

IESA Activity Report 2014-15



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India Energy Storage Alliance (IESA)

The India Energy Storage Alliance (IESA) was launched in 2012 by Customized Energy Solutions to promote energy storage & microgrid technologies and their applications in India. IESA's vision is to make India a global leader in adopting energy storage & microgrid technologies to enable the integration of renewables, to create a resilient grid, and also to enable energy access for everyone and a hub for manufacturing these technologies by 2020. IESA's mission is to make the energy sector in India competitive and efficient by creating awareness about energy storage technologies and applications among various stakeholders in the industry and by promoting information exchange with end users. IESA provides insights to technology developers, original equipment manufacturers, policy makers, renewable players and system integrators regarding the policy landscape and business opportunities in India through frequent interaction with all key stakeholders. Please find more information on IESA at <http://www.indiaesa.info/>

IESA Activities

During the last 3 years, we focused our energies on building a strong foundation to understand the need for energy storage and microgrids in India. During this period we also focused on building relationships with various stakeholders by sharing information on the latest trends in technologies and applications, and business models. This was done through direct one-on-one interaction with various policy makers as well as by making presentations at numerous national and international events. We are helping to create awareness as well as shape energy storage policies, both at the national and state level, by participating in various working groups and taskforces. IESA members include technology developers, system integrators, project developers, social entrepreneurs, investors, large users and research groups and universities.

IESA Members



IESA Activity Report 2014-15

India Energy Storage Alliance (IESA) had a very eventful third year (2014-15). This year we had a total of 50 members across verticals like energy storage manufacturers, renewable companies, inverter manufacturers, investors & finance companies, project developers, Research & Development (R&D) Institutes and universities. IESA is working to create awareness about energy storage and microgrids through various knowledge sharing initiatives like webinars, Information Bulletins, IESA-India Policy Updates, IESA – Emerging Technology News (ETN) magazine, Energy Storage Project Database and IESA Web Resource platform. In the near future, IESA will be launching an ETN podcast on emerging technologies in the electricity industry with energy storage technologies and applications as its primary focus. Following is an overview of our activities during the year 2014-2015.

1. **Exclusive Webinars for IESA members** to share knowledge and opportunities in the Indian Market. Some webinars in 2015 were:

- I. **Global Energy Storage Alliance Market Update Call on Global Energy Storage Market**, February 2015
- II. **"Energy Storage Technologies for Ancillary Services in India"**, March 2015
- III. **Tesla's Power Wall and its Relevance in India**, May 2015
- IV. **Indian Electric Vehicle (& Hybrid Vehicle) Market** with the support of panellists from CATL, SAR Group and Electrotherm (manufacturer of Yo-bikes), July 2015
- V. **MNRE Energy Storage Demonstration Projects - Expression of Interest (EOI)**, August 2015

In addition to the exclusive IESA Member webinars, to increase our outreach we also conducted **3 IESA Open webinars** targeting all the stakeholders in this industry. These webinars were well attended by Industry leaders from several countries, who are active in or want to enter the Indian energy storage market.

2. Global webinars in collaboration with leading global associations throughout the year, some of which were:

- I. India Energy Storage Market Update in association with **European Energy Centre (EEC)**, March 2015
- II. Innovations in PQ Interventions organised by **Asia Power Quality Initiative (APQI)**, May 2015
- III. “India: Looking for rapid adoption of energy storage for clean energy revolution” in association with **Energy Storage Association (ESA)**, October 2015
- IV. “Recent Trends in Indian Energy Storage Market” in partnership with **BVES**, November 2015
- V. Advanced Energy Storage in India in association with **Alliance for an Energy Efficient Economy (AEEE)**, December 2015

Some of our other global webinars include support from various International alliances such as **the China National Energy Storage Alliance, California Energy Storage Alliance (CESA), European Business and Technology Centre (EBTC), Energy Storage Japan (ESJ)** and others.

3. Global Partnership : IESA entered into Global Partnerships with several different associations and organisations promoting storage in different parts of the world:

- **IESA, India signed an MOU with ESO, Canada:** IESA signed an MOU with Energy Storage Ontario (ESO) to work collaboratively on the relevant issues regarding energy storage and its development and integration. Through this agreement IESA and ESO agreed to share information and collaborate on the relevant issues regarding energy storage and its development and implementation. We hope that this collaboration will bring new technologies and expertise to India to boost the energy storage market
- **IESA signed an MOU with European Business and Technology Center (EBTC)** to work in a collaborative manner on technology, knowledge and business to create a robust energy storage Industry. Through this partnership IESA and EBTC will establish forums for timely and open exchange of information on current and



planned activities relevant to the vision to achieve reliable and quality power for all, involving a broad array of stakeholders. It could establish non-exclusive vehicles for engaging the broad array of stakeholders including the utility industry, regulatory organizations, energy, telecommunications, controls, and information technology vendors, technology companies, consumer groups, government and non-governmental organizations.

