

UNLOCK THE POTENTIAL OF INDIA: PART 2



A BRIGHT FUTURE

India's ambitious net zero targets create opportunities for innovators and changemakers.

ROADMAP TO NET ZERO

India has announced policies and collaborations to achieve its targets.

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CATAPULT GIVES ③ UK COMPANIES A HELPING HAND

Enabling businesses to uncover immense opportunities.

PLANES, TRAINS, AND AUTOMOBILES

Transport is a major climate change contributor. Aviation, railways, and the auto sectors are working hard to reduce their footprints.



FRUGAL ENGINEERING

TWI showcases its low-carbon technologies in India.

SUSTAINABLE AGRICULTURE

By using digital solutions, India manages the delicate balance between economic development, food, security, rural employment, and emissions reduction.

RENEWABLES SETS RECORD

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Ayana Renewable Power is the fastest growing UK company in India.

SUN AND SALT

abundant resources

Faradion taps abundant resources for sodium-ion batteries.



FUNDING THE FUTURE

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HSBC is matching investments with innovations.

JOIN THE JOURNEY

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India's spirit of innovation is infectious. The key to success lies in spotting the right opportunities.

FOREWORD

India is moving forward in its mission to achieve net zero by 2070. It is reducing its greenhouse gas emissions, improving air quality, and enhancing its renewable energy capacity. All this is happening at a phenomenal pace. At the same time, India's GDP is growing faster than any major economy in recent years, and growth is projected to continue into the next decade and beyond.

A cornerstone of India's development strategy is a determined shift to manufacturing, under the 'Make in India' initiative. The country is growing its manufacturing output and energy usage, while concurrently making it cleaner and more efficient.

Manufacturing is, traditionally, a major cause of carbon emissions. In India, there is powerful policy support to use innovation and technology to transform the way things are made, to reduce the impact of the process, and to deliver solutions that are less

harmful to the environment. This is happening across all areas of industry — from traditional activities such as agriculture to aviation, automotive and energy storage. No part of the massive Indian economy, now the world's fifth largest, is unaffected.

In this UK India Business Council report, we highlight examples of how Indian and UK businesses are collaborating in a host of industries.

And yet, there are many more UK businesses that are still to enter the Indian market. This report aims to show these manufacturers that India is a place where businesses can flourish in a fast-growing economy with robust demand for advanced technologies.

Kevin McCole

Managing Director, UK India Business Council





INDIA SETS OUT ITS NET ZERO STALL

Decarbonisation is high on the agenda of the Indian government.

India is currently the third largest emitter of CO2 in the world. It is heavily reliant on coal which currently accounts for more than 70 per cent of the country's energy production. But it is changing rapidly, and its scale, huge population, rapid economic growth, and mass urbanisation means that what happens in India matters both at home and to the rest of the world.

One of the big stories of 2021's COP 26 was India's commitment to achieve net zero by 2070. This was one of a set of five **Amrit Tatvas** (nectar elements), announced by the Indian Prime Minister Modi in Glasgow. The other four are shorter term goals. By 2030, India will: raise its non-fossil fuel energy capacity to 500 GW (from its current capacity of just over 100 GW); meet 50 per cent of its energy

requirements using renewable energy; reduce the total projected carbon emission by one billion tonnes; and reduce carbon intensity of the economy to less than 45 per cent from the 2005 level.

India's statement and intent were broadly welcomed. They are based on several initiatives announced by the ruling BJP government in recent years to pool global resources and find solutions that transcend national boundaries.

The International Solar Alliance (ISA) was launched in 2018 as a joint venture between India and France, with a mission to deploy solar technologies. It has expanded to include a wide range of partners, including the UK, the European Union, World Bank, and Asian Development Bank, and now has 89 countries officially signed and ratified as members. At COP26, the UK government added impetus to



the project with the Green Grids Initiative - One Sun One World One Grid (GGI-OSOWOG), a partnership focused on strengthening global support for green power infrastructure. At the launch, PM Modi said, "One Sun, One World and One Grid will not only reduce storage needs, but also enhance the viability of solar projects. This creative initiative will not only reduce the carbon footprint and energy cost, but also open a new avenue for cooperation between different countries and regions." The Solar Energy Corporation of India (SECI) leads the solar initiative on the ground.

The Coalition for Disaster Resilient Infrastructure (CDRI) was unveiled by PM Modi in 2019. It promotes the development of resilient infrastructure to respond to the United Nations' Sustainable Development Goals' imperatives of expanding universal access to basic services, enabling prosperity and decent work. Another key joint UK-India announcement at COP26 was further support for small island nations through an Infrastructure for Resilient Island States initiative, as part of the CDRI.

