

NEWSLETTER

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India - Australia Renewable Energy Partnership

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MESSAGE

From the CEO's Desk

It is my privilege to address you and share the remarkable progress of the Skill Council for Green Jobs (SCGJ) as we continue our mission to foster a sustainable and inclusive future. By developing a skilled workforce, we aim to drive India's clean energy transition, a journey marked by significant milestones and impactful initiatives that underscore our commitment to this vital cause.

This year, we witnessed historic collaborations and achievements that will undoubtedly shape the future of green skills and technologies in India and beyond. A standout moment occurred during the second India-Australia Annual Summit, held on the sidelines of the G20 Summit in Rio de Janeiro on November 19, 2024. The Honorable Prime Minister of India, Shri Narendra Modi, and the Prime Minister of Australia, Anthony Albanese, launched the India-Australia Renewable Energy Partnership (REP). Through this partnership, Australia committed to training 2,000 young Indian technicians in solar photovoltaic (PV) technology, collaborating closely with the SCGJ and the private sector. This initiative is a testament to the power of international collaboration in addressing global climate challenges.

In line with India's ambitious target of achieving carbon neutrality by 2070, we are undertaking the monumental task of deploying approximately 5,630 GW of solar capacity. Recognizing that traditional solar PV installations often face land-use challenges, we have championed innovative, land-neutral applications such as floating solar technologies. Training and capacity building around these New and Innovative Solar Applications (#NISAs) are essential to realizing our green energy ambitions.

In December 2024, we organized a two-day workshop on floating solar technologies in partnership with EY India and supported by GIZ India under the TISA project. Hosted at Tawanai Ghar, Jammu & Kashmir, the event included insightful discussions and a visit to the 100 kW floating solar power installation on Dal Lake. Representatives from government bodies, such as JAKEDA and the J&K Skill Development Mission,

joined us in fostering knowledge sharing and collaboration. Workshops like these highlight SCGJ's dedication to bridging gaps and creating synergies among stakeholders in the renewable energy ecosystem.

Green hydrogen remains a cornerstone of SCGJ's strategic initiatives. Through masterclasses and workshops conducted in collaboration with institutions such as GERMI in Gandhinagar and the Tata Power Skill Development Institute, we have built capacity in hydrogen production, storage, transportation, and safety. These efforts, supported by the TISA project, exemplify our commitment to driving innovation and sustainability in renewable energy technologies.

Since our inception, SCGJ has trained over 615,000 individuals across sectors such as solar PV, wind energy, waste management, and green hydrogen, with more than 582,579 certifications awarded. Under PMKVY 4.0, we are addressing the growing demand for skilled professionals in green hydrogen, training candidates for roles ranging from technicians to entrepreneurs. Our goal is to build a robust workforce capable of driving India's energy transition while contributing to the global green economy.

Looking ahead, we are focused on scaling renewable energy adoption through initiatives like the PM Surya Ghar Muft Bijli Yojana, which will train 20,500 Solar PV Installation Helpers. Additionally, international collaborations, such as those with Denmark for off-shore wind energy skills, will further bolster India's leadership in clean energy. Through the TISA initiative and similar programs, we will continue promoting innovative solar applications.



Arpit Sharma
CEO
Skill Council For Green Jobs

History of United Nations Climate Change Conference in short

COP	Year	Host City/Country	Key Focus/Outcome
	1992	United Nations HQ	UN Framework Convention on climate change adopted
COP1	1995	Berlin, Germany	Adopted the "Berlin Mandate," laying the groundwork for future agreements.
COP2	1996	Geneva, Switzerland	Highlighted scientific consensus on climate change, preparing for the Kyoto Protocol.
COP3	1997	Kyoto, Japan	Adoption of the Kyoto Protocol, setting legally binding targets for developed nations.
COP4	1998	Buenos Aires, Argentina	Buenos Aires Plan of Action for implementing the Kyoto Protocol.
COP5	1999	Bonn, Germany	Focused on technical work and implementation strategies for Kyoto Protocol commitments.
COP6	2000	The Hague, Netherlands	Negotiations stalled on implementation rules for the Kyoto Protocol.
COP6-2	2001	Bonn, Germany	Reached the Bonn Agreements, finalizing operational rules for the Kyoto Protocol.
COP7	2001	Marrakesh, Morocco	Adoption of the Marrakesh Accords, finalizing rules for the Kyoto Protocol.
COP8	2002	New Delhi, India	Focused on adaptation and technology transfer for developing countries.
COP9	2003	Milan, Italy	Advanced technical aspects of the Kyoto Protocol implementation.
COP10	2004	Buenos Aires, Argentina	Focus on adaptation and the impacts of climate change on vulnerable countries.
COP11	2005	Montreal, Canada	Entry into force of the Kyoto Protocol; launch of the Montreal Action Plan.
COP12	2006	Nairobi, Kenya	Emphasis on adaptation in Africa and the Clean Development Mechanism (CDM).
COP13	2007	Bali, Indonesia	Adoption of the Bali Road Map, charting the course for a post-2012 agreement.
COP14	2008	Poznań, Poland	Preparation for Copenhagen; reviewed financial mechanisms.
COP15	2009	Copenhagen, Denmark	Copenhagen Accord aimed to limit warming to below 2°C; however, it lacked binding commitments.
COP16	2010	Cancún, Mexico	Cancún Agreements included a framework for adaptation and the Green Climate Fund.
COP17	2011	Durban, South Africa	Durban Platform for Enhanced Action, leading to the Paris Agreement.
COP18	2012	Doha, Qatar	Extended the Kyoto Protocol to 2020 through the Doha Amendment.
COP19	2013	Warsaw, Poland	Warsaw Framework for REDD+ and loss and damage mechanism introduced.

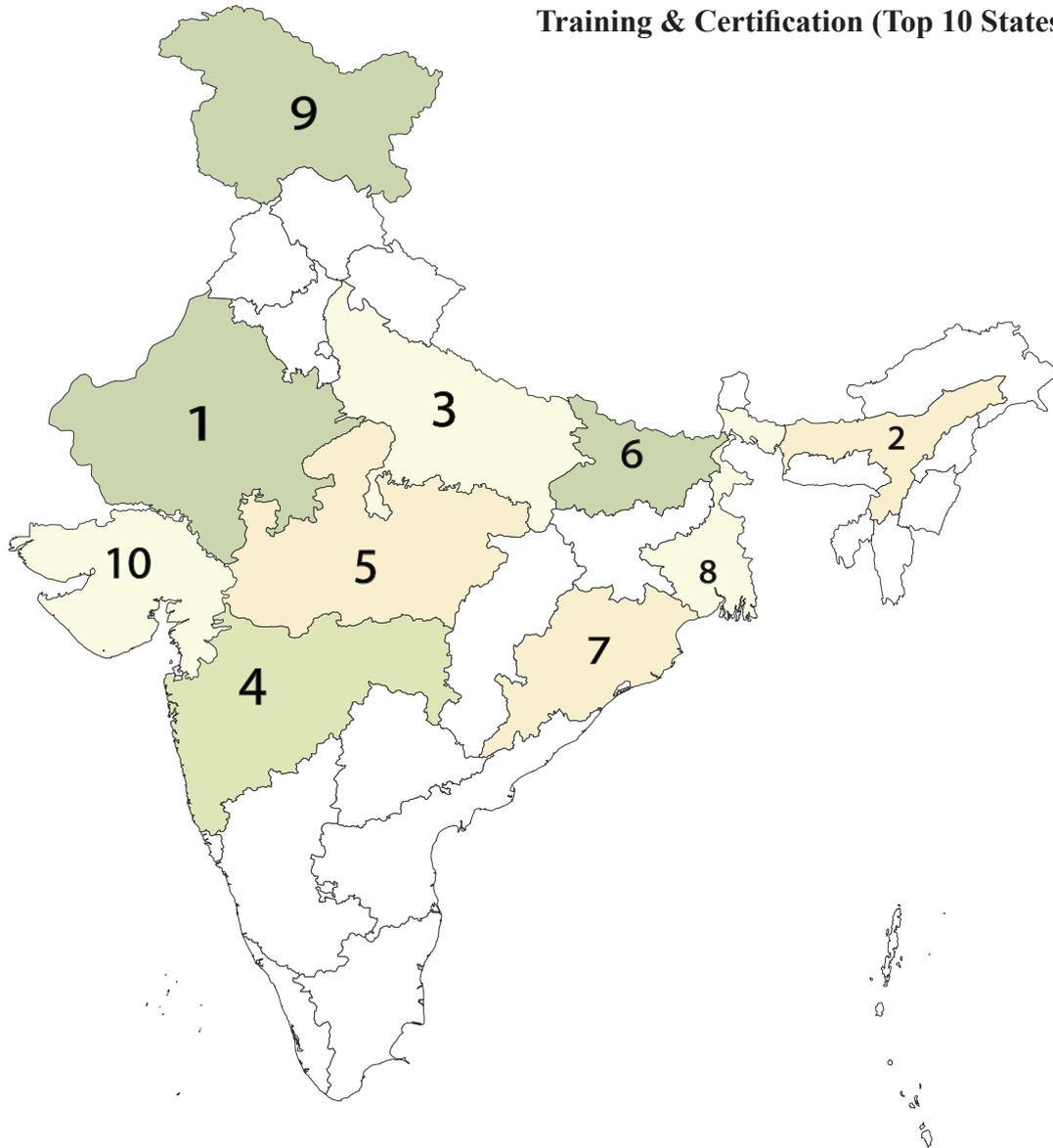
COP	Year	Host City/Country	Key Focus/Outcome
COP20	2014	Lima, Peru	Drafted elements of the Paris Agreement; focused on national contributions.
COP21	2015	Paris, France	Adoption of the Paris Agreement, aiming to limit global warming to well below 2°C.
COP22	2016	Marrakesh, Morocco	Marrakesh Action Proclamation for climate and sustainable development.
COP23	2017	Bonn, Germany (Hosted by Fiji)	Advanced the Paris Agreement rulebook.
COP24	2018	Katowice, Poland	Adopted the Katowice Rulebook for Paris Agreement implementation.
COP25	2019	Madrid, Spain (Hosted by Chile)	Delayed agreement on carbon market mechanisms.
COP26	2021	Glasgow, United Kingdom	Glasgow Climate Pact emphasized coal phase-down and climate finance.
COP27	2022	Sharm El-Sheikh, Egypt	Agreement on a "Loss and Damage" fund for vulnerable countries.
COP28	2023	Dubai, UAE	Comprehensive global stocktaking for Paris Agreement progress.
COP29	2024	(TBD)	Future planning under the Paris Agreement and long-term goals.
COP30	2025	Belém, Brazil	(Expected) Greater emphasis on Amazon forest conservation and indigenous issues.