- **MOU signed between IESA and Australia Energy Storage Council (AU-ESC):** Through this MOU, IESA and AU-ESC agreed to work jointly to advance the uptake and development of energy storage solutions in Australia and India. As a result of collaborative efforts, a Global Energy Storage Market Overview report was released in September 2015.



4. IESA's active involvement in IRENA's Energy Storage Technology Roadmap:

The International Renewable Energy Agency (IRENA) Energy Storage Roadmap Report was released in June 2015 on the side lines of IRENA's ninth Council meeting at Abu Dhabi. It prioritizes 14 action items across five priority areas where governments and industry can work together to facilitate the development of policies on electricity storage for renewables. The report is part of IRENA's *REmap 2030* program. Dr. Rahul Walawalkar, Executive Director - IESA, President, Customized Energy Solutions India Pvt. Ltd delivered a presentation on Energy Storage technologies at the ninth IRENA Council meeting, Abu Dhabi, U.A.E.

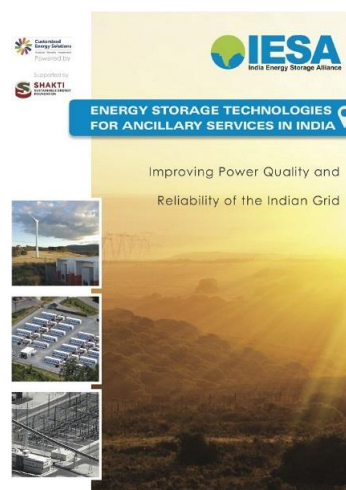
The roadmap is the product of four stakeholder workshops involving more than 200 electricity storage experts from 50 countries. The IESA team attended their first workshop and provided inputs on key application areas in which electricity storage can support renewable energy deployment.



The Third IRENA Workshop was successfully organised during Energy Storage India Conference 2014 at New Delhi, India. More than 50 policy makers from 12 countries participated, and provided their feedback for energy storage integration with renewables.

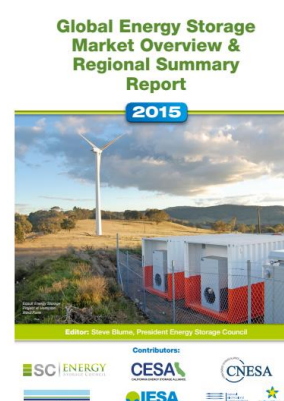
5. **IESA released report on “Energy Storage Technologies for Ancillary Services in India” at**

ESI 2014 : Mr. Tarun Kapoor, Joint Secretary Ministry of New and Renewable Energy, Mr. Sushil Kumar Soonee, CEO, POSOCO, Dr. Pramod Deo, Ex-Chairman, CERC and Mr. Ruud Kempener from IRENA released a report prepared by IESA and Shakti Foundation titled ‘**Role of Energy Storage Technologies in Providing Ancillary Services, Improving Power Quality and Reliability of the Indian Grid**’. Dr. Walawalkar optimistically stated that the next decade can be the decade of transformation of the power sector in India,



and energy storage will play a key role in this journey of revolution. As estimated by Customized Energy Solutions and IESA, the ancillary service market in India has a potential of almost 5 GW through 2020 and Energy Storage technologies can supply over 1 GW of this market.

6. IESA was a major contributor to “**Global Energy Storage Market Overview & Regional Summary Report**” prepared by the Australian Energy Storage Council. This report is designed to introduce the field of energy storage, and identify the major trends in this sector globally. This report identifies the applications, geographies and technologies that will experience the greatest growth in the short term.



7. **IESA Industry Reports Released:**

- IESA has compiled the new version (2015) of the **India Energy Storage Market Overview 2015-22** report this year. This assessment takes into consideration the current opportunities as well as a detailed overview of various growth scenarios and

key government initiatives such as the Government's 175 Renewable target, National Electric Mobility Mission (FAME India Initiative), National Smart Grid Mission, 'Make In India' and India's Smart Cities mission. The Energy Storage market in India in 2015 is estimated to be over 4400 MW, with backup inverter market comprising over 60% of the market. IESA has estimated over 70 GW and 200 GWh of Energy Storage opportunity in India by 2022, which is one of the highest in the world.

