation programme Horizon 2020.

For more information: Embassy of Italy: newdelhi.scienza@esteri.it

HUNGARY

India and Hungary concluded a bilateral agreement on Science and Technology (S&T) in 1992, which is still the basis for cooperation today. In 2008, a Joint Strategic Research Fund was established, which grants joint research projects based on calls for proposals, and has allowed to engage together in projects resulting in new or improved market-oriented products and services on water, energy, ICT and biotechnology.

The Educational Exchange Programme 'Stipiendium Hungaricum', offers each year 200 scholarships for Indian students to study in Hungary and the Indian government offers 35 scholarships for Hungarian students to study in India. Memoranda of Understanding have also been concluded on Water Management and on Exchange Programmes among Science Academies. Indian scientists and innovators can also cooperate with Hungary through the EU programme Horizon 2020. A good illustration of this is the Horizon 2020 project 'SPRING' selected under the 2018 EU-India call on water, in which institutes from Hungary and other European countries, together with institutes from India (IIT Guwahati and Kharagpur), are working together to find innovative and simple solutions for treatment of polluted water.

For more information: Dr Hilda Farkas, Counsellor S&T at the Embassy of Hungary in India hilda. farkas@mfa.gov.hu, misson.del@mfa.gov.hu

LITHUANIA

In Lithuania support for R&D is a national priority. So much so that €679 million is being put into enhancement of R&D capacity over the period 2014-2020.

Research and Innovation is one of the areas where Lithuania-India cooperation is expanding significantly. Short and long-term mobility of researches both ways plays a big part – currently more than 1,000 students from India study in universities in Lithuania, most of them choosing science, engineering, medical and IT studies.

Partnership in Innovation is enhanced by promoting exchange between Lithuanian and Indian start-up ecosystems – Kaunas Science and Technology Park is an active member of the EU-India Network of Incubators. The second ever Lithuanian satellite was launched to space on a rocket from India, and the producing company NanoAvionics is now establishing its office in South India to expand collaboration in this sector.

India's Vice President Venkaiah Naidu during a historic high-level visit to Lithuania had a chance to get familiar with the research laboratories at the Ultrasound Research Institute and Materials Sciences Institute at the University's Santaka Valley – joint scientific projects with Indian universities and industry companies are on the way.

For more information: Embassy of Lithuania in New Delhi, e-mail: amb.in@mfa.lt.

NETHERLANDS

The Netherlands is known as the Gateway to Europe from the perspective of business, trade and investment, science and technology and innovation.

The Netherlands and the EU share a joint belief that scientific excellence and innovation are the key to help solving the grand societal challenges the world faces today. India is an important partner for the Netherlands in this respect. Relations between our two countries go back more than 400 years. We actively work with India through joint programmes. Cooperation takes place on the basis of public private partnerships and leverages key enabling technologies such as high-tech systems and IT to help drive innovative solutions mainly in the fields of water, health and agriculture. Bilateral calls with DST, DBT and MEITY, and through Horizon 2020 and the Eureka network, are some of the tools used to bring together the best entrepreneurial and scientific minds.

With Holland Innovation Network, representatives at the Netherlands Embassy in New Delhi and the consulates in Mumbai and Bengaluru, the team is ready to help you connect. The network of Netherlands Business Support Offices (Hyderabad, and Ahmedabad) and Honorary Consuls (Kolkata, Lucknow and Chennai) helps extending that presence.

For more information: https://www.netherlandsandyou.nl/your-country-and-the-netherlands/india or follow us on @NLinIndia

AUSTRIA

Cooperation between Austria and India on research and innovation was boosted with the signing of a Memorandum of Understanding (MoU) in December 2018 between the Austrian Federal Economic Chamber (WKO), the Austrian Institute of Technology (AIT) and the Indian Institute of Science (IISc) in Bengaluru.

The aim is to create awareness about the cooperation opportunities in research and innovation in Austria as well as in India and to facilitate the creation of active business relations between the Indian Institute of Sciences, the AIT and the Austrian companies represented by the WKO. Cooperation will take place on the basis of a 'Two Plus Two Model', in which not only two scientific institutions are engaged but also two companies from each side. The ultimate objective of such collaboration is to open doors for Austrian companies to the Indian market. Topics for cooperation include urban development, mobility as well as Artificial Intelligence and the Internet of Things.

