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Department of Biotechnology, Government of India
&
Innovate UK

COMPETITION/CALL FOR PROPOSALS

India- UK industrial waste challenge 2017

A bilateral framework providing financial support for Indian and UK Organisations

Department of Biotechnology (DBT), Government of India, Innovate UK and Research Councils (the Biotechnology and Biological Sciences Research Council (BBSRC) and the Engineering and Physical Sciences Research Council (EPSRC))

June 2017

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Indian organisations can apply for funding to DBT to work with UK partners on biotechnology solutions for industrial waste challenges in India.

- **Competition opens:** Tuesday 20 June 2017
- **Registration closes:** Wednesday 11 October 2017 12:00pm

Description

Department of Biotechnology, Government of India is investing with matching resources with Innovate UK and Research Councils, the Biotechnology and Biological Sciences Research Council (BBSRC) and the Engineering and Physical Sciences Research Council (EPSRC) in projects that use cutting-edge solutions to reduce industrial waste in India.

The aim of this competition is to encourage partnerships between the India and UK. Department of Biotechnology, Government of India and Innovate UK, the Research Councils are funding this competition as part of the Newton Bhabha Fund.

Projects should address reducing industrial waste and pollution, and improve value recovery from waste using biotechnology in one or more of these 5 sectors:

- leather/tanning/textiles
- municipal solid waste
- paper and pulp
- sewage
- sugar cane

The total project grant will not exceed £2 million per project for UK partners. Match funding will be made available for Indian project partners by the Department of Biotechnology, Government of India. Projects should last between 30 months and 3 years.

Projects must include one UK business and one UK higher education institution or research council institute eligible for BBSRC/EPSRC funding. You also need to partner with one Indian academic institution or research organisation. Preference will be given to project consortia that also include an Indian business partner or an Indian urban or other local government body, who would be the end user of the proposed solution.

Additional UK and Indian businesses, research and academic partners are allowed. Either a business or a research organisation (including but not limited to UK higher education institutions or research council institutes) can lead the project in the UK. Only Indian academic institutions or research organisations can lead the project in India.

Funding type
Grant

Project size
Total project grant will not exceed £2 million per project.

Eligibility
To apply to this Newton Fund call, your project consortium must include, as a minimum:

- a UK-based business
- a UK higher education institution or research council institute eligible for BBSRC/EPSRC funding
- a Government of India supported or recognised academic institution or research organisation

Preference will be given to project consortia that also contain an Indian business partner or an Indian urban or other local government body who would be the end user of the solution, for example in municipal solid waste or sewage, although this is not mandatory.

The project must show how it meets the scope of this competition, including:

- that India is the primary target market for the project
- how it fits within official development assistance (ODA) criteria

The project consortium must be led by:

- either a business or a research organisation in the UK
- an academic institution or research organisation in India

You can also invite other types of organisations to join your project in the UK and in India. Please see the general guidance for applicants for further information.

Projects that we won't fund
Projects that only seek to further research objectives will not be funded. Projects must focus on translating research and/or knowledge, and must show a clear route to commercialisation.
Also out of scope are projects that:

- do not meet ODA eligibility requirements
- do not target one of the 5 sectors in India
- only focus on waste treatment or value recovery, rather than both treatment and recovery of wastes and their conversion to high-value products
- focus only on the recovery of energy from waste
- focus primarily on physicochemical solutions
- have negative environmental and social impacts

Funding and project details

Innovate UK, the UK's Research Councils and the Government of India's Department of Biotechnology (DBT) are funding this competition as part of the UK–India Newton Bhabha Fund.

In the UK, Innovate UK and the Research Councils have allocated up to £8 million to fund projects in this competition. India's DBT has allocated matched project funds. Innovate UK and the Research Councils will fund the UK project partners, and DBT will fund the Indian project partners.

