



NEWS ALERT

Forum for Indian Science Diplomacy

RIS Science Diplomacy News Alert is your fortnightly update on Indian and global developments in science research, technological advancements, science diplomacy, policy and governance. The archives of this news alert are available at <http://fisd.in>. Please email your valuable feedback and comments to science.diplomacy@ris.org.in

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GLOBAL

[Flash graphene rocks strategy for plastic waste](#)

Scientists at Rice University developed an efficient method to convert plastic waste into graphene using a different sequence of electrical pulses. The new process involves exposing plastic waste to around eight seconds of high-intensity alternating current, followed by a DC jolt, which yields high-quality turbostratic graphene, a valuable and soluble substance that can be used to enhance electronics, composites, concrete and other materials. The flashing process also produces a considerable amount of hydrogen, which is a clean fuel. At an industrial scale, the ACDC process is estimated to produce graphene for about \$125 in electricity costs per ton of plastic waste. The flash joule process also eliminates expenses associated with recycling plastic, including sorting and cleaning that require energy and water and offers a pathbreaking solution to address an island of plastic waste formed in the Pacific Ocean. The process is also being developed for converting food waste into high-quality graphene.

[Self-watering soil could transform farming](#)

A new type of soil created by engineers at The University of Texas at Austin can pull water from the air and distribute it to plants, potentially expanding the map of farmable land around the globe to previously inhospitable places and reducing water use in agriculture at a time of growing droughts. The method uses super-moisture-absorbent gels to capture water from the air. When the soil is heated to a certain temperature, the gels release the water, making it available to plants. When the soil distributes water, some of it goes back into the air, increasing humidity and making it easier to continue the harvesting cycle. Each gram of soil can extract approximately 3-4 grams of water. Depending on the crops, approximately 0.1 to 1 kilogram of the soil can provide enough water to irrigate about a square meter of farmland. The gels in the soil pull water out of the air during cooler, more humid periods at night. Solar heat during the day activates the water-containing gels to release their contents into soil. The team found that the hydrogel soil retained approximately 40% of the water quantity it started with. In contrast, the sandy soil had only 20% of its water left after just one week. Other applications of the technology could be for cooling solar panels and data centers and expanding access to drinking water.

[Malaria test as simple as a bandage](#)

Rice University engineers have developed a microneedle patch for rapid diagnostic testing



surrounds all of the cells in the skin. This fluid contains a multitude of biomarkers for various diseases, such as malaria, which can be used for rapid testing. The disposable patches could be programmed to detect other diseases, potentially including COVID-19. The self-contained test delivers a result in about 20 minutes and does not require medical expertise or any equipment. The sticky patch has 16 hollow microneedles in a 4-by-4 array on one side, coupled with an antibody-based lateral-flow test strip on the other. The antibodies react when they sense protein biomarkers for malaria and turn two readout lines on the strip's exposed surface red. If the test is negative, only one line turns red. The needles are treated to be hydrophilic -- that is, attracted to water -- so the fluid is drawn in and flows through to the test strip. Once the test is complete, the device can be removed like any bandage. This simple, inexpensive package will be easy to deploy at the point of need, especially in developing regions where finger-prick blood sampling and the availability of trained medical personnel to diagnose samples may be challenging. The hollow needles are 375 microns wide and 750 microns long, enough to reach the fluid within skin that is typically between 800 to 1,000 microns thick. The needles are sharp enough to overcome the mechanical stress of entering the skin. The estimated cost of individual patches could be about \$1 if produced in bulk.

[New technology to make desalination highly cost-effective](#)

Engineers from Rice University developed technologies to efficiently treat drinking water and industrial wastewater. Currently, more than 1.8 billion people live in water scarce areas and in many arid regions, seawater or salty groundwater is plentiful but costly to desalinate. The off-grid/solar powered desalination system developed by Rice university is based on a membrane distillation process which includes light-activated nanoparticles attached to the membrane that capture all the necessary energy from the sun, resulting in high energy efficiency. Due to high corrosiveness of seawater, researchers developed an electrically conductive material and a process for coating a fine stainless steel mesh with a thin film of hexagonal boron nitride (hBN), and significantly enhanced the desalination rate. The research team seeks to scale up the CVD coating process and produce larger prototypes.