India's Commitments at COP Conferences

COP	Year	Commitments
COP 21	2015, Paris	Reduce GDP emissions intensity by 33-35% by 2030 (from 2005 levels).
		Achieve 40% non-fossil fuel-based energy capacity by 2030.
		Create 2.5-3 billion tonnes CO ₂ carbon sink via afforestation by 2030.
COP 26	2021, Glasgow	Achieve Net Zero emissions by 2070
		Increase non-fossil fuel energy capacity to 500 GW by 2030.
		Meet 50% energy needs from renewable sources by 2030.
		Reduce emissions intensity of GDP by 45% by 2030 (from 2005 levels).
		Reduce 1 billion tonnes of carbon emissions by 2030.

SCGJ Statistics

Training & Certification (Top 10 States)



587K

Total Training since inception

5252

Total TOT Certified Trainers

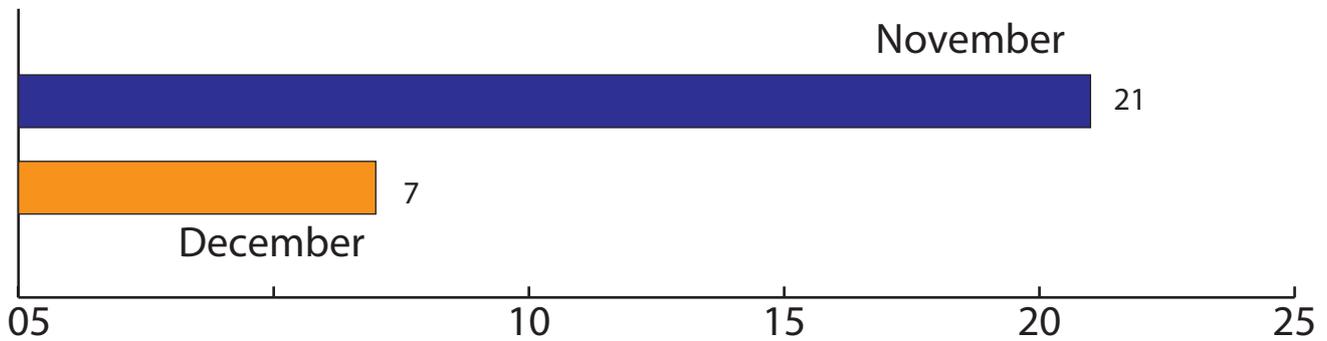
1045

Total Training Centers Affiliated

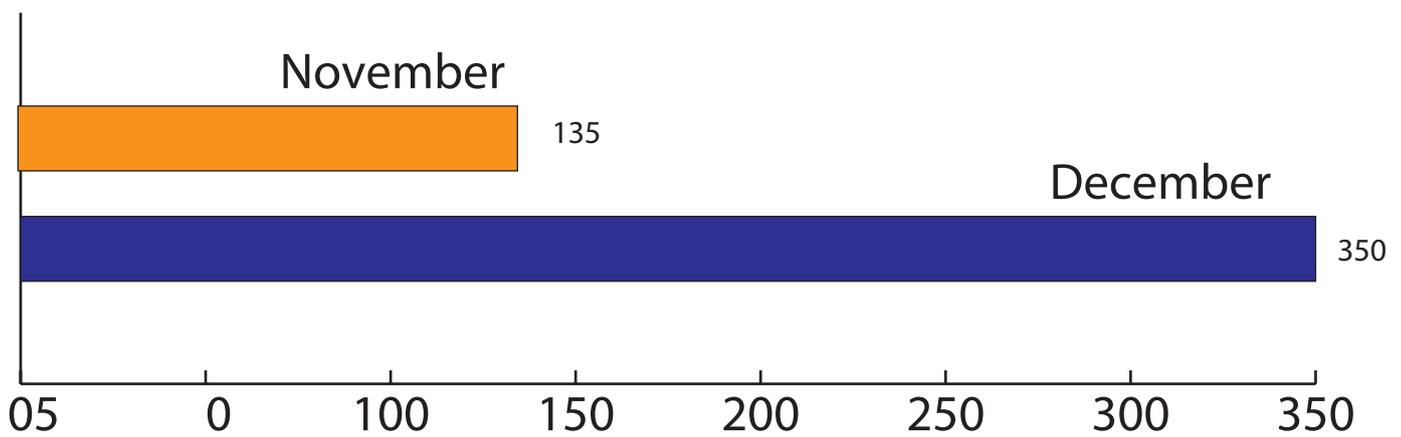
991

Total TOA Certified Assessors

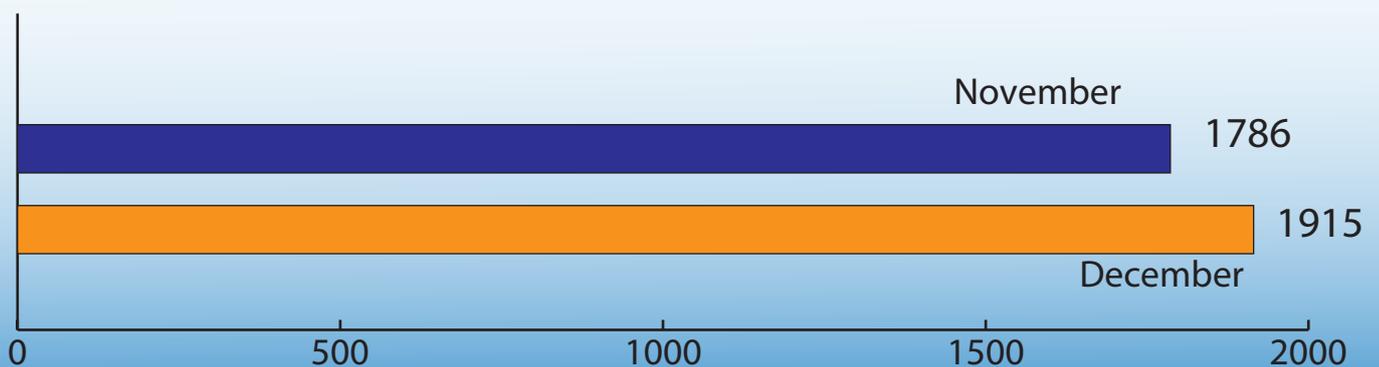
TOA for the month of November and December



TOT for the month of November and December



Training status for the month of November and December



The TISA Project: Advancing in Solar Energy and Green Skills

Launched in January 2024 as part of the Indo-German Energy Programme (INSolar), the TISA Project has emerged as a pivotal initiative in driving India's renewable energy revolution. Supported by GIZ and collaboratively implemented by the Skill Council for Green Jobs (SCGJ) and EY, the project is designed to foster innovation in solar applications while building a skilled workforce to meet the demands of a green economy.

Core Offerings for Transformative Impact

The TISA Project operates with a multifaceted approach, providing four primary services:

01

Capacity-Building Workshops:

Hands-on training sessions that empower participants with the knowledge and expertise required to implement innovative solar technologies effectively.

02

National Study Tours:

Opportunities for stakeholders to explore successful renewable energy installations and gain insights into best practices across India.

03

Conferences and Panel Discussions:

Forums for thought leaders, policymakers, and industry experts to share ideas, address challenges, and chart a path for sustainable growth.

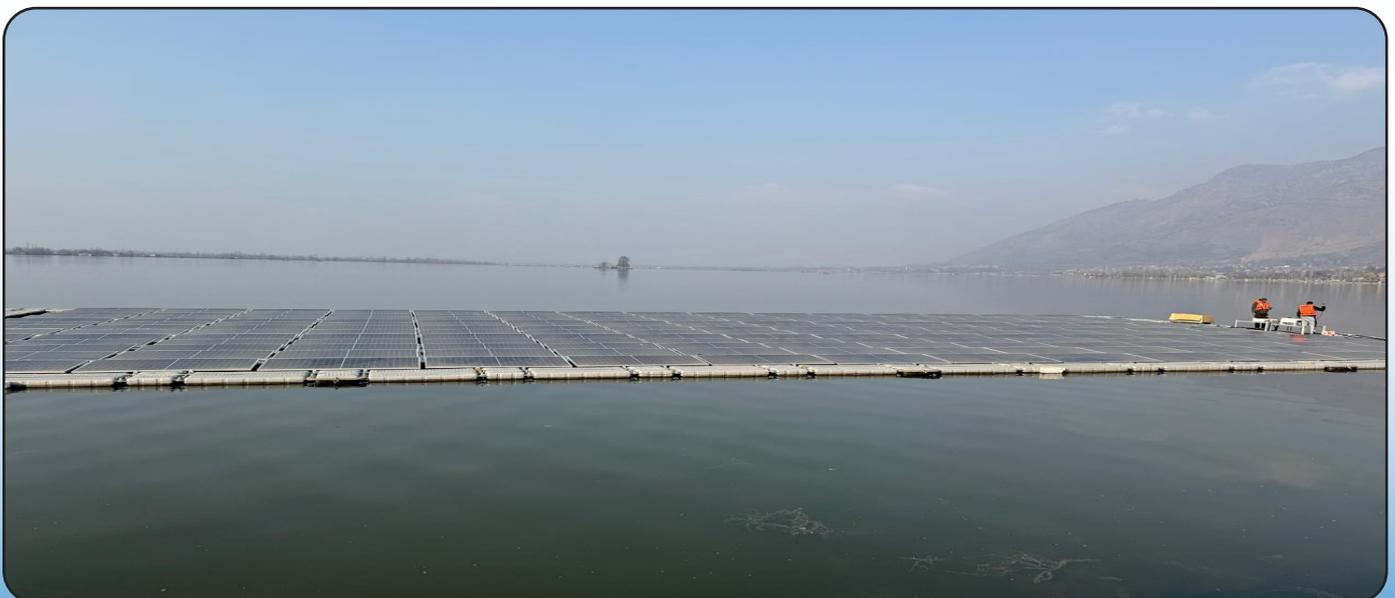
04

E-Learning Platform Development:

Creation of accessible, cutting-edge educational content on solar energy and related green technologies to ensure widespread knowledge dissemination.