In July 2022, seven months after the COP26 conference, its president Alok Sharma was in India to discuss progress on India's decarbonisation agenda. He had high profile meetings with officials from the Government of India's think tank, NITI Aayog, as well as the Union Environment Minister Bhupendra Yadav, and the Union Power Minister RK Singh. "India has made very good progress in the last few years," said Sharma. He pointed to India's wind and solar capacity, which has quadrupled in the past 10 years and noted Indian Railways' commitment of net zero emissions by 2030 (see page 7).

"INDIA HAS MADE VERY GOOD PROGRESS IN THE LAST FEW YEARS."

Alok Sharma, Conference president, COP26



The answers to the urgent questions of reducing emissions, responding to extreme weather events, and building sustainable infrastructure, do not lie with one nation or region. Nor do they just rest on governments – businesses, universities and research bodies all have critical roles to play. Solutions developed in one part of the world may well have, with some modifications, applications elsewhere.

This report looks at what is happening in R&D centres and factories, in plants, and on the streets to achieve India's ambitious goals. It speaks to policy makers, innovations, engineers, and bankers, and highlights partnerships and joint ventures where governments and businesses, are innovating together.

It identifies opportunities for more UK-India collaboration, knowledge sharing, and technology transfer, and should act as a clarion call to businesses with bold ideas to contribute to decarbonisation in India, and farther afield.



PLANES, TRAINS, AND AUTOMOBILES

Transport is thought to account for 23 per cent of energy-related greenhouse gas (GHG) emissions globally. Congested Indian megacities such as Mumbai, New Delhi, and Bengaluru, as well as scores of bustling tier-two and tier-three cities with large populations and poor infrastructure, make a significant contribution. India's newly affluent population is on the move for business and pleasure, domestically and internationally. Bringing down emissions in Indian cities and reducing the impact of travel between them are vital if India is to achieve its ambitious targets.

JET ZERO FOR NET ZERO

Aviation alone makes up 2.5 per cent of global CO2 emissions. India is one of the fastest growing aviation markets and is set to become the third largest by passenger numbers in 2024, according to the International Air Transport Association (IATA).

Much talk at this year's Farnborough International Airshow – the global aviation community's biannual meet-up – was about sustainability, and central to the reduction of carbon emissions. The UK government used the show to launch its 'jet zero' strategy – a timetable for the UK to become a zero-carbon aviation nation by 2050. The solutions will not only be home grown, as UKIBC's Richard McCallum explains, "Achieving net zero in aerospace and aviation—indeed, in the global economy—requires action across the entire value chain, and international cooperation. No single industry, let alone country, can make real progress in isolation."

"The UK is a world leader in sustainable manufacturing techniques and applied science in aviation. India is home to the greatest source of digital talent on earth, and unrivalled in building at scale. Each has its own net zero challenges and solutions. Partnerships rooted in technology collaboration will benefit both countries and the world's decarbonisation ambitions."

One company looking for answers is aero engine maker Rolls-Royce. It is a pillar of the UK industry with global reach and longstanding ties to India. In partnership with India's leading aircraft manufacturer, Hindustan Aeronautics Limited (HAL), it is exploring ways to use digital technologies to reduce the impact of its manufacturing activities. International Aerospace Manufacturing Pvt. Ltd. (IAMPL) is a 50:50 joint venture between Rolls-Royce and HAL. Established in 2010, IAMPL supplies 160 different machined and special processed parts for technologically advanced civil and defence engines, as a part of Rolls-Royce's global supply chain. It is one of the handful of companies in Rolls-Royce's High Performing Suppliers Group, tested monthly against rigorous standards on delivery, quality, management and cost, to retain its place as a class-leading vendor. This year, its factory in Bengaluru, where it employs 230 people, celebrates 10 years. IAMPL's CEO Seenivasan Balasubramanian, describes the company's approach to net zero, "We have split the sustainability journey into three broad areas. First is reduction of CO2. Second is recycling and reduction of solid waste. Third is reuse of water. On the third, we have already achieved a net zero position."



As well as making its own operations more sustainable, IAMPL is looking for improvements with wider applications.

"WE'VE ELIMINATED 80 PER CENT OF OUR PAPER CONSUMPTION WITH OUR DIGITAL TWIN."