Project costs

In the UK, the proportion of total eligible project costs is dependent on the type of applicant:

- UK-based businesses' total eligible project costs must be 50% or higher
- research organisations (including higher education institutes and research council institutes), public sector organisations and charities (undertaking non-economic activity) can together claim up to 50% of total eligible project costs

In India, DBT will:

- **support 100% of the academic partners budgeted costs**
- **support 50% of the industry partners budgeted costs to a maximum of INR 15 million (INR 1.50 crores). Matched funding must come from the industry**

Project types

Projects must focus on industrial research. Work packages that include elements of experimental development will be considered within projects that predominantly target industrial research. Those work packages that are primarily experimental development will receive the appropriate grant percentage.

For industrial research, you could get:

- up to 70% of your eligible project costs if you are a small business
- up to 60% if you are a medium-sized business
- up to 50% if you are a large business
- up to 80% of full economic costs if you are a higher education institute/research council institute
- up to 100% of eligible costs if you are another type of research organisation undertaking non-economic activity

For experimental development work packages, you could get:

- up to 45% of your eligible project costs if you are a small business
- up to 35% if you are a medium-sized business

- up to 25% if you are a large business
- up to 80% of full economic costs if you are a higher education institute/Research Council Institute
- up to 100% of eligible costs if you are another type of research organisation undertaking non-economic activity

Find out if your business fits the EU definition of a small and medium-sized enterprise (SME). Read full details of the funding rules for universities and other research organisations.

Details of eligible UK academic project costs can be found under section 5 of the BBSRC Grants Guide.

We expect projects to last between 30 months and 3 years. The total project grant will not exceed £2 million per project in the UK. Information on funding for project partners from India is included in the competition guidance for applicants.

Scope:
The aim of this competition is to fund collaborative biotechnology solutions that address one or more of India's industrial waste challenges in the following sectors:

- leather/tanning/textiles
- municipal solid waste
- paper and pulp
- sewage
- sugar cane

These industrial sectors have been selected as a competition focus because their processes have a negative impact on India's environment and ecology (particularly India's water resources). However, these sectors contribute greatly to India's economy. They also employ a significant percentage of India's population, including people who are economically weaker and marginalised.

Specific challenges for each sector are outlined below. For more detail, see the tab on supporting information.

The Government of India regulates environmental control of pollutants from industrial waste, such as heavy metals and persistent organic pollutants. The Government also finances common effluent treatment plants to help industry compliance. However, there are business challenges to meeting those controls. Also, many companies are not able to capitalise on the value recovery opportunity that their waste streams present.

Preference will be given to project consortia that include an Indian business or Indian urban or other local government body, who would be the end user of the proposed biotechnology solution. We are keen to see proposals that develop and operate pilots or prototypes to demonstrate the developed technology, but these should not operate commercially or generate revenue during the project.

A project should bring together a consortium of eligible UK and Indian partners to put forward biotechnology-driven solutions for waste treatment and value recovery in the identified sectors in India. Physicochemical processes are not excluded, however, the solution must predominantly focus on biotechnology.
We are looking for solutions that primarily focus on developing and applying biotechnological processes that:

- are lower cost but at least as effective as those already available to the Indian market, or at least as effective but not yet available to the Indian market at a cost-effective scale
- add value through the recovery of valuable chemicals or high-value products

Projects and their outcomes must fit with the official development assistance (ODA) criteria. This aims to boost economic development and have a positive social or environmental effect on the wider Indian society.

Challenge 1: leather/tanning/textiles
The chemical processes used in the leather, tanning and textiles industries result in waste water that, unless adequately treated, will have a negative impact on local ecology, health and agricultural production.

There is an opportunity to show how waste water and other waste treatment can be improved by applying innovative biotechnology-driven processes. Valuable materials that may be recovered or manufactured from wastes using novel processes include:

- biofuels such as liquid and/or gaseous fuels
- bulk and platform chemicals such as sugars and glycerol
- high-value products such as chromium, keratin, collagen, dyes, gelatine, fertilisers, metals and food additives
- other materials such as water, proteins for animal feed and short-fibre paper

We are particularly interested in biotechnological solutions that:

- reduce or remove heavy metals, organic dye and protein particles from waste water
- recover higher-value products such as chromium (and other metals) or compounds for further manufacturing