For more information: Embassy of Austria to India in New Delhi www.advantageaustria.org/in or contact the Commercial Counsellor at the Austrian Embassy newdelhi@advantageaustria.org

POLAND

Since the intergovernmental agreement signed in 1993 between Poland and India, both sides are proactively strengthening the cooperation. This is particularly visible when looking at the numbers: while in 2013 there were less than 500 Indian students in Poland, in 2018 there were more than 3,700. Polish universities have more than 70 MoUs with Indian counterparts, the last two signed in February 2019 on the occasion of the Bengal Global Business Summit in Kolkata. Cooperation with India is also strong through the EU's programme Horizon 2020.

Missions of Polish universities in India take place on a regular basis. In March-April 2019 the National Agency for Academic Exchange (NAWA) attended the Eduexpos fair in Chennai, Mumbai, Bengaluru and Delhi. Poland is also strengthening the innovation dimension: every spring Warsaw hosts the Wolves Summit (https://poland.wolvessummit.com/) which allows for multinational networking of incubators and startups. Poland initiated a global completion called SMOGATHON (https://smogathon.com/), to combat air pollution. Since 2017, India is part of the competition and Indian startups have done very well in coming up with creative solutions.

For more information: Klaudiusz Tchorzewski (klaudiusz.tchorzewski@msz.gov.pl

PORTUGAL

Portugal and India have a strong track record on cooperation on science and technology. Since 1998, a large number of initiatives were jointly launched including training and mobility of researchers, co-publication of joint scientific articles, presentation of joint communications, participation in international fora and creating opportunities for participation of Indian entities in the EU's R&I framework programmes, notably on environment, health, transport, nanotechnology, space and energy.

At national level, the major areas of cooperation are: material sciences; natural sciences with a focus on marine sciences, resulting in more than 80 co-publications of scientific articles. Portugal and India cooperate also on innovation through exchange of startups and incubators.

Building upon that strong partnership, India was invited at Portugal's National Science Day 'Encontro Ciência', in Lisbon in July 2017, which in turn resulted in signing new agreements on Information Technology and Electronics and on Higher Education and Science Research, between the Portuguese Foundation for Science and Technology and the Indian Institutes of Technology of Gandhinagar, Madras and Roorkee.

For more information: Head of Division for International Cooperation, Fundação para a Ciência e a Tecnologia; tiago.saborida@fct.pt or Project Office India Cooperation, Fundação para a Ciência e a Tecnologia; olga.dias@fct.pt

FINLAND

Finland and India have a close relationship with an increasing number of collaborations on R&D, innovation and startups. Exploring new partnerships and joint innovations in the field of artificial intelligence, Internet of Things, cybersecurity and energy, as well as in the more traditional industry sectors is a key component of Finland – India cooperation.

The framework for Indo-Finnish R&I cooperation is vast with a number of Memoranda of Understanding (MoU) bringing Finnish and Indian researchers, innovators, private sector actors and authorities together. Collaboration is established also between a numer Indian Institutes of Technology and Finnish Universities; between Finland and the State of Karnataka in the field of innovation, and between Finnish and Indian Meteorological Institutes and TERI India in climate change and air quality research.

A Finnish programme 'Talent Boost', was introduced in India at the Bengaluru Tech Summit in November 2018. This programme targets highly skilled tech experts, especially software developers, to work in companies in Finland, as well as startup entrepreneurs. In recent years, the Indo-Finnish startup collaboration has seen a boost, as demonstrated at SLUSH, the world's leading startup event organized annually in Helsinki.

For more information: Embassy of Finland in New Delhi: nde.sanomat@formin.fi or Business Finland India Office: newdelhi@businessfinland.fi

SWEDEN

In 2005, a Memorandum of Understanding (MoU) on Science and Technology was signed between Sweden and India and since then the Sweden-India research and innovation partnership has gone from strength to strength. The high-level diplomatic visits in 2018 have boosted further interest in bilateral collaboration between the two countries.