Seenivasan Balasubramanian, CEO, IAMPL

One of its innovations is an Internet of Things (IoT)-based app, developed in-house, that uses data from sensors on lighting units and chillers. By measuring energy use in real time, it can find efficiencies and bring down energy consumption in its manufacturing process. It is also pioneering the use of digital twins and removing paper from the way manufacturing workflows are recorded. That's not an easy task in a process-heavy and compliance-led industry. Says Balasubramanian, "We've reduced quite a lot of our paper consumption with our digital twin."



Currently IAMPL's customers are its two shareholders, Rolls-Royce and Hindustan Aeronautics Limited. Both benefit from the innovations emerging from the Bengaluru facility, which they are able to deploy in their wider ecosystems. Balasubramanian has plans to offer services to other engine makers so that what's learned in India can be shared across the propulsion industry.

Airport ground operations also contribute to pollution. At Indira Gandhi International Airport in New Delhi, TaxiBots, made by Israeli Aerospace Industries, are being used to move aircraft from terminal gates to runways. TaxiBots are powered by an 800-hp hybrid-electric engine. Using them means the aircraft does not burn aviation fuel as it taxis. Their introduction is part of the airport's drive to be carbon neutral by 2030.

RAIL ELECTRIFICATION ON TRACK

For many Indians, trains are the primary means of transport—whether they commute on the iconic 'Mumbai local', a system that carries 7.5 million commuters each day, or travel across the vast country on sleepers run by Indian Railways. The government owned operator manages the world's fourth largest rail network. It has more than 65,000 km of track under its jurisdiction and carries a mammoth 24 million passengers every day. Doing so makes it a major consumer of electricity with a massive carbon footprint.

Indian Railways aims to become a net zero carbon emitter by 2030. Reports suggest it is on track to electrify all its broad-gauge network by the end of 2023 and the whole network the following year. In doing so, it reduces its demand for diesel significantly and will save over GBP1 billion a year.

The company owns vast tracts of land across the country on which it plans to build huge solar power plants. According to Down to Earth, an Indian environmental news source, Indian Railways will install 20GW of solar power. In July 2020, despite severe COVID-induced restrictions, it established a 1.7MW solar power plant in Bina, Madhya Pradesh, in collaboration with the state-owned Bharat Heavy Electricals Ltd. It is the first solar energy plant in the world to directly power railway overhead lines, from which locomotives draw traction power. A 2.5MW solar project in Diwana, Haryana, has begun and work on a third pilot with a capacity of 50MW has started in Bhilai, Chhattisgarh.

Electrification comes with inherent challenges. Electricity is being generated at a scale never seen before and integrated in ways not originally envisioned. Railways built a century and more ago were not constructed for electric trains.

REDUCING LEAKAGE

Significant amounts of electricity leak during transmission and distribution. So, one important part of the energy transition agenda is to improve efficiency. Leeds-based, tech start-up AssetCool is solving that problem, and has a particular focus on India. As CEO Niall Coogan explains, "Building new transmission lines, or improving the existing lines via line refurbishment, is very expensive. AssetCool makes photonic coatings, which allows us to increase the capacity of existing lines by as much as 30 per cent, and can also reduce power losses by as much as 10 per cent. This coating works to simultaneously reflect solar radiation and increase heat dissipation. That allows for passive reduction in the temperature of overhead power lines, so you can get more power down the power line before it reaches its maximum operating temperature. And by running at a lower temperature, you have lower power losses". The technology is being applied to new lines and will be applied to existing power lines in the near future.

> "IT'S A DYNAMIC MARKET. WE'RE ESTABLISHING STRATEGIC INDUSTRIAL AND TECHNICAL RELATIONSHIPS FOR MANUFACTURING AND DISTRIBUTION. THERE'S A REAL ENTREPRENEURIAL SPIRIT AND A SPEED OF DECISION-MAKING THAT WE HAVEN'T SEEN ELSEWHERE." Niall Coogan, CEO, AssetCool

Founded in 2017, the VC-funded company is working with states and utility companies across India. The size of the market is an obvious appeal, but says Coogan, as is the receptiveness to innovation and collaboration, and the speed of activity. "It's a dynamic market. We're establishing strategic industrial and technical relationships for manufacturing and distribution. There's a real entrepreneurial spirit and a speed of decisionmaking that we haven't seen elsewhere," he says.





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ON THE ROAD

After two years of harsh lockdowns and sluggish domestic demand, India's automotive sector has seen an uptick in 2022. Reports suggest that sales are now back to pre-pandemic levels, with Q1 2022-23 turning out to be a bumper quarter with just under 5 million units sold.