Progress and Achievements

Since its inception, the TISA Project has achieved significant milestones. Nine workshops focused on green hydrogen have been conducted, covering crucial aspects like production, storage, and utilization. Additionally, specialized content has been developed on green hydrogen and floating solar technologies, enabling stakeholders to access valuable resources for knowledge enhancement.



Driving Renewable Energy Goals

Running until June 2025, the TISA Project is aligned with India's renewable energy targets and broader sustainability objectives. By enhancing the skilled workforce in solar energy, the initiative is playing a crucial role in reducing carbon emissions and fostering economic growth. With its focus on innovative solar applications, such as floating solar technologies, the project not only addresses land-use challenges but also promotes the adoption of sustainable practices.

A Vision for the Future

At its core, the TISA Project represents a commitment to advancing green skills and technologies. By bridging knowledge gaps, enabling collaboration, and empowering stakeholders, the initiative is paving the way for a future powered by clean energy. As it progresses toward its goals, the project stands as a beacon of innovation and sustainability, ensuring that India remains at the forefront of the global renewable energy movement.

**JAMMU****GERMI | GANDHINAGAR**

SCGJ ACTIVITIES

MoU with Avaada Group

The Skill Council for Green Jobs (SCGJ) signed a Memorandum of Understanding (MoU) with the Avaada Group to advance workforce development in the green hydrogen sector. This collaboration, conducted under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) 4.0 and the Skilling, Re-Skilling, and Upskilling Scheme under the National Green Hydrogen Mission, focuses on providing specialized training to equip individuals with the necessary skills to support India's green energy transition. Together, SCGJ and Avaada Group aim to build a skilled talent pool to contribute to India's mission of developing a competent workforce in the green hydrogen domain.



India-Australia Renewable Energy Partnership (REP)

The Hon'ble Prime Minister of India, Shri Narendra Modi, and the Prime Minister of Australia, Anthony Albanese, held the second India-Australia Annual Summit on the sidelines of the G20 Summit in Rio de Janeiro on 19 November 2024.



The Prime Ministers welcomed the launch of the India-Australia Renewable Energy Partnership (REP). Australia will collaborate with Skill Council for Green Jobs and the private sector to train 2,000 young Indian technicians in solar PV technology.



joint press release



watch the video

International Conference on Sustainability, Waste Management, and Environment (ICSWME-2024)

GreenBrigade Pvt. Ltd, in collaboration with the Skill Council for Green Jobs (SCGJ), organized the International Conference on Sustainability, Waste Management, and Environment (ICSWME-2024), dedicated to promoting innovation, sustainability, and collaborative solutions in environmental management. The event took place on December 20th, 2024, at Westford University College, Al Zahia campus, Sharjah, United Arab Emirates.



Promoting Land-Neutral and Dual-Use New & Innovative Solar Applications

The Government of India had set an ambitious target of achieving carbon neutrality by the year 2070, which would require the cumulative deployment of approximately 5630 GW of solar capacity by 2070. At the time, solar PV installations were highly dependent on ground and rooftop spaces. The land use for energy generation faced competition from other socio-economic usages, directly affecting natural habitats and ecosystems. New and innovative solar applications were identified to play a vital role in achieving this ambitious target, considering their land-neutral and dual-use properties. Training and capacity building on New and Innovative Solar Applications (#NISAs) for various stakeholders, including government bodies and policymakers, was deemed necessary for their effective and efficient deployment.

A two-day workshop on floating solar technologies was jointly organized by the Skill Council for Green Jobs (SCGJ) and EY India as part of the TISA project supported by GIZ India. The event took place on December 12–13, 2024, at Tawanai Ghar, Department of Science & Technology, Jammu & Kashmir Energy Development Agency (JAKEDA), Kashmir, and featured insightful sessions on floating solar technologies and their implementation. A key highlight of the program was a site visit to the 100 kW floating solar power installation on Dal Lake. Participants included representatives from various stakeholders, such as government organizations like JAKEDA, JKPTCL, JKPDC, and officials nominated by the J&K Skill Development Mission.

The workshop provided a platform for knowledge sharing and capacity building, fostering collaboration among stakeholders in the renewable energy sector.





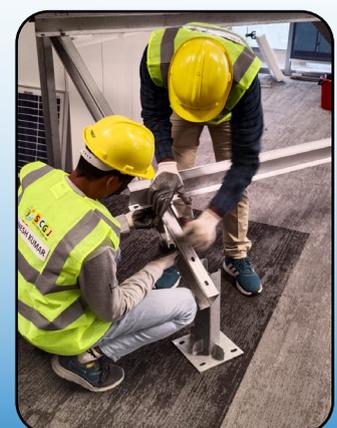
Recognition of Prior Learning (RPL) training program on Green Hydrogen

The Skill Council for Green Jobs (SCGJ) conducted a three-day Recognition of Prior Learning (RPL) training program on Green Hydrogen (GH₂) at the Karnataka Renewable Energy Development Limited (KREDL) facility in Bangalore. Held from November 5 to 7, the program offered industry professionals engaging sessions on Green Hydrogen technologies and their practical applications. A notable feature of the event was a guided visit to the Indian Institute of Science (IISc), led by Professor Dasappa, where participants had the opportunity to explore groundbreaking advancements and research in hydrogen energy. The training comprehensively addressed essential topics, including green hydrogen generation, operational practices, and safety protocols.



Hands-on masterclass on Rooftop Solar Installation at IAGE

The Skill Council for Green Jobs (SCGJ) recently organized a comprehensive ten-day hands-on masterclass on Rooftop Solar Installation at IAGE. This intensive program was designed to equip participants with practical knowledge and technical skills essential for the successful installation and maintenance of rooftop solar systems. Covering critical aspects such as system design, installation techniques, safety protocols, and troubleshooting, the masterclass aimed to bridge the skill gap in the renewable energy sector. Industry experts and seasoned professionals facilitated the sessions, ensuring a robust learning experience through real-world applications and interactive workshops. This initiative underscores SCGJ's commitment to fostering green skills and supporting India's renewable energy targets.



Kaushal Acharya Award 2024

At the esteemed 34th IISSM Annual Global Conclave 2024, the Skill Council for Green Jobs (SCGJ) was bestowed with the prestigious Kaushal Acharya Award 2024 by the International Institute of Security and Safety Management (IISSM). This accolade highlights SCGJ's steadfast dedication to promoting skill development within green sectors and advancing sustainable practices across diverse industries. Accepting the award on behalf of SCGJ, Mr. Sarvesh Pratap Mall marked a moment of pride for the organization. The recognition celebrates SCGJ's pioneering initiatives and its substantial contributions to cultivating a skilled workforce in alignment with national sustainability objectives. Through its efforts to address key challenges in renewable energy, green technologies, and environmental preservation, SCGJ continues to play a transformative role in shaping a sustainable future while setting exemplary standards for skill development and environmental leadership.