[Highly Stretchable, Self-Healable, and Recyclable Wearable Electronics developed](#)

A team of scientists from China and the United States has developed a multifunctional wearable electronic device that can simultaneously provide full recyclability, excellent mechanical stretchability, self-healability, and reconfigurability. The team's device can heal itself, much like real skin. It also reliably performs a range of sensory tasks, from measuring the body temperature of users to tracking their daily step counts. And it is reconfigurable, meaning that the device can be shaped to fit anywhere on your body. This wearable electronics is achieved by heterogeneous integration of rigid (chip components), soft (dynamic covalent thermoset polyimine with new formula), and liquid (eutectic LM) materials through advanced mechanical design and low-cost fabrication method. In this wearable electronic system, off-the-shelf chip components provide high-performance sensing and monitoring of the human body, including physical motion tracking, temperature monitoring, and sensing of acoustic and electrocardiogram (ECG) signals. They are interconnected by intrinsically stretchable and robust LM circuitry and encapsulated by dynamic covalent thermoset polyimine matrix. The resulting device is a little thicker than a Band-Aid and can be applied to skin with heat. It can also stretch by 60% in any direction without disrupting the electronics inside.

[Waste to wealth with new generation nanocatalyst](#)

Australian researchers have developed a highly porous, micron-sized ceramic sponge containing different specialised active components that accelerate chemical reactions. Molecules enter the sponge through large pores, where they undergo the first chemical reaction, and then pass into smaller pores to undergo the second reaction with the help of nanoparticles. The catalyst is cheap to fabricate, easy to recover, and reuse, requires less energy and creates less waste while producing biodiesel, and includes a built-in cleaning component that neutralises common contaminants. The innovation has the potential to benefit rural farmers and villages by enabling them to produce their own fuels. The multifunctional catalyst offers a low-cost and low-tech route to recycle carbon contained in waste from rice husks and vegetable peelings to rancid used cooking oil. The research team is currently working to scale-up catalyst production to make it commercially available, and to create a range of similar catalysts tailored for different waste streams, for example, used cooking oil, sugarcane bagasse and vegetable scraps.

COVID-19

COVID-19 (WORLD)

[Pfizer-BioNTech's COVID-19 vaccine found to be 90 per cent effective in phase 3 trial](#)

A Covid vaccine using mRNA technology jointly developed by Pfizer and BioNTech was found to be 90 per cent effective in preventing COVID-19 infections in phase 3 clinical trials



against the virus, 28 days after their first shot. Pfizer is planning to get emergency use approval from the FDA by the third week in November. However, there could be significant logistical problems in getting the vaccine to everyone, especially given it must be kept super-cooled at minus 70 degrees celsius and currently requires two doses given 21 days apart.

[New saliva-based antibody test for SARS-CoV-2 highly accurate in initial study](#)

A new saliva-based test developed by a team at Johns Hopkins Bloomberg School of Public Health has been found to accurately detect the presence of antibodies to SARS-CoV-2. The test is based on multiple fragments, or "antigens," from the SARS-CoV-2 coronavirus, mostly from its outer spike and nucleocapsid proteins. In the study, the researchers found that their test detected antibodies to several of these antigens in saliva samples from all 24 participants who had confirmed SARS-CoV-2 exposure and whose symptoms had begun more than two weeks prior to the test. The test also reliably yielded negative results for 134 saliva samples that had been collected from people prior to the COVID-19 pandemic. The experiments suggested that people who become infected with SARS-CoV-2 develop detectable antibodies in saliva at roughly the same time as they do in blood, about 10 days after COVID-19 symptom onset.

[Study finds vitamin-D deficiency in over 80 percent of COVID-19 patients](#)

A new study at the Spanish hospital reported a serious deficiency of vitamin D in COVID-19 patients. Vitamin D hormone is produced in kidneys, which controls blood calcium concentration and impacts the immune system. Earlier research has shown that vitamin D has beneficial impacts for the immune system, especially regarding protection against infections. Accordingly, the research attempted to identify vitamin D deficiency in high-risk individuals such as the elderly, patients with comorbidities, and nursing home residents for COVID-19. The researchers found 80 percent of 216 COVID-19 patients had vitamin D deficiency, and men had lower vitamin D levels than women. COVID-19 patients with lower vitamin D levels also had raised serum levels of inflammatory markers such as ferritin and D-dimer. The research has therefore recommended Vitamin D treatment for COVID-19 patients, which may have beneficial effects in both the musculoskeletal and the immune system.