One big opportunity in India's mobility sector right now is the shift to electric vehicles. India is one of the fastest growing EV markets, and is projected to be worth <u>US\$150 billion by the end of the decade</u>. The government predicts sales of 6.4 million EV units in 2027 and wants electric vehicles to account for 30 per cent of private cars, and 70 per cent of commercial vehicles by 2030.

Rocky Mountain Institute (RMI), a think tank, works closely with NITI Aayog, the strategy function of India's central government, to assess the viability of EVs as compared to Internal Combustion Engine (ICE) vehicles, and promote the uptake of EVs. RMI reports that the regional Delhi government is investing heavily in charging infrastructure and offering incentives to EV customers. It is keen to reduce the emissions made by last-mile delivery vehicles which are so prevalent on the streets of the Indian capital.

There's plenty of private sector action too. Ola Electric is building the world's largest EV plant on the outskirts of Bengaluru, and says it aims to become the world's leading urban mobility EV company, including an R&D centre currently being built in the UK, with further plans to sell into the UK market in 2025.

And there are UK companies already present too. GreenEnco is a British company that makes and installs solar power to charge EVs. The technology is developed and designed in the UK and installed with local partners in India. GreenEnco is present in 15 countries, including India, as a Technical Advisor and engineering solution provider in solar, energy storage and EV charging infrastructure projects. Says founder Jyotirmoy Roy, "Our focus is on the optimisation of assets. We're bringing carbon usage down by producing electricity from solar, and then supplying that electricity to charge vehicles. The solution is very specifically designed for this project in India. It came out of the Innovation for Clean Air Programme led by Energy Systems Catapult." GreenEnco has solar -powered EV charging infrastructure in Bengaluru and now in Chennai where the British Deputy High Commissioner's

"WE'RE BRINGING CARBON USAGE DOWN BY PRODUCING ELECTRICITY FROM SOLAR, AND THEN SUPPLYING THAT ELECTRICITY TO CHARGE VEHICLES."



electric Jaguar is charged with solar power via a unit made by CityEV, another UK company.

Jyotirmoy Roy, Founder, GreenEnco

CityEV designs and supplies EV infrastructure – the charging points, without which EVs cannot function. "The notion of solar-powered EVs sounds straightforward. You hook up a solar panel to an EV charge point plug into your car, and surely it should work. It's not that easy" says Managing Director Doug Watson. "There's a lot of challenges, there's a lot of technical issues to be overcome. Those include the fact that there's no light at night, variable temperatures, the angles at which the sun hits a photovoltaic panel, the rates of voltage coming of the panel, and extreme heat which is a significant factor in India," says Watson.

The units CityEV and GreenEnco are installing in India can charge two- and three-wheelers as well as cars. Says Roy, "The concept is very modular. It can be ramped up and can support any number of vehicles in the space."



For more on the Energy Systems Catapult programme supporting UK innovators, see page 14.



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M.A.D.E FOR INDIA IN THE WEST MIDLANDS

The Mahindra Group is well known in India for its farm vehicles and rugged SUVs. Chairman Anand Mahindra has long been an advocate of environmental causes. Group companies are working hard to solve the issue of emissions and have collectively set a target to be carbon neutral by 2040. Mahindra has coined the phrase 'alternativism' to describe its approach. Head of sustainability Anirban Ghosh explains, "Alternativism is a way of looking at things with a non-regular lens. We use a climate lens. There are ways in which we can build an enduring business while we are rejuvenating the environment and enabling stakeholders to rise." Mahindra has adopted a 60-MWp captive solar plant to achieve >40 per cent renewable electricity by 2025. It also has a massive tree planting programme called Mahindra Hariyali which plants around a million trees a year. The group's construction business has a strong focus on green buildings and recently announced India's first net zero energy residential complex.

On 15 August 2022, India's 75th Independence Day, Mahindra announced five new electric SUVs. Much of the development work has been done by Mahindra Advanced Design Europe (M.A.D.E.) located in Coventry in the UK's West Midlands, a region with a long history of automaking. M.A.D.E. is also the location for much of the work Mahindra Racing does for its Formula E setup — the first team to achieve FIA Environmental Accreditation.

Says Ghosh, "Over time, a lot of the technologies developed for Formula E will flow into the vehicles of the future. Because, unlike Formula One, these cars are not the kind that can only be used on the racetrack. The technology can go into regular street vehicles very easily.

"ALTERNATIVISM IS A WAY OF LOOKING AT THINGS WITH A NON-REGULAR LENS. WE USE A CLIMATE LENS."