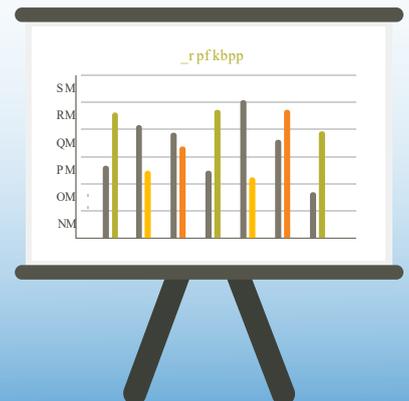
Kaushal Acharya Award 2024



Windergy India 2024

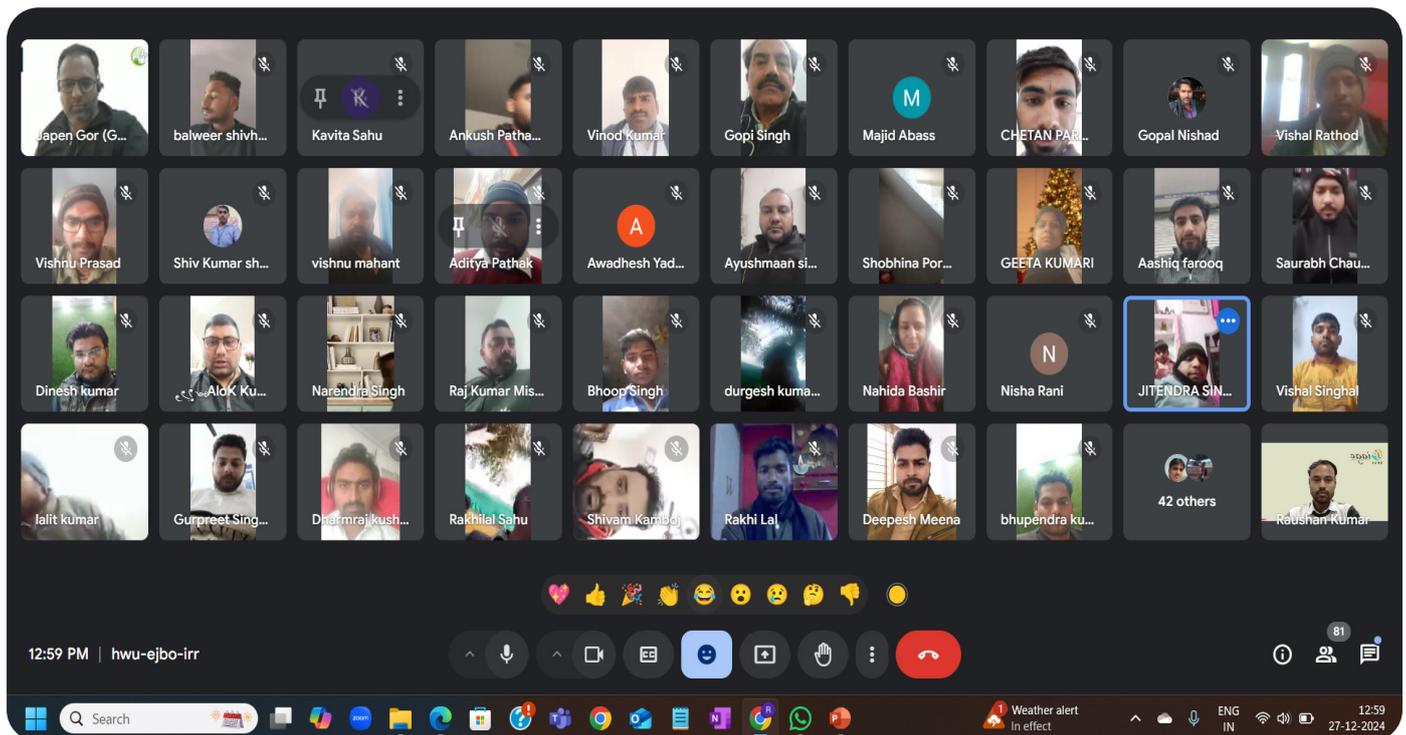
Skill Council for Green Jobs (SCGJ) participated in Windergy India 2024, held in Chennai, Tamil Nadu. Among the highlights was the academia session, which covered a diverse range of topics, including a key session titled "The Role of Renewable Energy in the Green Economy Transition and Sustainable Job Creation." The speaker of this session was Ms. Sangeeta Patra, Vice President and Head of Marketing and Partnerships at SCGJ, who underscored the importance of renewable energy in advancing a green economy while laying the emphasis on through skills, National Apprenticeship promotion Scheme (NAPS), National Apprenticeship Training Scheme (NATS) & NSDC JobX Portal.

The third and final day of Windergy India 2024 marked the close of this impactful sixth edition, concluding with a forward-looking vision centered on Green Jobs as drivers of a sustainable future. The event floor was filled with energy and inspiration, reflecting the enthusiasm and commitment of industry leaders, IITians and specific attendees as the day commenced.



Training of Trainers (TOT) at IAGE

A Training of Trainers (ToT) program was organized by the international Academy for Green Energy (IAGE) from December 25th to 27th. The training was conducted by experts Japan Gor and Raushan Kumar and focused on two key Qualification Packs (QPs) in the solar energy sector: Solar PV Installer (Suryamitra) (SGJ/Q0101) and Solar PV Installation Helper (SGJ/Q0111). This initiative aimed to enhance the technical skills and pedagogical capabilities of trainers, equipping them to deliver high-quality training in solar photovoltaic installation and support roles, thereby contributing to the growth of skilled professionals in the renewable energy domain.

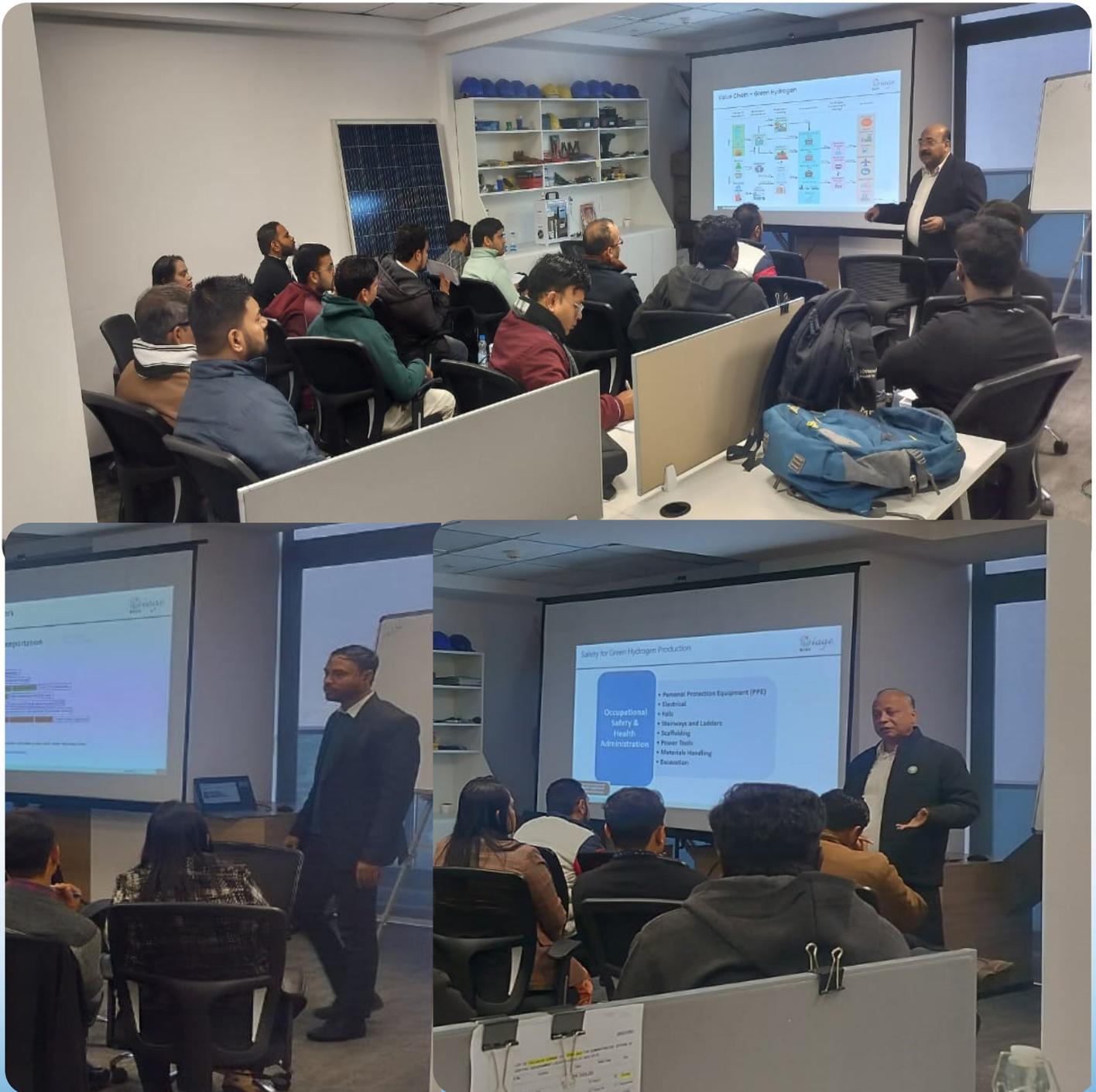


Electrolyzer @ IAGE



Training of Trainers (TOT) Green Hydrogen

A three-day Training of Trainers (TOT) program on green hydrogen was conducted from January 17 to 19, focusing on building capacity and expertise in this emerging energy sector. The program aimed to equip participants with advanced knowledge, practical skills, and pedagogical tools to train others effectively in the production, storage, and application of green hydrogen technologies. Key sessions covered the fundamentals of electrolysis, integration with renewable energy sources, policy frameworks, and financial models to promote green hydrogen adoption. The initiative emphasized fostering a skilled workforce to support global transitions toward clean energy and achieving long-term sustainability objectives..



Latest /Revised Qulification Packs 2024

S.No	Qualification Pack	Level	QP Code
1	Solar PV Installer (Suryamitra)	4	QG-04-ES-02628-2024-V2-SCGJ
2	Rooftop Solar Grid Junior Engineer	5	QG-05-ES-02627-2024-V2-SCGJ
3	Safai Mitra	3	QG-03-ES-02634-2024-V2-SCGJ
4	Solar Lighting Assembler	4	QG-04-ES-02630-2024-V2-SCGJ
5	Solar PV Installation Helper	2	QG-02-ES-02632-2024-V2-SCGJ
6	Solar PV Module Manufacturing Technician	4	QG-04-ES-02633-2024-V2-SCGJ
7	Solar PV Installer - Electrical	4	QG-04-ES-02629-2024-V2-SCGJ
8	Solar Water Pumping Junior Engineer	5	QG-05-ES-02631-2024-V2-SCGJ
9	Water Technology	4.5	QG-4.5-ES-01816-2024-V1-SCGJ
10	Renewable Energy	4.5	QG-4.5-ES-01818-2024-V1-SCGJ
11	Agrivoltaics Installer Electrical	4	QG-04-ES-02029-2024-V1-SCGJ
12	Biomedical Waste Management Nursing and Paramedical Staff	4.5	NM-4.5-ES-02106-2024-V1-SCGJ
13	Electrolyzer Manufacturing Plant Supervisor	5	QG-05-ES-02028-2024-V1-SCGJ
14	Electrolyzer Manufacturing Plant Technician	4	QG-04-ES-02027-2024-V1-SCGJ
15	GHG Accounting and Sustainability Reporting	6	NM-06-ES-02105-2024-V1-SCGJ
16	Fundamentals of Financing for Green Hydrogen Project	6	NM-06-ES-02253-2024-V1-SCGJ
17	Overview of Instrumentation and Control for Green Hydrogen Plant	6	NM-06-ES-02254-2024-V1-SCGJ

Outlook of webinars under AKAM & its future prospective

By P B Singh (SCGJ)

Azadi Ka Amrit Mahotsav (AKAM) was an initiative of the Government of India to celebrate and commemorate 75 years of India’s independence and the glorious history of it’s people, culture, and achievements. The Mahotsav was dedicated to the people of India who have not only been instrumental in bringing India thus far in its evolutionary journey but also hold within them the power and potential to enable Prime Minister Narendra Modi’s vision of activating India 2.0, fuelled by the spirit of Aatmanirbhar Bharat.