Challenge 2: municipal solid waste

Applicants are invited to put forward commercially viable and scalable innovations to meet India's significant waste management challenges. Proposals should include:

- new cost-effective, biotechnology-driven processes to recover, separate or extract valuable components from urban household or commercial waste
- developing new biotechnologies for community-owned recycling schemes based on a viable 'circular economy' model
- innovative and rapid processes of waste disposal

Valuable materials that may be recovered or manufactured from wastes include:

- biofuels such as liquid, gaseous and solid fuels
- bulk and platform chemicals such as fats and oils, volatile fatty acids and glycerol
- high-value products such as fibre products, organic acids, metals, plastics, chitin/chitosan and bio-fertiliser
- other materials such as animal fodder, novel microbes, compost/fertiliser and construction materials made from recycled glass and cement

Challenge 3: paper and pulp

Pulping and paper-making generates wastes including:

- resins, fatty acids, adsorbable organic halides (AOX), volatile organic compounds (VOCs), lignin and derivatives, air pollutants and coloured effluents generated during the digestion and cooking process
- organic chlorides (dioxins, furan derivatives, chlorophenols), inorganic chlorides, polychlorinated biphenyls (PCBs), VOCs, dissolved lignin and coloured effluent generated during bleaching

Waste management and treatment across the industry varies. There is a need for more efficient water treatment and biological techniques and better use of integrated technologies (bio and physicochemical treatment).

Valuable materials that may be recovered or manufactured from paper and pulp wastes include:

- biofuels such as liquid, gaseous and solid fuels
- bulk and platform chemicals such as sulphite, sulphinated lignin, tannins, waxes, benzene, toluene, xylene, lignin and volatile fatty acids
- high-value products such as surfactants and nanoparticles including metals and plastics
- other materials such as water, minerals, sludge for building materials, food packaging and volatile fatty acids

We are particularly interested in biotechnological solutions that focus on reducing or removing lignocellulosic biomass, heavy metal ions bleaching agents and sulphites from waste water.

Challenge 4: sewage

An important challenge for India is to provide reliable, sustainable, affordable sewage treatment plants at an appropriate scale to treat waste water and reuse treated water, resources or nutrients. Valuable materials that may be recovered or manufactured from sewage include:

- biofuels such as liquid, gaseous and solid fuels
- bulk and platform chemicals such as methane, nitrogen, phosphorous, biosurfactants, glycerol and sulphur
- high-value products such as creatine, products from urine, phosphates, metals, paint ingredients and biofertiliser
- other materials such as water, biofertiliser and hydrogen sulphide

We are particularly interested in biotechnological solutions that focus on processing sewage to:

- reduce waste water contamination
- use residues to manufacture chemicals and fuels

Challenge 5: sugar cane

Sugar cane processing generates:

- large quantities of biomass waste, primarily bagasse and cane trash
- press mud which is discarded as solid waste from sugar mills
- waste water

Valuable materials that may be recovered or manufactured from sugar cane waste include:

- water
- biofuels such as liquid, gaseous and solid fuels
- bulk and platform chemicals such as ethanol, methanol, wax, volatile fatty acids, glycerol, cellulose and acrylates
- high-value products such as various chemicals, biosurfactants, vanillin, glucose, chitin, animal/insect feed, oligosaccharides, nanocellulose, lignin-based farnesene and food additives
- other material such as biofibre, biochar, biofertiliser, paper and food packaging

We are particularly interested in biotechnological solutions that focus on reducing or removing lignocellulosic biomass from waste water and its recovery for use in manufacturing high-value products.

Important dates:

20 June 2017	**Competition opens**
12 July 2017	Briefing event and partnering workshop
11 October 2017 12:00pm	Registration closes
18 October 2017 12:00pm	Competition closes

How to apply

To apply in the UK:

- each project consortium should nominate a UK project lead to act as lead applicant and register for the competition
- the lead applicant must register online
- read the guidance for applicants for this competition
- attend the briefing event for potential applicants
- complete and upload your online application on our secure server

Each project consortium will also be required to submit their application form to DBT in India. For more details on this process, see the guidance for applicants document.