The Swedish Research Council (VR) funds joint network grants with the Indian Department of Science and Technology (DST). The Swedish Research Council for Health, Working Life and Welfare – FORTE - funds joint research programmes with Indian Council of Medical Research (ICMR). Sweden's Innovation agency VINNOVA funds research programmes with Department of Science and Technology (DST) and Department of Biotechnology (DBT).
During Prime Minister Narendra Modi's visit to Sweden in 2018, the governments of Sweden and India signed a Joint Declaration on Sweden-India Innovation Partnership for a Sustainable Future. The partnership sets the framework for future cooperation to jointly tackle societal challenges including innovation driven challenges on cross sectoral issues with multi-stakeholder participation from both countries.

In 2019, DST and VINNOVA launched the India-Sweden Collaborative Industrial R&D programme to bring together innovators from both countries for the joint development of innovative products/processes in the areas of (i) Smart Cities and Clean Technologies; (ii) Digitalization and Internet of Things (IoT).

For more information: Fanny von Heland, Counsellor at Embassy of Sweden: fanny.von.heland@regeringskansliet

Associated Countries with Horizon 2020

NORWAY

India is one of Norway's priority countries for collaboration on Research and Innovation (R&I). The Research Council of Norway (RCN) has a dedicated programme with India called 'INDNOR' and international cooperation is encouraged in all national R&I programmes and calls. Innovation Norway assists and funds Norwegian companies in collaboration with India.

Already back in 2006, Norway and India had established a Programme of Cooperation and since then the RCN has financed several R&I projects with the DST, ICMR and the MoES on energy, polar, climate & environment, bioeconomy, anti-microbial resistance, ICT and nanotechnology, and advanced materials. DBT and the ICSSR are partners through multilateral collaboration on bioeconomy and social sciences, respectively. Up to end of 2018, about 100 joint projects had been started. Several student exchanges have been implemented. In December 2018, Norway published a new strategy "India-Norway 2030", with the priority areas: Democracy and rule-based order, Oceans, Energy, Climate & Environment and Research, Education and Health. The 'Panorama Strategy (2016-2020)' also foresees cooperation on education and research with India.

Norway is associated to the EU's R&I framework programme Horizon 2020 (2014-2020), which offers additional opportunities for India to cooperate with Norwegian entities or develop a research career with a MSCA in a Norwegian university.

For more information: Dr. Maan Singh Sidhu, Science and Technology Counsellor, Royal Norwegian Embassy, Commercial Section Innovation Norway. https://www.innovasjonnorge.no/no/verktoy/eksport-og-internasjonal-satsing/regionkart/?map=no_73299&map_overlay=no_285384

SWITZERLAND

Switzerland and India signed an agreement on S&T in 2003, and in 2012 an MoU on social sciences. Up to 2018, Switzerland invested about CHF20 million (`140 crore) matched by the Indian government. All fields of research are funded.

Since 2017, the Zurich University of Applied Sciences (ZHAW) is the Leading House for South Asia in Switzerland. The ZHAW is mandated to promote and foster scientific cooperation with institutions in India during the period 2017-2020.

In 2011, swissnex India was established in Bengaluru. It facilitates collaboration between Swiss and Indian institutions of higher education and research and acts as an information hub on science, innovation and education in India and Switzerland. swissnex India also brings exciting projects combining science and arts.

India is a priority country for the Swiss Government Excellence Scholarships: in the last ten years, 169 scholarships have been awarded to Indian applicants, to pursue post graduate research in Switzerland. Switzerland is also becoming an important destination for Indian students: from 2005 to 2018, the number of registered Indian students in Swiss public universities increased from 268 to 1071.

Swiss and Indian researchers also cooperate through the EU's programme Horizon 2020.

For more information: www.swissnexindia.org https://www.eda.admin.ch/countries/india/en/home/switzerland-and/science-technology-funding.html

euraxess
RESEARCHERS IN MOTION

EURAXESS India

EURAXESS Worldwide is a component of 'EURAXESS - Researchers in Motion', an initiative of the European Research Area (ERA) strategy that addresses barriers to the mobility of researchers and seeks to enhance scientific collaboration between Europe and the world. It is funded by the European Commission and has the support of 40 European countries.