- IESA also released another report on the Indian lead acid battery market, entitled **India Lead Acid Battery Market Landscape Report (Stationary and Motive Applications)**. Total current market size for lead acid batteries is around INR 27,000 Crore (USD \$4.2 billion) out of which stationary and motive applications in India takes the share of INR 12,650 Crore. The stationary and motive application segments are likely to grow by 14% CAGR until 2020 and the forecasted market will be INR 25,000 Crore (USD \$4 billion). In the current market scenario, inverter and UPS applications take the major share of 60% of the stationary and motive battery market. Key applications which will boost the market are batteries for Solar integration (CAGR > 50%) and electric & hybrid vehicles (CAGR >40%).

8. **IESA Policy Working Group Launch:** We launched the **IESA Policy Working Group** wherein we initiated discussion among key stakeholders regarding the various policy initiatives underlying the energy storage industry. The energy storage space is evolving at a tremendous pace, and also covers a wide variety of application areas ranging from EVs and personal electronics to renewable integration and grid applications. The main aim of the Working Group is to be actively involved in this fast growing field and to propose and suggest state and central governments to adopt various action plans to take this industry forward.

We have conducted 3 Working Group meetings on **Proposed Energy Storage Mission, Draft Energy Storage Roadmap for India, Draft Regulatory Framework for Introduction of Ancillary Services at Interstate level, MNRE EoI for Energy Storage Demonstration Projects** and other policy related issues. We are also closely working with MNRE, USAID, ISGF and other stakeholders on policy and regulatory framework to boost the Indian energy storage market.



9. **IESA- India Policy Update Bulletin (*Exclusive for Members*)**: As per our interactions during one-on-one calls with all IESA members, we started the IESA - India Policy Update Bulletin, reporting on the State and the Central Government's policy updates on energy storage, renewables, smart grid and electricity markets. This bulletin is published monthly starting in May 2015.
10. Through the monthly **IESA-Information Bulletin (*exclusive for IESA Members*)**, we provide Industry and Technology news to all our members. It includes an opportunity (tender/RFP) section to help all our members in the Indian ESS market. It also includes IESA featured events where IESA members can get a special discount to participate.



11. The IESA team has uploaded **100+ research papers, presentations, industry reports, case studies and white papers** under resource category for its members through secure login access on the IESA website (<http://indiaesa.info>). We are working with members to incorporate their feedback to create a dashboard for these resources to improve the usability of this vast resource for all our members.
12. **One-on-One calls with IESA Members**: We are very much thankful to all our IESA members for active participation in **One-on-One Calls** held during the month of April and May 2015. It was helpful for the IESA team to understand their needs. Based on the discussion and interaction with IESA Members, IESA has started new initiatives like working groups, Policy Updates and the IESA India Microgrid Forum.

13. Opportunity Section in IESA Secured Login Segment: Starting in 2014, we have offered another feature for IESA members, identifying opportunities (RFP/Tender) related to energy storage markets in India. All IESA members can access this page through their login credentials at the IESA website. We are introducing a dashboard for this feature on our new website, which will be ready to launch at the Energy Storage India Conference & Expo 2015 in December.

14. RE-INVEST 2015: Dr. Rahul Walawalkar participated in the **energy storage panel with discussion on "Sustainable renewable energy storage and renewable powered mobility"** at the **Global RE-INVEST 2015 Conference** organised by the Government of India.

During the Conference, the IESA Team met Shri Piyush Goyal; the Honorable Minister of State with Independent Charge for Power, Coal, New and Renewable Energy in the Government of India, and discussed the Indian energy storage market and also explained the need for a strong policy framework for energy storage technology in India.



15. IESA Magazine (Emerging Technology News-ETN) completed 2 years of publication: To spread the knowledge among all stakeholders and to create a market for energy storage, IESA started the quarterly magazine, Emerging Technology News (ETN), in 2014. The magazine presents articles covering different domain areas such as Microgrids, Smart Cities, storage for DR, Smart Grid and Storage for Renewable Integration. Apart from articles, it also includes case studies on technology and national and international happenings in the energy storage sector. This is circulated to 10000+ energy enthusiasts throughout the world and shared at different national and international energy storage conferences.



16. Industry Academic Co-operation: IESA was actively involved in supporting different Institutes and universities in India to organise workshops and Seminars in past days, and will continue to take this forward.