We will not accept late submissions. Your application to Innovate UK is confidential.

A panel of independent experts from the UK and India will assess your application. We will choose the best applications from those that meet the aims of this competition. We will then select the projects that we fund, to build a portfolio of projects as described in the general guidance for applicants. Please read this general guidance carefully before you apply. It will help your chances of submitting a high-quality application.

Background and further information

About the target industrial sectors in India

India has experienced decades of intense growth resulting in densely populated areas and large-scale industrialisation. The industrial sectors targeted in this competition are some of the largest in India. While their processes can have a negative impact on India's environment and ecology, they are major employers, often of economically weaker and marginalised communities.

The leather, tanning and textile industries are prioritised under the Government of India's flagship 'Make in India' initiative, with high growth anticipated over the next five years. India produces 13% of the world's leather hides/skins, is the world's second-largest producer of footwear and leather garments, with the second-highest textile manufacturing capacity. Textiles represent 14% of India's industrial production and constitute 15% of the country's export earnings.

The leather industry employs almost 2.5 million people. The textiles industry is the second-largest employer in India. In 2015 to 2016, the industry employed nearly 51 million people directly and 68 million people indirectly.

Indian cities need new solutions to reduce landfill waste and incineration of municipal solid waste. Every year India generates 62 million tonnes and collects 43 million tonnes of waste. Of the amount collected, 72% is landfilled, and the balance undergoes some form of treatment. Solutions that reduce landfill and increase value recovery have an important social, economic and environmental role to play in India's urban areas.

India's pulp and paper industry has 500 paper mills producing 14 million tonnes annually. This is estimated to increase to 20 million tonnes a year by 2020.

Only around 30% of India's sewage is treated. Untreated sewage from urban areas is one of the largest sources of surface water pollution and groundwater contamination in the country. The Government of India recognises the urgency of the impact on health, the environment and the economy.

The centralised sewage treatment plants in the country have failed to achieve the prescribed effluent discharge standards, for various reasons. However, some experts in the sector do not consider centralised sewage systems to be a viable solution.
In 2015, India was the second-largest world producer of sugar cane. The sugar cane industry is the second-largest agro-based industry in the country and supports approximately 60 million farmers and their families.

Joint competition funding partners
Innovate UK helps translate the UK's innovation expertise into business solutions in emerging economies. We enable collaborative solutions to global socio-economic challenges. We do this by supporting companies and research organisations from the UK to establish global partnerships and exchange knowledge with organisations in some of the most dynamic markets in the world. The size, diversity and potential of India's markets present significant opportunities for innovative UK businesses and research organisations.
For this reason, Innovate UK, the UK Research Councils and the Government of India's DBT are jointly funding this competition. We are running it as part of the UK–India Newton Bhabha Fund. The Department for Business, Energy and Industrial Strategy leads the Newton Fund in the UK.

About the Newton Fund
The Newton Fund was established in 2014 and will operate to at least 2021. The Newton Fund forms part of the UK government's ODA commitment. The Fund uses science and innovation partnerships to improve the economic development and social welfare of 16 partner countries, including India. There is a total of £735 million funding available from the UK government for the Fund's duration to 2021. Partner countries contribute extra matched funding.

Further help and information
Innovate UK and the Knowledge Transfer Network are holding an optional briefing and partnering workshop on 12 July 2017 in York.
If you want help to find a project partner, contact the Knowledge Transfer Network.
If you need more information, contact the competition helpline on 0300 321 4357 or email us at support@innovateuk.gov.uk

Queries from Indian organisations can be sent to the Department of Biotechnology's Dr. Shailja Gupta (shailja.dbt@nic.in) and Dr. Sanjay Kalia (sanjay.kalia@nic.in).

- **Hard copies of the joint proposal (Three in number) must be sent to:**
  Dr. Sanjay Kalia, Scientist-D, Room No. 814, 8th Floor, block-2, CGO Complex, Lodhi Road, New Delhi-110003, India.