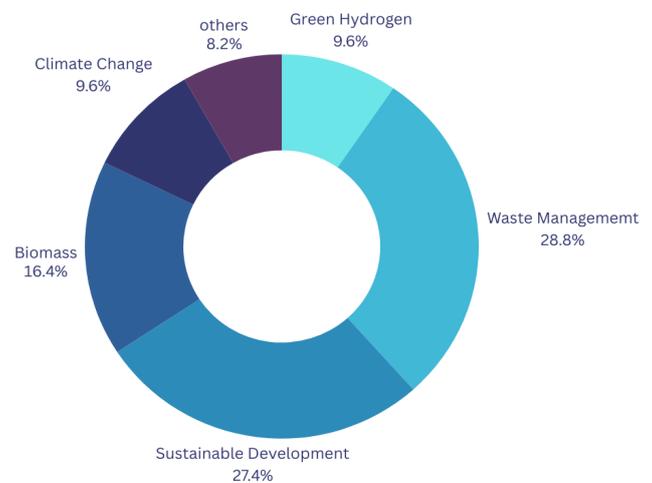
As a part of the ‘Azadi ka Amrit Mahotsav’, the Skill Council for Green Jobs (SCGJ) organized a series of 100 Webinars on Sustainable Development, Renewable Energy, and Waste Management by inviting eminent and learned Speakers to share recent developments in these sectors. The first Webinar in the series was launched on 24th September 2021 and inaugurated by Mr. Sameer Gupta-Chairman (SCGJ), and Dr. Praveen Saxena-CEO (SCGJ).

During the journey of 100 webinars, around 110 speakers shared developments in different domains. More than 6,000 participants attended and benefited on different subjects.

Key Sectors Covered in the Webinars:

The Skill Council for Green Jobs covered various Key sectors through the webinars. The webinars covered seven main key sectors – viz. Solar PV (RE), Green Hydrogen, Biomass, Climate Change, Sustainable Development, Waste Management, and Others. The details are given in the figure below.

Webinars under Andi Ka Amrit Mahotsav		
S.No	Topic (Category)	No. of Webinars
1	Solar	27
2	Green Hydrogen	7
3	Waste Management	21
4	Sustainable Development	20
5	Biomass	12
6	Climate Change	7
7	Others	6
	Total	100



The main objective of SCGJ is to create a strong and vibrant ecosystem for quality training and skill development in the green job sector in the country. Also, after skill gap study in various sub sectors, SCGJ has developed around 62 valid qualifications. Such as Solar PV Installer (Surya Mitra), Solar PV Installation Helper, Green Hydrogen Plant Technician, Green Hydrogen Plant Entrepreneur, Agri-residue Aggregator, Biomass Depot Operator and Wind Energy etc. are important in themselves. Skill Council for Green Jobs (SCGJ) is always ready to provide quality training and skill development keeping in mind the above subject. Proper use of qualifications can prove to be effective in online trainings. Unskilled manpower can be reduced by providing quality training and skill development to unskilled youths and related people through appropriate qualifications.

Comparison of a Physical Seminar and Webinar: When you go to a physical event, you can only learn one time. If you don’t make the notes properly, you might end up with less knowledge. You would never be able to get full insights whenever you require it. However, this scenario doesn’t happen in webinars. After attending a webinar, you can easily access all the information with the help of recordings. You just need to play the recording and you get access to the full event. It seems like you are attending the webinar again and again and can polish your skills. These are some benefits of webinars. Therefore, if you want to enhance your knowledge and polish your career counselling skills, attending the webinar could help you out.

Benefits of Webinars: Webinars have a lot to offer. You can reach out to anyone from the world with a webinar. A webinar is an online event where you present images, videos, and presentations, and have a discussion with the participants. Webinars at SCGJ were hosted on the Zoom platform. You can also host live polls and surveys with the audience to make the webinar more engaging. The participants can communicate with the host in a webinar with the help of features like live chat, whiteboard, etc. A ‘webinar’ is the amalgamation of the two words ‘web’ and ‘seminar’. These are online events to spread awareness about any particular topic.

Webinars are one of the most effective channels through which businesses can generate qualified leads that could, in turn, help with conversions. It is an environment where you can build relationships with your target audience and nurture your leads. Some key benefits of hosting webinars are shared below.

Knowledge & Upskilling: The biggest benefit of attending webinars is the sharing of knowledge. Webinars are great sources of information. These are like personal sessions where you can easily share your perspectives, ask questions, and get engaged with large audiences.

Networking: It seems a bit difficult for everyone to connect with each other in physical events. However, this barrier gets eliminated in the webinars. People can ask questions, participate in polls, and take part in other activities. This is a great way of engaging with others, learning and growing. One of the best ways to maintain your existing customers is to keep them engaged, and what could be a better way than to have a webinar where the customers can interact through polls and Q&A sessions. Webinars are a way of highlighting your products’ benefits organically in front of your customers.

Time & Money Savers: Webinars are convenient and easy to attend. People used to go on long journeys to attend seminars. It is not possible to attend more than one seminar in different cities. However, webinars have made it easier. These events eliminate the need to travel and make it easier and cheaper for attendees and organizers alike. During the COVID situation where people were under lockdowns, online events made it possible for everyone to be connected with

others professionally.

The fact that hosting a webinar doesn’t cost much money is one of its finest features. You avoid the expenses for the participants’ travel, lodging, meals, and other amenities. A webinar can be the ideal substitute if you want to reach a big audience with a low-cost solution.

Conclusion: According to above webinars shows that most participants are interested in attending some interactive online lectures. Zoom link and YouTube is one of the available platforms from where trainees/ participants can attend different topics. Face to face interaction is required to clear doubts and get proper knowledge. In this direction webinar is a good educational tool. This enables participants/trainees to interact face to face through a computer or mobile in real time and therefore is much more effective in imparting knowledge.

The proper use of qualifications can prove to be effective in online trainings. Unskilled manpower can be reduced by providing quality training and skill development to unskilled youths and related people through appropriate qualifications. The interactive Webinar session on the deferent topics organized by Skill Council for Green Jobs In addition to providing the useful insights in the webinars provided the intuition into ways that it can contribute to a healthy environment.



Building-Integrated Photovoltaics (BIPV): The Future of Sustainable Architecture

Building-Integrated Photovoltaics (BIPV) is revolutionizing present modern construction by integrating energy into forms, functions, and performances during structural construction. BIPVs unlike conventional solar panels are deployed between/within the building's fabric performing as roofs, walls and also windows. This disruptive paradigm does offer an environmentally safe strategy toward energy generation maintaining equally in aesthetic and practical virtues of the structure.

BIPV is often promoted because of the interest in net-zero energy buildings and because it meets the global targets for sustainability on a grand scale. Photovoltaics can be directly integrated into the design, thus avoiding separate installations for solar, with multiple advantages in terms of energy, cost savings, and probably environmental impacts.

The dual function of BIPV

BIPV-based systems can perform several operations and have become a defined feature. The photovoltaic parts generate clean electricity through their functionality while acting as other construction materials. Thus, they act in such a way so that it is no longer essential to use the building shingles, glass, or even cladding, and materials costs reduce with improved energy efficacy. Also, the structural design does not disturb when using BIPV but integrates smoothly with a structure for sleek and modern, smooth outlook, hence appropriate urban and rural landscape designs.

Benefits of BIPV

BIPV systems have many advantages that make them very interesting for sustainable building projects. One of the major features is aesthetic integration, which allows them to be harmoniously integrated within the architecture of the building, eliminating the bulky appearance typical of traditional solar panels.

Another major benefit is energy efficiency. BIPV will generate renewable energy onsite, significantly cut the use of external power and also lowering greenhouse emissions. BIPV will also serve as an answer to city areas with minimal space as existing structures, like building walls and rooftops, are used in generating energy.

Though the initial offset of higher installation costs are absorbed, later the cost savings occur in the form of

lower energy costs and the replacement of traditional building materials. In addition, several governments provide tax breaks and grants for renewable energy installations, which increase the economic feasibility of BIPV projects.

BIPV systems contribute to environmental sustainability as they apply renewable energy sources, working towards the attainment of global climate goals such as those adopted in the Paris Agreement. Reducing the carbon footprint of buildings achieved by the BIPV system diminishes the adverse impacts of climate change and encourages greener cities.

Key elements of BIPV

The effectiveness of BIPV systems is derived from their components. Modules remain the core of a photovoltaic system, where sunlight becomes electricity. Modules can be made to use silicon-based cells or other advanced thin-film technologies-both flexibility in application and the appearance.

Other key components included the inverter, which converts DC power directly generated in the solar cells to alternating current, the supply feeding the building, and the mounting structures ensured secure integration of photovoltaic components within the building envelope without weather-tight construction and structural harm.

This could integrate discrete energy storage systems, including batteries to store excess electricity to be used at low light times, further enhancing the system's energy independence and reliability.

Utilizations and Multifunctionality

BIPV systems can be integrated with any type of building element. This makes them versatile. Roofing systems may use solar shingles or tiles instead of the normal roofing material to provide durability and energy generation. Facade systems integrate photovoltaic panels into curtain walls or cladding and become energy producers and aesthetic elements at the same time. Lastly, glazing systems, such as semi-transparent PV glass, may be used in windows, skylights, or atriums for the penetration of natural light while generating electricity.

This makes BIPV systems highly suitable for urban settings and large industrial ventures, where space efficiency and energy delivery are respectively at a premium.

Problems and Issues

Despite the benefits, BIPV systems present several challenges. Installation costs and specialized materials are much more expensive than traditional solar panels or conventional building components, which could be a disadvantage for widespread adoption, particularly on budget-driven projects.