[Ultrapotent COVID-19 vaccine candidate designed via computer](#)

Scientists at the University of Washington School of Medicine have developed an innovative nanoparticle vaccine candidate for COVID-19 virus which has shown ten-times higher levels of virus-neutralizing antibodies in mice than people who have recovered from COVID-19 infections. The data also show a strong B-cell response after immunization, which can be critical for immune memory and a durable vaccine effect. The antibodies produced in mice by the new nanoparticle vaccine targeted multiple different sites on the Spike protein, which is part of the coronavirus infectivity machinery. This, according to vaccine developers, would ensure strong protection against mutated strains of the Sars-Cov-2 virus. The vaccine candidate was developed using structure-based vaccine design techniques invented at University of Washington which is licensing the candidate non-exclusively and royalty-free during the pandemic. One licensee, Icosavax, Inc., is currently advancing studies to support regulatory filings and has initiated the U.S. FDA's Good Manufacturing Practice.

[Hot or cold, weather alone has no significant effect on COVID-19 spread](#)[Update](#)

Research led by University of Texas at Austin has revealed that temperature and humidity do not play a significant role in coronavirus spread thereby adding some clarity on weather's role in COVID-19 infection. The link between weather and COVID-19 has been complicated and at the onset of the coronavirus pandemic, there were high hopes that hot summer temperatures could reduce its spread. It however did not bring widespread relief. According to a new study, weather influences the environment in which the coronavirus must survive before infecting a new host but it also influences human behavior, which moves the virus from one host to another. That means whether it is hot or cold outside, the transmission of COVID-19 from one person to the next depends almost entirely on human behavior. The effect of weather was found low and other features such as mobility found to have higher impact than weather. The study thus regards weather to be one of the last parameters in terms of its relative importance.

[Computer model can predict how COVID-19 spreads in cities](#)

A team of researchers from Northwestern University, USA has created a computer model that accurately predicted the spread of COVID-19 in 10 major cities by analyzing three factors that drive infection risk: where people go in the course of a day, how long they linger and how many other people are visiting the same place at the same time. For the study, the researchers traced the movements of 98 million Americans in 10 largest metropolitan areas and computed the probability of infectious events at different places and times. The model revealed that most COVID-19 transmissions occur mainly at "super-spreader" sites, like full-service restaurants, fitness centers and cafes, where people remain in close quarters for extended periods. The specificity of the model, according to researchers, can serve as a tool for officials to help minimize the spread of COVID-19 as they reopen businesses at 20 percent or 50 percent of capacity.



[Startups offering medical equipment& aids to ensure doctors' safety during pandemic](#)

During the COVID-19 crisis, several Indian medical equipment firms have designed products that can keep doctors safe and cater to unique emergency requirements of the crisis. The start-ups supported by the Department of Science and Technology (DST) have innovative products such as digital stethoscopes that doctors can use without touching the patient, while the oxygen concentrator can help the hospitals to generate in-house oxygen and a portable and app-controlled IoT (Internet of Things) based ventilator system. The DST through its Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) initiative scouted, evaluated and supported promising ventilators, respiratory aids and other vital medical equipment from 5 companies who have now taken their products to deployment stage. These include a digital stethoscope developed by Ayu Devices Mumbai; a portable Oxygen Concentrator by Ambala-based WALNUT MEDICAL; a ventilator by Pune-based Nocca Robotics which operates in both invasive and noninvasive, pressure-controlled mode and is solar powered with low wattage requirement, etc.

INDIA – SCIENCE & TECHNOLOGY

[National Aroma Mission extends to Arunachal Pradesh](#)

CSIR-North East Institute of Science and Technology (CSIR-NEIST) has inaugurated second multi-locational experimental research field at Runne, East Siang district, Arunachal Pradesh, in collaboration with the Bosing Bango Farmers' Cooperative Society Ltd., Pasighat and formally signed an MoU to promote cooperation in scientific research and dissemination of technology related to aromatic, medicinal, floriculture and other important plants under national aroma and floriculture mission implemented by CSIR-NEIST in North East. The mission aims to set-up about 15 multi-locational experimental research fields in Northeast including five farms in Assam, four in Arunachal, and one each in Manipur, Nagaland, Meghalaya, Mizoram, Sikkim and Tripura to identify, domesticate, & cultivate rare, threatened and endangered species of medicinal plants and sustain the modern pharmaceutical industries. It also aims to sustain India's strong traditional system of medicines through breeding of new plant varieties, identification of stable performance through multilocal trials, integration of modern science along with market and industrial applications.