EURAXESS India is a networking and information initiative that supports researcher mobility and career development, with the goal of enhancing scientific collaboration between Europe and India. The multidisciplinary network involves researchers at all stages of their careers seeking collaboration in India or mobility and job opportunities in Europe.

EURAXESS India services and events

EURAXESS India offers free information and several yearly information events on research funding, research careers and collaboration opportunities. Members of the EURAXESS network receive regular newsletters and flash notes regarding research opportunities in Europe. The annual EURAXESS Science Slam India competition is open to all fields of research including Social Sciences and Humanities, Life Sciences and Engineering and promotes science communication by emphasising that science can be fun. The winners get a trip to their favourite research destination in Europe.

For more information: www.India.euraxess.org and register for free; join worldwide group on LinkedIn (linkedin.euraxess) or contact: Dr Samrat S. Kumar l Country Representative: india@euraxess.net

Dr Samrat Kumar, Country Representative, Jennifer Reckwell, Programme Officer, Euraxess India, giving the Science Slam 2018 Prize to Prabahan Chakraborty, graduate student from NCBS, Tata Institute of Fundamental Research Bengaluru

Websites of European Union Member States Relevant to R&I Cooperation with India

EU Delegation to India	http://eeas.europa.eu/delegations/india/eu_india/research_innovation
DG RTD's related page	http://ec.europa.eu/research/iscp/index.cfm?pg=india
Horizon 2020	https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/programmes/h2020
MSCA	http://ec.europa.eu/research/mariecurieactions/
European Research Council	https://erc.europa.eu/
EURAXESS India	https://euraxess.ec.europa.eu/worldwide/india

EU Member States

Austria	http://www.bmeia.gv.at/
Belgium	http://www.diplomatie.be/newdelhi/
Bulgaria	http://www.bulgariaembindia.com/
Croatia	http://www.mvep.hr/en/diplomatic-directory/diplomatic-missions-and-consular-offices-of-croatia/india-new-delhi,143.html
Cyprus	http://www.mfa.gov.cy/mfa/highcom/highcom_newdelhi.nsf/index_en/index_en?opendocument
Czechia	http://www.mzv.cz/newdelhi/
Denmark	http://indien.um.dk/
Estonia	https://newdelhi.mfa.ee/
Finland	http://www.finland.org.in/
France	http://ambafrance-in.org/
Germany	http://www.india.diplo.de/science
Greece	https://www.mfa.gr/missionsabroad/en/india.html
Hungary	https://delhi.mfa.gov.hu/eng
Ireland	http://www.irelandinindia.com/
Italy	https://ambnewdelhi.esteri.it/ambasciata_newdelhi/en/
Lithuania	https://in.mfa.lt/in/en/
Luxembourg	http://newdelhi.mae.lu/en
Malta	https://foreignaffairs.gov.mt/en/Embassies/Hc_New_Delhi/Pages/HC_New_Delhi.aspx
Netherlands	https://www.netherlandsandyou.nl/your-country-and-the-netherlands/india
Poland	https://newdelhi.mfa.gov.pl/en/embassy/
Portugal	https://www.novadeli.embaixadaportugal.mne.pt/en/
Romania	http://newdelhi.mae.ro/
Slovakia	https://www.mzv.sk/web/dilli-en
Slovenia	http://www.newdelhi.embassy.si/en
Spain	http://www.exteriores.gob.es/Embajadas/NUEVADELHI/en/Pages/inicio.aspx
Sweden	https://www.swedenabroad.se/en/embassies/india-new-delhi/

Countries Associated to HORIZON 2020

Norway, Albania, Bosnia and Herzegovina, Republic of Macedonia, Montenegro, Serbia, Turkey, Israel, Moldova, Switzerland, Faroe Islands, Ukraine, Tunisia, Georgia, Armenia

Norway	https://www.norway.no/en/india
Switzerland	http://www.swissnexindia.org/

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