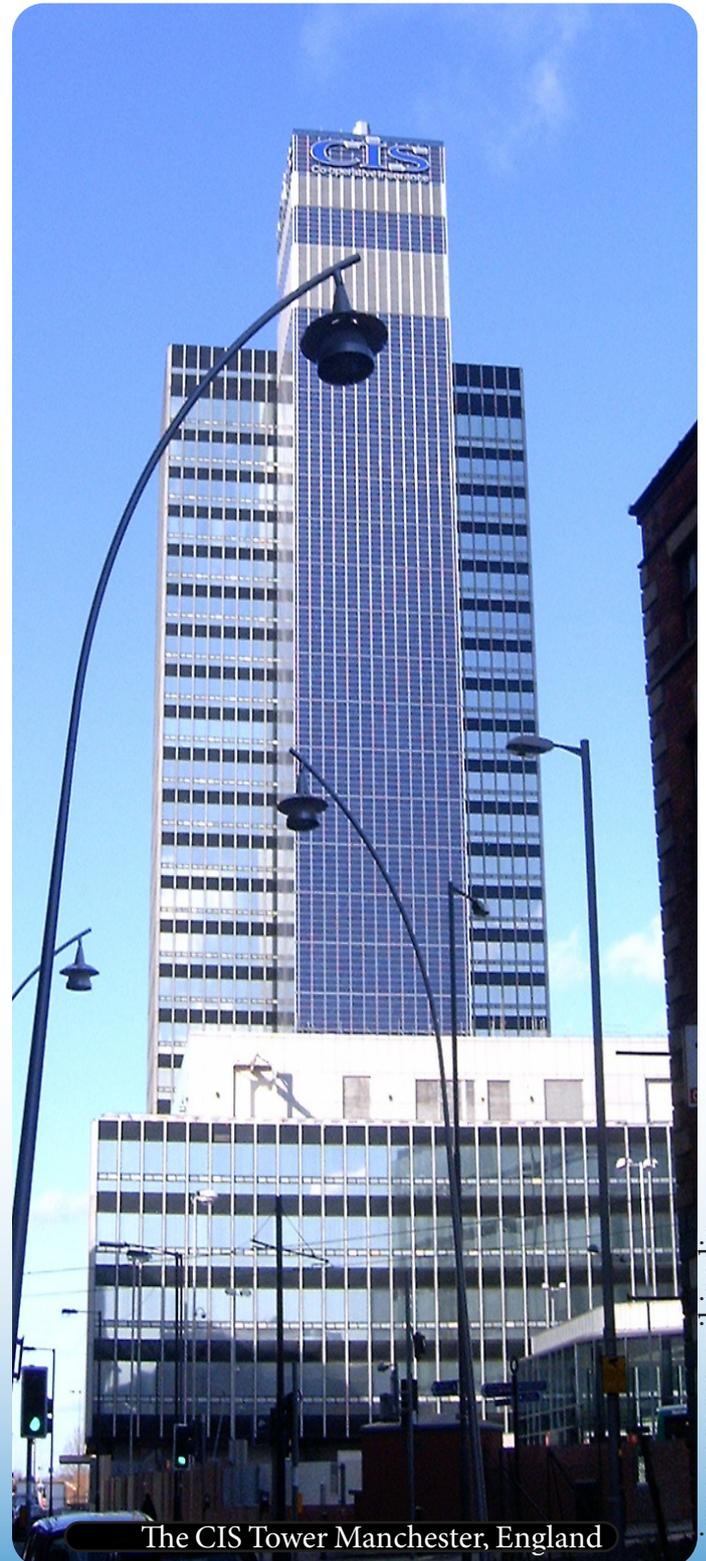
Additional environmental characteristics have on the efficiency of BIPV systems include orientation, shading as well as the conditions specific in a particular region or environment, thus meaning that designs plus building should be in place enhance producing energy. BIPV designs/implementation into buildings will generally need to follow set standard building codes and regulatory features that complicate installing systems.

Maintenance is another challenge as integrated systems are hard to assess for repairs compared to traditional solar installations. The long-term performance of BIPV requires regular maintenance and proper use of durable materials in construction.

The Future of BIPV BIPV will become a basic element of the sustainable architecture and urban development as its photovoltaic efficiency advance, material innovations, and new integration techniques can reduce costs as well as become more efficient. For instance, perovskite solar cells guarantee higher efficiencies with tandem technology, but lightweight and flexible materials bring about much greater application variety.

Economic incentives, such as renewable energy credits and carbon taxes, are also making BIPV systems more accessible to developers and homeowners. With the push towards smart cities and net-zero carbon goals, the demand for energy-efficient buildings with integrated renewable energy systems will only grow. In addition, cases such as Swiss Tech Convention Center and Tesla Solar Roof indicate that BIPV systems are realizable and beneficial in practical situations. Projects show how BIPV can be integrated into residential, commercial, and industrial constructions. Conclusion: Building-Integrated Photovoltaics is the leap into sustainable construction and energy generation. Directly integrated with the envelope of the building, BIPV systems have been shown to be a very practical remedy that is aesthetically pleasing against modern urbanization and climate change. As these

technologies become increasingly more efficient and cost-effective, BIPV is well-positioned to have an important role in shaping the architectural and energy futures. Investment by developers, architects, and policymakers is not only a step in the direction of sustainability but also a commitment to innovation and environmental stewardship.



The CIS Tower Manchester, England

image source : wikipedia.

Global Investment Trends in Renewable Energy

The renewable energy sector is gradually morphing into the main engine of the global transition towards a sustainable energy system. It is at the heart of addressing such issues as climate change, energy security, and economic growth. Investment in renewable energy is now skyrocketing, spurred by the decreasing costs of renewable technology, government policies making renewables cheaper, or the urgency of international climate goals like those laid out in the Paris Agreement.

In 2023, renewable energy investments worldwide came to an all-time high of \$495 billion, exceeding investments in traditional energy in some regions. By far more than any other renewable sources, the funding sought for solar and wind energy is, therefore, establishing these two technologies as the backbone of all renewable energy systems worldwide. This increase is, therefore, demonstrating a growing consensus that renewable energy is not a necessary environmental option but rather an economically viable one.

A Global Landscape of Investment

Investment in renewable sources of energy has been changing the landscape of energy markets worldwide. The Asia-Pacific region leads with China and India being specifically instrumental in this change, which can be most clearly noted in solar and wind power development. China alone still is the number one single investor, continuously giving priority to large-scale renewable energy projects.

Europe has its importance on and is majorly marked with offshore wind farms and green hydrogen infrastructure. Unmatched growth from the European Green Deal carved by such plans has come aligned with those recovery plans in respect of long-term sustainability.

In North America, the USA has shown improvement in renewable energy projects due largely to the Inflation Reduction Act (IRA). This law has set out significant incentives for photovoltaic, wind, and storage systems to create a favorable environment for public and private investment.

Emerging markets are starting to renew their shine in Africa and Latin America, though they mostly suffer challenges regarding finance and infrastructure. Beacons of progress in such instances are Morocco's giant solar farms and Brazil's wind energy projects,

which underscore the potential of the Global South.

Driving Forces Behind Renewable Energy Investments

Several key factors underpin the fast pace of renewable energy investments. One of the most important of them is the declining price of renewable technologies. With the melting LCOE of solar and wind energy, these options are priced not only competitively with fossil fuels, but they often prove cheaper. Technological advances and economies of scale support it.

Government policies and incentives play a prominent role as well. Instruments like tax breaks, feed-in tariffs, or renewable portfolio standards create an investment-friendly environment. International accords such as the Paris Accord also add to their encouragement so that countries together form a common onus towards carbon emission mitigation.

Private corporations have emerged as key players in this energy transition. Many companies include renewables in their quest for ambitious sustainability targets. Power purchase agreements (PPAs) and direct investments in renewable projects are becoming increasingly normalized, marking the acceptance of clean energy as good for the planet and the wallet by the private sector.

Another radical trend is in the growth of green finance. These include the green bonds and ESG (environmental, social, and governance) investment strategies that opened new lanes for financing renewable energy projects and, indeed; in the year 2023 only, new green bond issuance related to renewables exceeded \$300 billion worldwide, pointing to an ever-increasing convergence between financial markets and sustainability objectives.

The Key Players in Renewable Energy

The Solar energy continues to attract the largest percentage of investments in renewable energies, attracting almost 60% of total global investments. It has made itself an almost ubiquitous solution, from city rooftop applications to that of large-scale solar farms in very remote areas. The distributed generation of solar systems has further democratized access to clean energy around the world.

Wind has proved to be one of the backbone renewable-energizing sources in the renewable sector. Growth has been remarkable among offshore wind projects, especially in Europe, Asia, and North America. Floating wind farms, which further extend the reach of wind energy into deeper waters, are one of the new frontiers of this promise. In the meantime, onshore wind continues to offer the greatest investments and cheaper opportunity for energy generation from wind.

Green hydrogen is capturing attention fast and is now considered the next big thing for transforming an energy source, especially for industries that are having a tough time decarbonizing. Provided and fast-tracked investment in electrolyzers and hydrogen storage infrastructures are growing rapidly in Europe and Asia in conjunction with government and private investors in developing the energy source.

Modern energy systems are also becoming dramatically dependent on energy storage. Attention is now turning toward battery energy storage systems (BESS), which allow balancing associated intermittent renewables across electricity systems. Advances in battery technology continue to propagate grid stabilizing forces while creating much better potential for widespread renewable energy use.

Challenges and Opportunities

Yet, the renewable energy industry has succeeded in making rapid progress over the years. For instance, the more developing countries often have to deal with issues such as limited access to affordable proper finances and high costs of capital. Such an implication hampers possible implementation of large-scale renewable projects, even in areas that are naturally endowed.

Another issue is grid infrastructure. Aging systems and limited capacity to absorb renewable energy are critical obstacles, particularly in some regions moving to rapid energy transformations. Without substantial investments in modernization of the grid system, the true potential of renewal energy systems cannot be realized.

The other barrier is policy uncertainty. Inconsistent or unclear regulatory regimes can easily put deterrence in investment and undermine the long-term planning needed for large-scale projects.