[NDDB develops indigenous sex sorting technology](#)

NDDB Dairy Services (NDS), a wholly-owned subsidiary of National Dairy Development Board (NDDB) has successfully developed an indigenous technology for sex sorting bovine sperms which would ensure birth of only female calves. NDDB conducted the field trials using this technology in partnership with Bangalore-based Jiva Sciences and the first female calf from sex-sorted semen dose was produced at a semen station at Alamadhi, near Chennai, last month. The ability to assure the birth of only female calves provides huge financial advantage to dairy farmers. However the existing technologies for sex sorting of bovine sperms are highly cost prohibitive with few MNCs owning proprietary rights. The NDS technology will bring down the cost of the sex sorted semen doses, which are expected to be commercially available since January 2021. The technology will also address the problem of stray cattle in the country.

[Saffron bowl of India extends to the North East](#)

India's saffron bowl, which was traditionally confined to Kashmir valley, is soon set to expand to the country's North East region. The North East Centre for Technology Application and Reach (NECTAR) together with Botany and Horticulture department (BHD) of Sikkim Central University successfully transported and acclimatised saffron plants from Kashmir to Sikkim. The plants are now flowering in Yangyang in the Southern part of the North-East state. The pilot project by NECTAR explored the feasibility of saffron cultivation in India's North East region with the same quality and higher quantity. With tests showing comparable soil and actual pH conditions of Yangyang in Sikkim and saffron producing areas of Kashmir, the BHD purchased saffron seed/corns and air transported them from Kashmir to Yangyang site. The faculty members engaged a local saffron grower and oversaw the complete growing process including the irrigation of plants during the September and October, and ensured timely corm sprouting and good flower yields. The project also focuses on post-harvest management and value addition of saffron.

[Startup India Award-winning Jackfruit Flour for Diabetics](#)

An Indian tech veteran has developed a patented green jackfruit flour, which is clinically proven to control blood sugar. In a randomized, double-blind, placebo-controlled study a significant decrease in HbA1c was observed within 90 days amongst participants taking 30g of Jackfruit365 green jackfruit flour daily, as part of their diet replacing an equal volume of



patented and clinically proven invention to control blood sugar and provide an additional source of income for farmers.

[Energy Efficient Smart Screens from Discarded Groundnut Shells](#)

Indian scientists at Centre for Nano and Soft Matter Sciences (CeNS), Bangalore have developed an eco-friendly smart screen from waste groundnut shells by using liquid crystal molecules confined in a polymer matrix. The matrix was built using cellulose nanocrystals (CNC) which were prepared from discarded groundnut shells. In the absence of the electric field, there was a mismatch between refractive indices between those of the polymer and the liquid crystal, leading to the scattering of light. Upon application of a small electric field, the liquid crystal molecules underwent a direction change resulting in the matching of refractive indices, and the device became transparent almost instantaneously. When the field was turned off, the system quickly recovered the scattering state. The polymer and the liquid crystal should co-exist in the right size to create the required optical properties for the smart screen. The smart screen developed from groundnut waste has been found to be most efficient. Apart from the original intention of targeted privacy creation, the device can be employed for a whole range of possible applications, especially in energy conservation by controlling the amount and window of infrared light that is permitted to pass.

[NTPC develops Geo-polymer aggregate from fly ash](#)

NTPC Ltd, India's largest power producer has successfully developed Geo-polymer coarse aggregate from fly ash, as a replacement to natural aggregates. The technical parameters as per Indian standards for its suitability to use in concrete works were tested and the results are in acceptable range. The Geo-polymer aggregates finds its extensive usage in the construction industry turning the ash eco-friendly and does not require any cement for application in concrete where the fly ash based Geopolymer mortar acts as the binding agent. The Geo-polymer aggregates will help in reducing carbon emission and has great potential for reduction of water consumption.