Anirban Ghosh, Chief Sustainability Officer, Mahindra Group





DOING MORE WITH LESS

The Indian Space Research Organisation (ISRO) famously put a rocket on the moon for less than the price of the Hollywood movie Interstellar. The comparison may not be entirely fair, but it makes an important point about India's appetite for, and excellence in, frugal engineering – the art of doing more with less.

TWI is a UK research training and technology firm that contributed to ISRO's achievement through a collaboration on diffusion bonding technology. Chris Wiseman, TWI's corporate sector manager, Aerospace and Equipment, Consumables and Materials, also leads the firm's India growth. He says there is a lot to learn from what the country has achieved in space exploration, "It's eye-opening! There's a good knack to do what is necessary. We tend to make things sometimes too complicated. ISRO does not tend to over-engineer where they don't need to. The idea of making it better, rather than replacing, is prevalent. And I think we can learn a hell of a lot from that broad concept."

TWI has been present in India since 1988 and is currently one of three key markets for TWI. Wiseman has seen a major shift in this time. "Earlier, we were training Indian engineers who went and worked in the Gulf. Now, we're training and certifying engineers to Make in India."

The company has strong positions in the transportation and energy sectors. As well as its training and certification services, it develops technology in partnership with its members, which include global OEMs, and helps them find new markets. Wiseman is excited about three key low-carbon technologies currently being developed and introduced to India by TWI. Near net shape is a technology that reduces waste and energy use by eliminating the need for surface finishing of components. Linear friction welding is used primarily to bond titanium products in the formation of lightweight structural components for aerospace applications. As demand for hydrogen grows, there is a need to develop containers that can hold the gas in aerospace and automotive settings.

> "EARLIER, WE WERE TRAINING INDIAN ENGINEERS WHO WENT AND WORKED IN THE GULF. NOW, WE'RE TRAINING AND CERTIFYING ENGINEERS TO MAKE IN INDIA."



Chris Wiseman, Corporate Manager, TWI

The company is also working closely with Rolls-Royce to develop sustainable aviation fuel and electrification of motorcycles.

Wiseman is keen to point out that while there is plenty of focus on new energy sources, energy transition is a long-term process, and India will continue to rely on conventional thermal power for many decades. "We're active in solar and wind energy in India, but we must recognise that the traditional plants won't be switched off yet. So, our other focus is on life extension of conventional plants and the structural integrity of those large facilities. That's a part of the journey that shouldn't be forgotten", he says.





FARMING GETS A DIGITAL MAKEOVER

India's agriculture industry is huge. It employs 58 per cent of the population and accounts for 18 per cent of India's GDP. It is both a victim of climate change and a significant contributor to greenhouse gas emissions through livestock rearing, fertiliser application, rice production, and vehicle emissions. The sector also consumes vast quantities of water.

To achieve its net zero ambitions, India must therefore transform its farming sector.

Meghdoot is an indigenous farming app developed jointly by the India Meteorological Department, Indian Institute of Tropical Meteorology and Indian Council of Agricultural Research to deliver critical information to farmers. Another start-up Fasal, founded in 2018, uses an Al-powered, IoT SaaS platform to capture data from on-farm sensors and share insights, in local languages, to help make better decisions. It claims to 'take the guesswork out of farming'. Others, including Tata Chemicals, have launched similar agritech solutions to offer India's farmers.

Agritech is a prime opportunity for UK companies in India according to our August 2022 <u>report</u>.



The Mission for Sustainable Agriculture was established in 2010 as one of eight missions under the National Action Plan on Climate Change. It has a ten-point strategy to manage the delicate balance between economic development, food security, rural employment and emissions reduction.

The Mahindra group is a major player in the agriculture sector. It is the country's largest tractor maker with the capacity to turn out 150,000 units a year. As yet, the company hasn't found an alternative to fossil fuels that's commercially viable. "But," says Anirban Ghosh, "there are experiments ongoing in that space." It has however made progress on micro-irrigation and solar pumps. Says Ghosh, "The investment in micro-irrigation is interesting because not only does it require less water, it also reduces energy costs. So, there are multiple ways its good for the planet."

As in all areas of change, digital technology will play a role. EY suggests that India's agritech sector is growing at 25 per cent per annum and will be worth US\$24 billion by 2025. KisanHub is one UK company already making its mark. The Cambridge company provides software to farmers (kisan in Hindi). Suppliers of fresh produce use this technology to improve supply chains and get better margins.