- Dr. Rahul Walawalkar participated in a discussion on "collaboration of Universities & Industry" with Prof. Pratik Biswas, Dr Devang Khakhar, Dr Mark Wright at IIT Faculty Alumni Network India Symposium on Energy and Climate in Goa in January 2015.



The IESA Team helped to organise and delivered presentations at a State Level seminar on “Large Scale Integration of Renewable Energy Resources - Challenges and Opportunities” at **Sinhgad Institute of Technology, Pune** in March 2015.

- Dr. Satyajeet Phadke presented on thermal storage technologies at a workshop organised by **The Energy Research Institute (TERI)-COE** in April 2015.
- Dr. Rahul Walawalkar delivered a lecture on the topic “Energy Storage and Policy Development in Emerging Market - India” at the **Department of Engineering and Public Policy (EPP), Carnegie Mellon University (CMU)** during his visit to the University in June 2015.
- Debi Prasad Dash delivered an expert talk on “Distributed Generation and Energy Storage” at **College of Engineering, AISSMS, Pune** in August 2015.

- Dr. Rahul Walawalkar delivered a lecture on the topic “Energy Storage in Rural Electrification and Microgrids” at **Tata Center for Technology and Design, Massachusetts Institute of Technology (MIT)** in October 2015.
- Under Industry-Institute-Interaction activity, the IESA supported (IESA was Knowledge Partner for the event) **Veermata Jijabai Technological Institute (VJTI), Mumbai** to organise a week long workshop on “Recent Trends in Power Electronics, Drives and Storage Technologies for Emerging Applications” in the month of October 2015. Dr. Rahul Walawalkar inaugurated the workshop, introducing various energy storage technologies and applications in the Indian market. Dr. Satyajit Phadke also spoke on future trends on technology during the workshop.



- In this context, we want to mention that Gujarat Energy Research & Management Institute (GERMI), Carnegie Mellon University (CMU), Veermata Jijabai Technological Institute (VJTI) and The Energy Research Institute (TERI) are active IESA-KPN members.

17. IESA Student Competition and Scholarships: To encourage student participation in the growth of the energy sector, IESA organised a student competition on the theme of “**Re-Imagining India’s Energy Infrastructure through Emerging Technology**” among Indian top universities. As a part of the competition, the winning team was given a cash prize and an offer to work with IESA Team through a 3 month internship program. For Energy Storage India 2015 Conference, IESA is also offering 10 full scholarships for students to attend the conference compensating their conference expenses.

18. IESA Regional Capacity Building Workshops:



IESA believes that domestic manufacturers and other stakeholders are a key part of the global energy storage ecosystem. Therefore, IESA undertook a major initiative to educate a larger audience, especially domestic manufacturers and potential users, about advances in energy storage technologies and business models. With the support of strategic partners, the IESA Team organised knowledge building seminars and workshops at different cities around India.

- **IESA Energy Storage Seminar at Hyderabad** in association with Hyderabad Battery Association and Supreme Batteries
- **IESA Knowledge Forum on Energy Storage at Chennai** in association with Indian Wind Turbine Manufacturer Association (IWTMA) and NIWE (earlier CWET)
- **IESA Energy Storage Seminar at Bengaluru** in association with IET Local Network Bangalore
- **IESA Round Table meeting for Local Manufacturers** at Customized Energy Solutions, Pune

IESA is planning to take this initiative forward and is hopeful for active involvement of domestic players to create a robust energy storage market in India. Based on feedback received from members as well as other industry stakeholders, IESA will organise more such regional seminars & workshops across India during 2016-17.

- Recently IESA also signed an agreement with **Maharashtra Lead Acid Battery Association** to promote adoption of advanced technologies amongst domestic manufacturers.

19. IESA India Microgrid and Off Grid Forum Launch: IESA is launching India Micro-grid and Off-grid Forum to bring all the stakeholders in the industry to a common platform and to help reduce overall cost for rural microgrids in India. We will be launching this forum on 7th of Dec 2015 at Energy Storage India conference workshop. Our goal is to make

microgrids economically sustainable by 2018. We are hoping that with the advances in technology, better design, sharing of best practices as well as policy initiatives to address some of the risks, we can bring down the cost of energy delivered from microgrids by 25-50% in the next 3 years. Dr. Satish Agnihotri, Former Secretary, MNRE is mentoring this initiative.