IN BRIEF

[New protein nanobioreactor for sustainable bioenergy production](#)

Researchers at the University of Liverpool have modified nanoscale bioreactors called carboxysome shells for hydrogen production. They introduced hydrogenases (enzymes that catalyse the generation and conversion of hydrogen) which is catalytically active into the empty carboxysome shell. They tested the hydrogen-production activities and found that the nano bioreactor achieved a ~550% improvement in hydrogen-production efficiency and a greater oxygen tolerance in contrast to the enzymes without shell encapsulation. This opens up a new technical platform to create a diverse range of synthetic factories to encase various enzymes and molecules for customised functions and opens the door for new possibilities for developing sustainable, clean bioenergy.

[Next-generation computer chip with two functions](#)

Engineers at EPFL have developed a next-generation circuit that allows for smaller, faster and more energy-efficient devices. Their technology uses a 2D material for a logic-in-memory architecture, that combines logic operations with a memory function. The EPFL chip is made from MoS₂, which is a 2D material consisting of a single layer that is only three atoms thick. The chip is based on floating-gate field-effect transistors (FGFETs) which can hold electric charges for long periods. The electrical properties of MoS₂ make it particularly sensitive to charges stored in FGFETs, which enabled the LANES engineers to develop circuits that work as both memory storage units and programmable transistors. By using MoS₂, they were able to incorporate numerous processing functions into a single circuit and then change them as desired.

[Precision chemo-immunotherapy for pancreatic cancer](#)

A team from Boston Children's Hospital, reports marked and lasting tumor regression in a mouse model, using a highly selective, potent, engineered antibody-drug combination, or ADC, consisting of two parts: an antibody that selectively homes to a molecule on the surface of pancreatic cancer cells, known as ICAM1, and a drug toxic to cancer cells. Cells bearing ICAM1 on their surface are killed by the drug, while normal cells are spared. The size of the ADC is similar to the size of a single antibody: less than 10 nanometers. Because of this ultra-small diameter, it can penetrate and reach pancreatic tumor cells better than other novel treatments. Mice receiving the DM1-ICAM1 antibody conjugate had a significant reduction in tumor size that persisted during the 14-week study, even after just two doses. The treatment also effectively inhibited metastasis to normal organs including lung, liver, and spleen. There was no observed toxicity, assessed by weighing the animals and through pathology analysis of their organs. The ICAM1-DM1 ADC is part of a portfolio of targeted, patented cancer drug delivery systems being developed; others include nanolipogels, liposomes, and exosomes.

[Scientists create hybrid tissue construct for cartilage regeneration](#)



have developed a method to bioprint a type of cartilage that could help to restore knee function damaged by arthritis or injury. The cartilage, known as fibrocartilage, helps connect tendons or ligaments or bones and is primarily found in the meniscus in the knee. The meniscus is the tough, rubbery cartilage that acts as a shock absorber in the knee joint. Degeneration of the meniscus tissue affects millions of patients and there is a lack of available treatment options. In this latest proof-of-concept strategy, the scientists have been able to 3D bioprint, a hybrid tissue construct for cartilage regeneration by printing two specialized bioinks. The system deposits both biodegradable, plastic-like materials to form the tissue “shape” and bioinks that contain the cells to build new tissues and organs. The results demonstrate that this bio-printed construct offers a versatile and promising alternative for the production of this type of tissue.

RESOURCES AND EVENTS

[VAIBHAV Summit brings together galaxy of Indian origin Scientists & Academics](#)

India successfully held a first-ever global summit of overseas and resident Indian researchers and academicians called “VaishvikBharatiyaVaigyanik (VAIBHAV) Summit”. Inaugurated by Prime Minister Narendra Modi on 02nd October 2020, the summit held a wide spectrum of deliberations under a structured framework including 18 Areas (verticals), 80 subjects (horizontal), 230 Panel Discussions for 23 Days, 3169 Panelists and 22500 Attendees. It covered subjects such as computational sciences, electronics & communication, quantum technologies, photonics, aerospace technologies, health and medical sciences, pharma and biotechnology, agro-economy and food security, material & processing technologies, advanced manufacturing, earth sciences, energy, environmental sciences, management and social sciences. The summit outcomes were reviewed by the Advisory Council involving Principal Scientific Advisor to the Government of India, Secretaries from various S&T departments and other ministries and Member NITI Aayog and proposed a comprehensive roadmap leveraging the expertise and knowledge of global Indian researchers for addressing emerging challenges for universal development.