However, these hurdles pose many avenues for great opportunities. The most promising avenue is the public-private partnerships (PPPs), which really lend

themselves to creating a model for closing the financing gap and accessing technical expertise. Technology is at work, with innovation in AI-driven energy management systems and next-generation storage

Change in investment by countries between 2019- 2024

Country/Region	Investment in 2019 (USD Billion)	Investment in 2024 (USD Billion)
China	134	273
Europe	125	134
United States	80	114
India	44	53
Rest of World	100	150



Stubble burning in India: an agricultural evil persisting



The activity of stubble burning is very common in India, especially in the northern states of Punjab, Haryana, and Uttar Pradesh, where agricultural producers burn crop residues left in the fields after harvest. This practice is fundamentally related to the mechanically harvested paddy and wheat, which leave heavy residues that are not collected. Even though it economizes a lot and saves more precious agricultural production time for those working in constrained timelines, this technology entails far-reaching implications for the ecology system, community health, and financial stability. Due to the efforts of several governments and the increased vigilance of society, burning stubble remains a widespread practice, particularly during the autumn season when its effects are manifest on atmospheric conditions.

Causes of Stubble Burning

One of the principal reasons for stubble burning is that there is a very tight schedule between harvesting paddy and planting wheat, where farmers get only about 20 to 25 days to prepare their fields and such land clearance by burning remains the quickest and most economical method for them. This causes an increased problem because the combine harvester leaves behind stalks of 12 to 18 inches, which are laborious and expensive to remove through manual extraction. Economic constraints are also major factors; most of the smallest and marginal farmers cannot afford the financial inputs required for sustainable residue management systems.

Policies that promote rice cultivation, mainly water-dependent in the regions of Punjab and Haryana, along with assured government procurement at Min-

imum Support Prices (MSP), have led to widespread paddy agriculture and over residues.

Environmental and Health Effects

High intensity in terms of environmental impact is associated with stubble burning. Significant results of the ecological impacts from the same include the worsening of air quality due to emission of pollutants, namely, particulate matter (PM2.5 and PM10), carbon dioxide, carbon monoxide, methane, and nitrogen oxides. Throughout the season associated with stubble burning, the quality of the air of places like Delhi and NCR frequently decline into dangerous levels, posing public health crises.

They enhance the rates of global warming through climatic alterations caused by their releases. On another dimension, burning destroys beneficial nutrients and microorganisms that live in soil, contributing to long-term soil degradation and decreased agricultural productivity.

The health implications are equally disturbing. Increased exposure to the emissions resulting from stubble burning has been related to an increase in respiratory illnesses, such as asthma, bronchitis, and COPD. Vulnerable groups of populations affected by it are children, old persons, and those with other previous conditions. The admission in hospitals for respiratory and cardiovascular diseases increases during the season of burning, and both the individual and the public health system bear the increased healthcare costs. In addition, the reduced air quality impinges on productivity in urban areas and also disrupts daily activities.

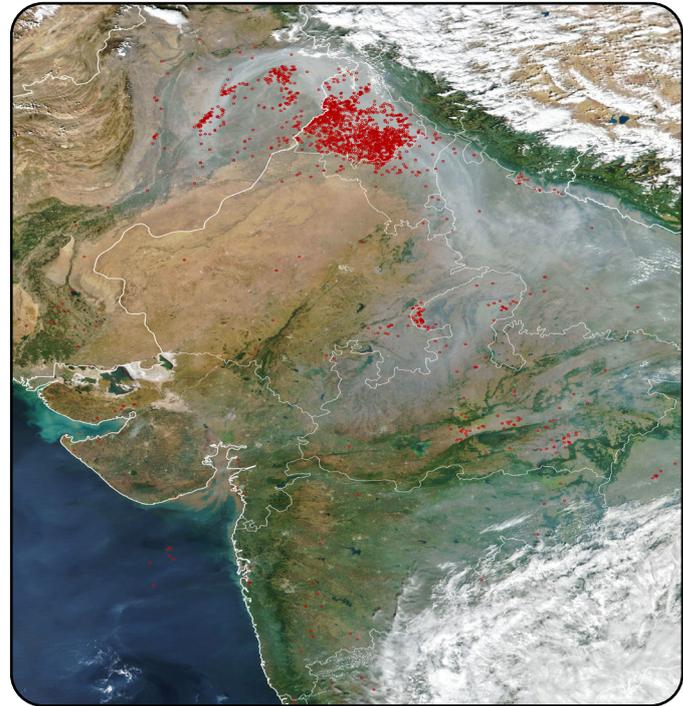


Image source: NASA

Government Responses and Challenges

In combating the issue, the federal and state administrations have brought on board a myriad of initiatives. Besides those are prohibitive regulations on stubble burning and punitive regulations that face operational challenges with effective monitoring capacity and the fiscal vulnerability of producers in the agricultural sector. Technologies like the Happy Seeder that enables sowing without removal of residues and microbial solutions like Pusa Bio-Decomposer that accelerates decomposition have been brought to farmers with subsidies and incentives. Campaigns are also taken to make people aware of the health-hazardous and environment-damaging effect of burning and its alternative sustainable alternatives. Notwithstanding these initiatives, numerous obstacles impede advancement.

Many agricultural producers show reluctance to adopt alternative practices mainly because of high initial costs or inaccessibility. The poor enforcement of regulations banning burning coupled with inadequate infrastructure for harvesting and disposal of agricultural waste maintains the practice. Further, crop diversification which offers a potential long-term solution faces resistance as paddy cultivation ensures guaranteed income in the form of government procurement.

Therefore, overcoming these challenges requires a multidisciplinary approach focused on some of the major economic, technical, and even behavioural barriers affecting farmers.

Available Options and Possible Futures

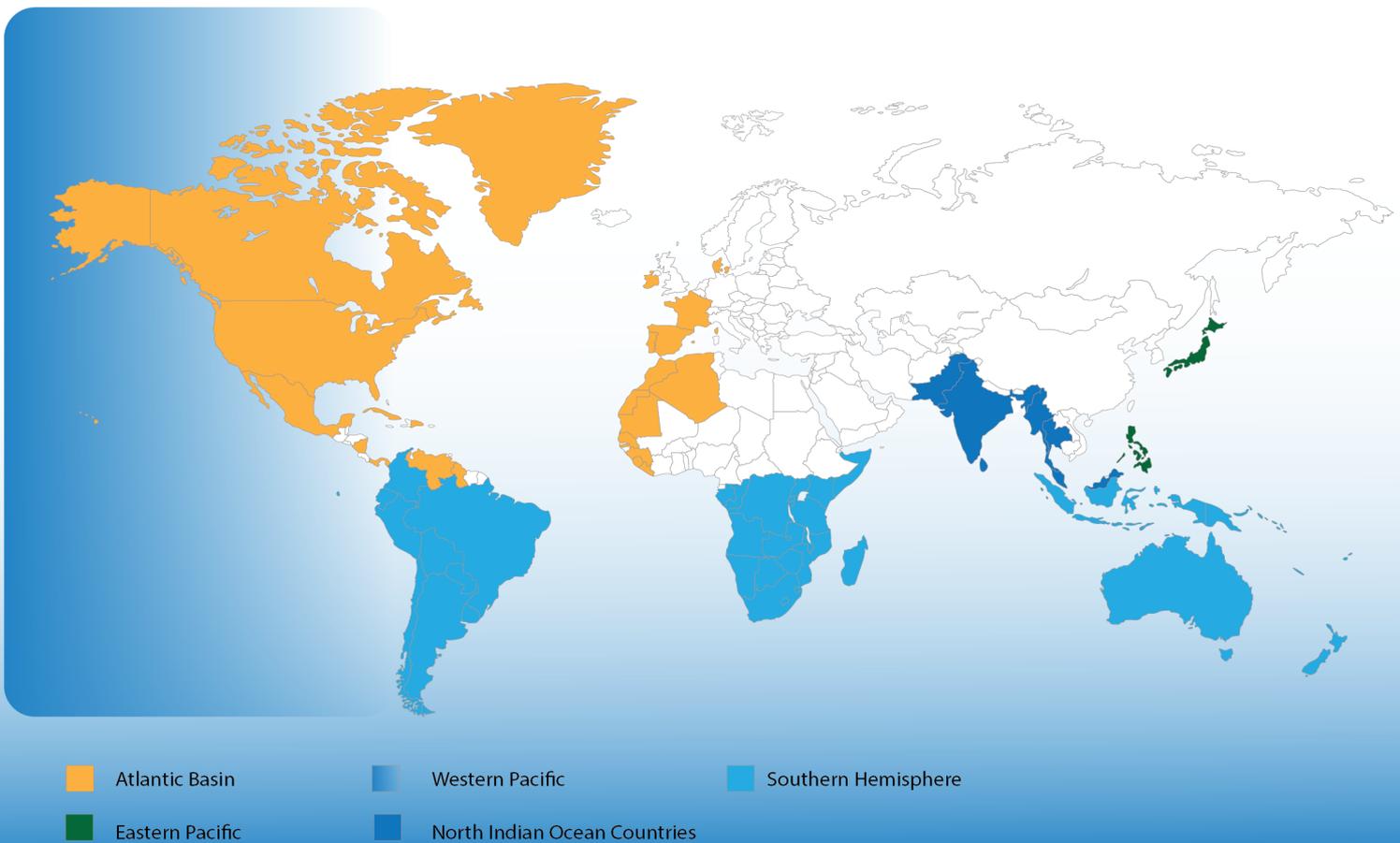
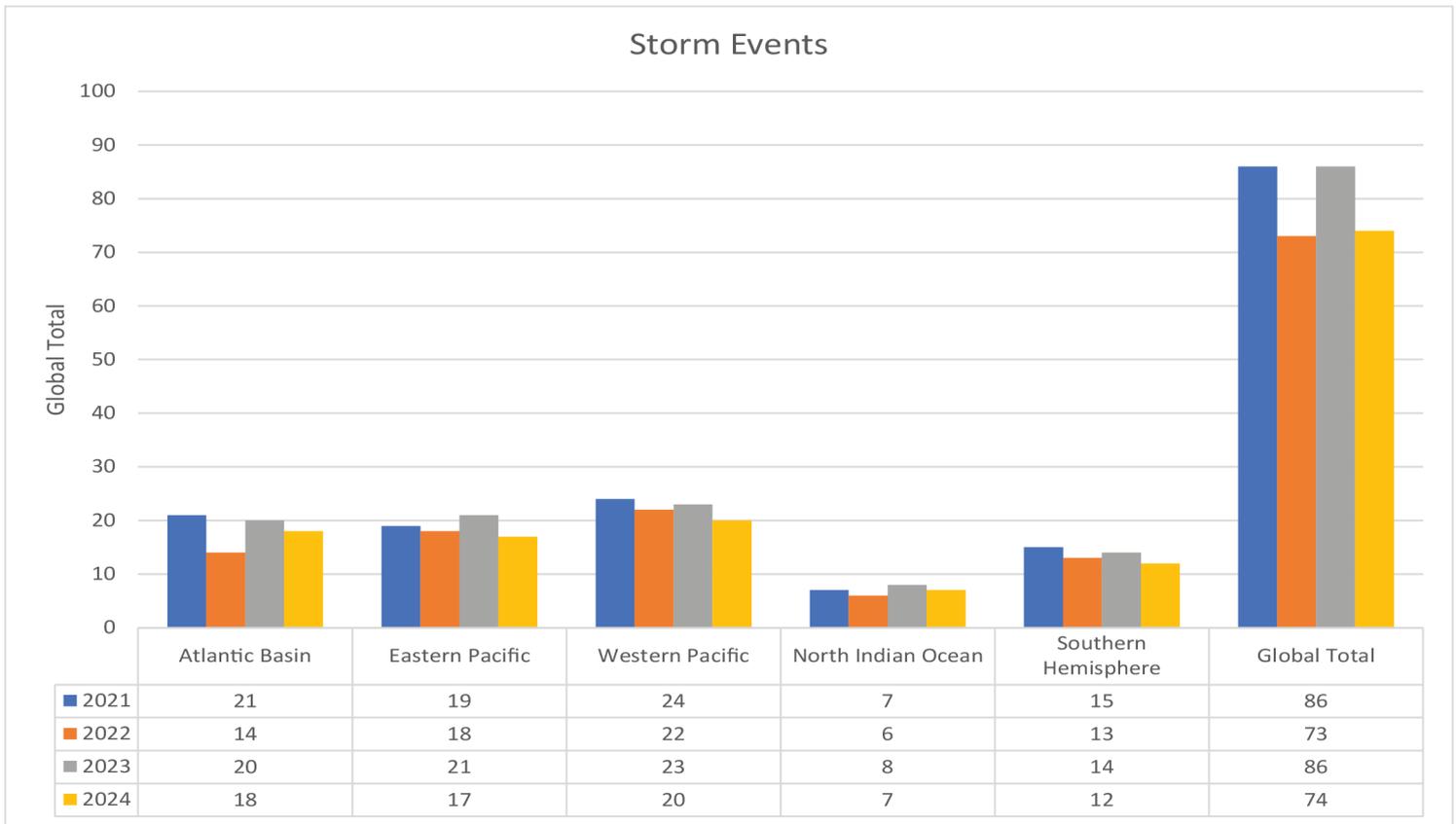
Several sustainable alternatives to stubble burning have been developed and now provide effective solutions to this problem that is prevalent now. Residue management technologies such as Happy Seeder and balers can clear the field efficiently while maintaining the soil health. Composting and use of crop residues as feedstock for bioenergy generation through biogas and biochar provide environmentally friendly avenues to recycle agricultural waste.