AGRIVOLTAICS TO BOOST CROPS

Agrivoltaics is another novel innovation being tested in India. The term refers to the simultaneous use of land for growing crops and producing solar energy – using solar panels to shade crops reduces water consumption while energy is produced. The neat idea was initiated by the Indian Council of Agriculture Research Central Arid Zone Research Institute. Its principal scientist Priyabrata Santra says, "India needs to combine two important missions for the country – the Food Security and Solar mission, by applying agrivoltaics to multiply land productivity."

The potential of agrivoltaics is significant, given that 60 per cent of India's land is used for agricultural purposes. ■

Photo: nsci.ca

CATAPULTS GIVE UK COMPANIES A HELPING HAND

India's pro-business government encourages foreign investment, and the country's decarbonisation agenda offers exciting potential for overseas firms with innovative solutions. But solving problems and market entry require very different skill sets. It's not easy to find the right local partners, understand the regulatory landscape, and build viable business models.

UK India Business Council COO, Kevin McCole says, "UKIBC's India experts, supported by our unique network of government and business leaders across the UK and India, enable us to help UK businesses better understand the complexities and, importantly, take advantage of the immense opportunities in India. Foreign businesses are too often not fully aware of their prospects in India, never mind being able to act upon them. And yet, competitors are already enjoying success in India in the form of growth, innovation, access to talent, as well as obtaining access to a huge and growing market. We want to help more UK businesses to uncover these opportunities and succeed."

Among UKIBC's partners is the UK's Catapult Network, covering a wide range of sectors, and a not-for-profit collaboration between industry, academia, and government that works with partners to help innovators bring their products to market, including international markets like India.

Paul Jordan leads the Energy Systems Catapult International team'. He uses his 25 years' experience in the energy industry to help entrepreneurs such as GreenEnco's Jyotirmoy Roy and City EV's Doug Watson (see page 9) to establish themselves in international markets. Jordan explains, "We take a whole system approach to help people understand what the future energy system looks like. We ask how different energy aspects come together, how you think about legacy infrastructure, how you think about the end user and how market might evolve.

"We have a team of incubation managers, so we are very hands-on in helping start-ups understand their commercialisation needs, and we have interventions to help them on that journey. We work with other countries overseas to help them plan their net zero pathways and give them access to innovation. We help them create the right demonstration environments and evolve their market for future energy transition. And we introduce UK innovators into that market." "WE WORK WITH OTHER COUNTRIES OVERSEAS TO HELP THEM PLAN THEIR NET ZERO PATHWAYS AND GIVE THEM ACCESS TO INNOVATION."



Paul Jordan, Energy Systems Catapult

INNOVATING FOR CLEAN AIR IN BENGALURU

In 2019, the Energy Systems Catapult, Connected Places Catapult, and Satellite Applications Catapult, launched a joint programme to support UK and Indian innovators in Bengaluru to promote best practice innovation and technology exchange in order to help address the challenge of EV adoption.

Funded by the UK government's Newton Fund, the programme works with innovative businesses, local authorities, academics and civil society organisations to develop interventions to improve air quality. This includes supporting the Government of India's FAME (Faster Adoption and Manufacturing of Electric and Hybrid Vehicles in India) scheme to accelerate the adoption of electric vehicles and other activities which drive positive changes in urban air quality.

Through the programme, UK start-ups have been able to showcase their solutions, test them in a real-life context, and gather consumer feedback. Several enjoy Energy Systems Catapult's support to understand and prepare for entry into India. They include:

ACELERON, creator of the world's first sustainable lithium-ion battery, where every part of the battery can be repaired, upgraded, or replaced, thus eliminating battery waste.

BEAM CONNECTIVITY, producer of a Connected Vehicle as a Service (CVaaS) solution which helps electric vehicle makers, across all vehicle types including industrial and agricultural ones, accelerate their time to market.

ENGAS UK converts vegetable market waste into electricity and fuel suitable for transport and back-up power. The technology was developed specifically for the Indian market and pilot-tested in Kolkata.

Lancashire-based LiNa ENERGY commercialises solid state sodium batteries for stationary storage and transport markets at a fraction of the cost of lithium-ion batteries. Will Tope, Commercial Director of LiNa Energy, says, "India is a huge growth market for energy storage and well suited for LiNa Energy's breakthrough batteries, which can be manufactured locally and operate safely in high temperatures."