[Horizon Europe gets extra €4B, as intense budget negotiations end](#)

EU governments and the European Parliament proposed to add another €4 billion for the EU's 2021-2027 Horizon Europe research budget following intense negotiations. While the proposal would require a final nod from parliament and member states, the EU is set to implement its overall €1.8 trillion budget and COVID-19 recovery package. In all, a series of EU programmes gained an additional €15 billion. Among them, the student exchange programme Erasmus+ went up by €2.2 billion, health spending in EU4 Health by €3.4 billion, and the InvestEU programme got an additional €1 billion. Of the restored €15 billion in the total EU budget, €12.5 billion is fresh funding, primarily from competition fines imposed by Brussels. The remaining money comes from reallocated funds, according to the EU Council, which represents the 27 EU governments. The challenge now is to divide extra funds of Euro 4 billion within Horizon Europe fairly, since officials attached to public-private partnerships, new missions, the ERC & Innovation Council all demand for more funds.

[PM dedicates two future-ready Ayurveda institutions](#)

Prime Minister Narendra Modi dedicated two future-ready Ayurveda institutions to the nation. These are the Institute of Teaching & Research in Ayurveda (ITRA), Jamnagar and the National Institute of Ayurveda (NIA), Jaipur. Director General of WHO Dr Tedros Adhanom Ghebreyesus gave a video message on the occasion and praised the Prime Minister's commitment to the universal coverage under Ayushman Bharat and evidence-based promotion of traditional medicines to achieve health related objectives. The Prime Minister thanked WHO and the DG for choosing India for the Global Centre of Traditional medicine. He said that Ayurveda is an Indian heritage and it is a matter of happiness that India's traditional knowledge is enriching other countries also.

SCIENCE POLICY AND DIPLOMACY

[India-Italy cooperation boosted in Science and Technology](#)

Prime Ministers of India and Italy, meeting virtually, agreed to intensify cooperation in high technology, clean energy and energy sector development, infrastructure, food processing. They encouraged respective “national champions” and SMEs to explore new avenues of cooperation. They agreed to work closely during their Presidencies of the G20 in 2021 and 2022. They agreed to increase collaboration and technology cooperation, co-development and co-production, in defence equipment. Indian support to Italy during the Covid 19 pandemic was appreciated and both sides agreed to enhance cooperation in the health sector. They noted the progress made under India-Italy Science and Technology Cooperation and Executive Programme of Cooperation. Both leaders encouraged cooperation between the Italian Space Agency (ASI) and the Indian Space Research Organization (ISRO) and noted the creation of the first joint ASI-ISRO working group in heliophysics. India welcomed Italy as a founding member of CDRI and looks forward to Italy joining ISA. 15 MoUs were signed by the two sides. The two leaders adopted an



[Paving the way for Europe-India Horizon partnerships](#)

Top public and private research institutions in India are building alliances with universities and research institutions under European Union's Horizon Europe 2021-27 programme. Last month, India and the EU agreed to allow Indian researchers to join European Research Council (ERC) funded teams in Europe for periods of up to one year. Under the EU's next Horizon Europe (2021-2027) programme, cooperation in research and innovation is taking place in all areas including the social sciences and humanities. Since the start of the ERC in 2007, some 62 Indian nationals have been awarded an ERC grant. Compared with other non-European grant holders, Indians are ranked third after nationals of the United States and Canada. The OBREAL Global Observatory launched its India chapter to build bridges between Indian and European higher education institutions for research collaboration and mobility of students and academics. The portfolio for joint research aims to include projects on energy, technology, machine learning and artificial intelligence as areas of focus, particularly given India's strengths in technology and links to industry.

[PM highlights support for fighting Covid-19 at ASEAN India Summit](#)

Speaking at the 17th ASEAN-India Summit, Prime Minister Modi highlighted India's response and broader support to the international community in fighting COVID-19, and welcomed ASEAN's initiatives to fight the pandemic. Prime Minister announced a contribution of US\$ 1 million to the COVID-19 ASEAN Response Fund. He reiterated India's offer of US\$ 1 billion Line of Credit to support ASEAN connectivity. The Summit also welcomed the adoption of the new ASEAN-India Plan of Action for 2021-2025.

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Research and Information System for Developing Countries

Core IV B 4th Floor, India Habitat Centre, Lodi Road, New Delhi 110003, India

Tel:-011- 24682176, E-mail: science.diplomacy@ris.org.in

Website: www.fisd.in

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