Building biomass power plants that use residues creates demand for these materials and so will have an economic incentive on farmers to avoid burning. Crop diversification is an available option that encourages farmers to shift from producing water-intensive rice to the production of crops that have low agricultural residue, such as maize, pulses, and millets. This shift will reduce the need for burning stubble while conserving water and enhancing soil quality. However, this shift requires a lot of market support, education, and assured procurement of these alternative crops. Public-private partnerships can take up an important role in promoting better sustainable practices. Collaboration of government organizations, private entities, and research institutions could create innovations regarding agricultural residue management and introduce cost-effective technology for broader access. Engaging the community at grass root levels through cooperatives and self-help organizations would accelerate community initiatives while building up knowledge among the population on the importance of sustainable agriculture. Conclusion: This remains a complex problem related to economic,

agricultural, and policy issues. It is an easy remedy for farmers, but the environmental and health effects are drastic and call for an urgent response. The challenge here would be to maintain the right balance between short-term responses, like promoting residue management technologies, and long-term strategies like crop diversification and strengthening of infrastructure. Through collaborative initiatives involving governmental bodies, agricultural producers, and various relevant stakeholders, India has the potential to alleviate the negative consequences associated with stubble burning, enhance air quality, and progress toward sustainable agricultural methodologies. While this transition may present difficulties, the advantages for environmental sustainability, public health, and future generations render it an essential undertaking.



Climate change and Storm events in 2024



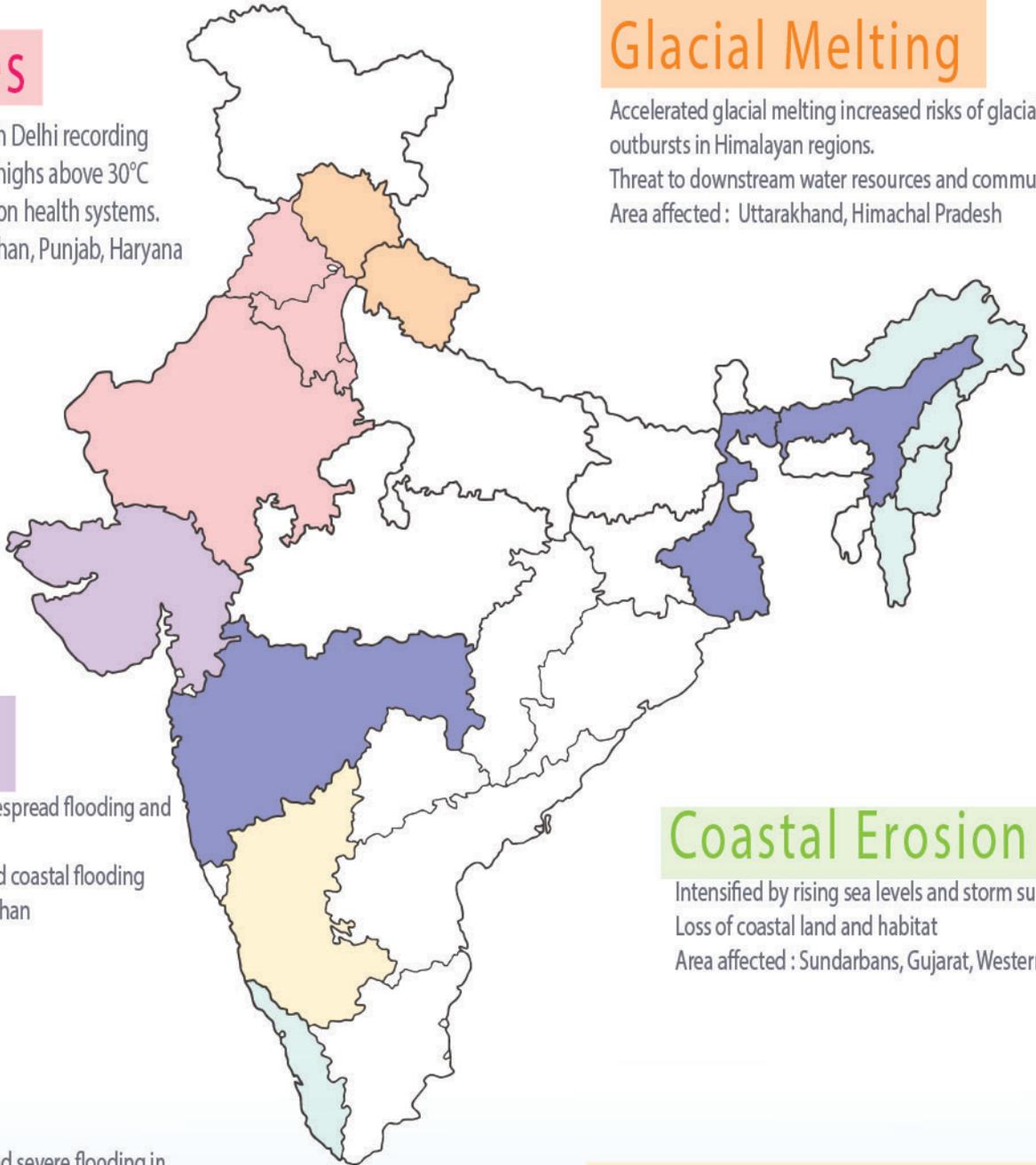
Climate change effect in India 2024

Heatwaves

Extreme temperatures, with Delhi recording unprecedented nighttime highs above 30°C
 733+ deaths, severe strain on health systems.
 Area affected :Delhi, Rajasthan, Punjab, Haryana

Glacial Melting

Accelerated glacial melting increased risks of glacial lake outbursts in Himalayan regions.
 Threat to downstream water resources and communities
 Area affected : Uttarakhand, Himachal Pradesh



Cyclones

Cyclone Biparjoy caused widespread flooding and damage to infrastructure
 Widespread crop damage and coastal flooding
 Area affected : Gujarat, Rajasthan

Coastal Erosion

Intensified by rising sea levels and storm surges.
 Loss of coastal land and habitat
 Area affected : Sundarbans, Gujarat, Western Coast

Floods

Excess monsoon rains caused severe flooding in multiple states, affecting lives and infrastructure.
 1,021 deaths
 Area affected : Maharashtra, West Bengal, Assam

Agricultural Losses

Crop loss from drought and unseasonal rains.
 3.2+ million hectares of crops damaged
 Area affected : Maharashtra, Karnataka, Punjab

Landslides

Landslides triggered by heavy rainfall during the monsoon season.
 Displacement and infrastructure damage
 Area affected : Kerala, Uttarakhand, Northeast India

Editor of this Issue



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