RENEWABLES TOPS GROWTH LIST

The fastest growing UK company in India in 2021 was Ayana Renewable Power. Established in 2018, the company is backed by British International Investment — the UK government's development finance institution. Ayana Renewable Power aims to add 2GW of renewable power in India annually. In doing so, it is supporting the transition to low carbon power generation and creating job opportunities in the renewable power sector. Its revenues grew 137 per cent in FY2020-21, according to Grant Thornton's Britain Meets India report, an annual report on trending UK investment into India, produced in partnership with the Confederation of Indian Industry (CII).

Business Services is the fastest growing sector accruing 21 per cent of UK investments in India, according to the latest report launched in August 2022.

Speaking at the launch in New Delhi, British High Commissioner Alex Ellis stressed the importance of the forthcoming free trade agreement (FTA) and its role in achieving the target of doubling bilateral trade by 2030. "THE FTA PRESENTS A SIGNIFICANT OPPORTUNITY FOR THE LARGE NUMBER OF UK COMPANIES PRESENT IN INDIA TO EXPAND THEIR OPERATIONS IN THE COUNTRY, AS WELL AS FOR NEW COMPANIES IN THE UK TO EXPLORE THE INDIA OPPORTUNITY."



Alex Ellis, British High Commissioner to India

UK companies in India employ 466,640 people



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A SALT AND BATTERY

UK pioneer of sodium-ion batteries, Faradion, was bought by Reliance Industries in 2021. With the might of India's largest privately owned business group behind it, Faradion has plans to bring this cleaner, cheaper alternative to lithium-ion batteries, to market at scale in India and elsewhere.

India has abundant supplies of sun and salt. The first allows it to generate huge amounts of solar power, the second can be used to store the energy efficiently. This, according to Faradion CEO James Quinn, will provide the country with energy security and environmental security. It also reduces dependence on largely Chinese-origin lithium-ion batteries.

Says Quinn, "We can source the raw material locally, manufacture batteries at scale, and integrate them quickly into the energy mix. Reliance is already geared up for building massive manufacturing capacity and there's no shortage of demand, whether for energy storage, which is the low hanging fruit, or in EVs, which is set to be a huge market in India." He says the company is in discussion with "most of the EV, OEMs".

Founded in 2011, the business, with offices in Sheffield and Oxford, has spent a decade as a discovery factory building what Quinn describes as a "minefield" of IP around energy storage. The next task is to commercialise the product.

> "WE SEE THE POTENTIAL TO LEAPFROG BEYOND LITHIUM, WHICH REQUIRES EXPENSIVE RARE-EARTH INPUTS, AND DELIVER A LOWER COST, MORE SUSTAINABLE ALTERNATIVE."

James Quinn, CEO, Faradion



"We see the potential to leapfrog beyond lithium, which requires expensive rare-earth inputs, and deliver a lower cost, more sustainable alternative," says Quinn.

The company is already shipping UK-made products to Australia and gathering data from field trials. Now it's set to operate at a very different scale.

As well as deep pockets, Reliance brings immense captive demand across its many business interests from energy to telecoms. Its bold and acquisitive nature suggests it will create an end-to-end solution from generation to storage and supply.

Quinn, a serial entrepreneur now in his fifth start-up, envisions that Faradion in the UK will be the Centre of Excellence for sodium-ion batteries globally. It has existing relationships with Sheffield University and Oxford University. Scaling in India will give the firm a huge boost, enabling it to bring down the unit costs of batteries and compete with incumbent technologies. From this position, it can look at other large markets for energy storage across SE Asia, Africa, and Europe.

"It's a once-in-a-generation opportunity," says Quinn.







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FUNDING NET ZERO

In their report 'Getting India to Net Zero', published in August 2022, former Australian Prime Minister Kevin Rudd, former United Nations Secretary General, Ban Ki-Moon, former Vice Chairman of NITI Aayog, Arvind Panagariya, and Global Head and Director of Climate Business, International Finance Corporation, Vivek Pathak, suggest that achieving net zero by 2070 would boost annual GDP by up to 4.7 per cent by 2036. They say it will create 15 million jobs beyond a baseline scenario by 2047, and that savings in household energy costs could be as much as much as US\$9.7 billion by 2060.

None of this comes cheap. Estimates suggest that India's energy transition will cost around US\$10 trillion, requiring massive injections of public and private financing. That's huge for an economy valued at US\$3.5 trillion in 2022.

One of the challenges India faces is the high costs of capital for infrastructure projects because of its developing nation status. The answer could well lie in banks' ability to work with global financial institutions to provide the capital and structures, innovative new financing models relevant and specific to Indian challenges, and harness the use of technology to accelerate the sustainability process, according to the <u>World Economic Forum</u>. "INDIA IS A RARE BEACON OF LIGHT AND HOPE IN THE GLOBAL ECONOMY. THE GOVERNMENT HAS DONE MUCH BY WALKING THE TALK AND DELIVERING INVESTMENTS. THERE'S ALSO POSITIVE SENTIMENT TO INDIA IN GLOBAL CAPITAL MARKETS AND WE'RE WORKING WITH OUR CLIENTS TO BRING THOSE POOLS OF CAPITAL TO INDIA."



Dibirath Sen, HSBC

Thankfully, India's appeal is strong. GDP growth has pushed it ahead of the UK to become the world's fifth largest economy, and the government has done much in recent years to make it an attractive destination through a strong focus on ease of doing business.

On a visit to New Delhi in September 2022, HSBC's Group CEO, Noel Quinn, was upbeat about the country's prospects, not least because he sees less inflationary pressures in India than in other parts of the world.

HSBC traces its Indian origins to 1853 and, among other claims to fame, introduced the first ATM to the country in 1987. Managing director Dibirath Sen calls India "a rare beacon of light and hope in the global economy". He notes the "tone from the top" and credits several government initiatives: the introduction of production led incentives (PLI), changes in the bidding process for solar projects, and the requirements for companies to make detailed ESG disclosures. "The government has done much by walking the talk and delivering investments. There's also positive sentiment to India in global capital markets, and we're working with our clients to bring those pools of capital to India."

India has long suffered from a 'trust deficit'. Finance is particularly prone. HSBC is addressing that with innovative trust-and-retention solutions as part of its project financing offering. Says Sen, "We have one of the best credit ratings in India. We're using that to develop Indian solutions for Indian clients, but those solutions may well then be replicated elsewhere."

Globally, HSBC has committed to investing between US\$750 billion and US\$1 trillion in sustainable assets over the next decade, and Sen says India is high on the priority list. The bank already has 13 per cent of its Indian balance sheet in sustainable assets and a large chunk of that in renewable energy.



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India is industrialising rapidly, and simultaneously taking steps to decarbonise and achieve net zero carbon emissions by 2070. As this report highlights, businesses are playing a vital role in meeting this critical and exciting challenge, with R+D-intensive companies from the UK and India developing and deploying innovative technologies.

Collaborations are already delivering results:

- India's Hindustan Aeronautics Limited and the UK's Rolls-Royce have a long tradition of partnership. They are now working together to provide precision machining for aircraft engines to reduce CO2 emissions, to dispose of solid waste more efficiently, and to reuse water.
- Ola Electric is building the world's largest EV plant on the outskirts of Bengaluru and an R&D centre in the UK.
- Mahindra & Mahindra recently announced five new electric SUVs. Much of the development work is done by Mahindra Advanced Design Europe in the UK.
- Indian Railways is on track to electrify all its broadgauge network to reduce its demand for diesel.
 It is also embarking on a bold plan to build huge solar power plants.
- Leeds-headquartered AssetCool is working with states and utility companies across India to bring its capacity-building photogenic coatings to India's new and existing power lines.

- TWI is providing training and certification services and developing low-carbon technologies with partners in India to make surface finishing and welding more sustainable.
- Faradion from South Yorkshire, with backing from its new Indian owner Reliance Industries, is bringing a cleaner, cheaper alternative to lithium-ion batteries to market at scale in India and elsewhere.
- HSBC and British International Investment are among the private and public sector institutions providing new financing models needed to fund the energy transition.

These collaborations are driving tremendous progress in India, and there are many untapped opportunities for IP-rich UK businesses to export their climate technologies.

There's a spirit of innovation in India that UK companies can tap into and learn from. But, given India's scale and complexity, these opportunities are not easy to spot or access – dedication, patience and expertise are needed.

UK India Business Council has the knowledge, networks, and an expert team to help you cut through the complexity.

To learn how UK India Business Council can help you, contact <u>manufacturing@ukibc.com</u>



WHO ARE WE?

The UK India Business Council is a strategic advisory and policy advocacy organisation with a mission to support businesses with the insights, networks, policy advocacy, services, and facilities needed to succeed in the UK and India. We believe passionately that the UK-India partnership creates jobs and growth in both countries, and that UK and Indian businesses have ideas, technology, services and products that can succeed in India and the UK respectively.

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Art of the possible - You can download our earlier report here.

Case study images have been sourced from the relevant company website.