We have got in principle support from the Global Energy Storage Alliance for this forum and Dr. Ravi Seethapathy from Board of IEEE Smart Village will also be part of the launch. This forum will address the issues of microgrid developers, operators and end-consumers. Under this forum, initiatives like funding portal, remote microgrid monitoring, and control and mapping of up-coming projects will be launched to address the following goals:



20. IESA has closely worked with other Indian Alliances/Associations to take the Indian Energy Market forward:

- Worked closely with **ISGF-Smart Utility Group (SUG)** to create and suggest a framework for electric charging infrastructure for electric vehicles in India.
- IESA participated in an **AEEE (Alliance for an Energy Efficient Economy) Workshop** to promote performance contracts to scale up **ESCO businesses**, August 2015
- Workshop on Energy Storage by **The Institute of Engineers (India)**, Pune, September 2015

21. IESA's contribution in creating an Energy Storage Roadmap for India: Dr. Rahul Walawalkar was invited to become part of the Standing Committee on Energy Storage and

Hybrid Systems in 2014 by MNRE. He participated in the MNRE-USAID meeting to discuss the roadmap for National Energy Storage Mission and Demonstration Program in Delhi in May 2015. IESA also organised 2 member meetings to discuss the draft energy storage roadmap and provided inputs for its improvement. The IESA Team also provided feedback and suggestions on the draft roadmap to the Ministry of New and Renewable Energy (MNRE), Govt. India. In this process, the IESA Team closely supported Nexant and USAID-PACE D Program.

22. IESA represented the Indian market and IESA members **at various National and international events**. Some of the conferences and workshops are mentioned here:

1. PowerOn 2015 Conference and Expo in Aurangabad, January 15
2. 15th Annual Greentech Environment & CSR Conference, January 15
3. CII Conference on Renew India, January 2015
4. IEEE Intelect "Smart Distribution System" conference, Mumbai, January 2015
5. 7th International Battery Expo & Recycling Conference (IBRX India), Goa, Jan 2015
6. 6th India-Japan New& Renewable Energy Seminar,(by Institute of Energy Economics), Japan, February 2015
7. India Smart Grid Week (ISGW), Bangalore, March 2015
8. US-India Smart Grid Workshop, Bengaluru, March 2015
9. Energy Storage Europe and IRES Conference, Dusseldorf, March 2015
10. Power & Electricity World Asia 2015, Singapore, May 2015
11. ESA 25th Annual Conference and Expo, Dallas, May 2015
12. Asian Utility Week, Bangkok, Thailand, June 2015
13. ADB Clean Energy Forum, Manila, Philippines, June 2015
14. Energy Storage China, Beijing China, June 2015
15. 14th Green Power International Conference (by CII), Chennai, India, July 2015
16. 3rd International Convention Renewable Energy World. New Delhi, July 2015
17. Power Transmission in India, Gurgaon, India, July 2015
18. Clean Energy Regulators Forum, Bengaluru August, 2015
19. 6th World Renewable Energy Technology Congress, New Delhi, August 2015
20. India Off-Grid Energy Summit, New Delhi, August 2015

21. India Renewables Forum by Kotak Inst. Equities, Mumbai, September 2015
22. 3rd Annual IUKAN Conference, Delhi, September 2015
23. Energy Storage North America (ESNA), San Diego, USA, October 2015
24. Seminar on Smart and Sustainable Technologies for Smart Cities New Business Opportunities, Pune, October 2015
25. InterSolar 2015, November 2015
26. India Wind Energy Forum, Delhi, November 2015



IESA has also established good collaboration and relationships with the **Canadian High Commission, French Embassy, US-India Business Council and Indo-German Energy Programme (IGEN) – GIZ** at different occasions throughout the year. Dr. Rahul Walawalkar and other IESA team members also delivered speeches at these forums on the Indian Energy Storage market and future trends.

23. IESA hosted India's **1st Energy Storage Conference in December 2013**, which was attended by over **300 participants from 12 countries** and has generated lots of interest on energy storage and microgrid opportunities in India. Most of the companies who participated in the event have provided very strong positive feedback, and are looking forward to continuing the discussion for implementation projects. Here is a link to the post show report: http://www.esiexpo.in/PDF/Post_Show_Press_Release-ESI_2013.pdf
Bloomberg TV-India also hosted a 30 minute program based on the conference. Here is the link to the program: <https://www.youtube.com/watch?v=g5irVjYiqc>

The **2nd Annual Energy Storage India Conference and Expo**, hosted by the India Energy Storage Alliance (IESA) from December 03 - 05, 2014, in New Delhi, was a successful event that brought together **532 industry professionals and 65 speakers from 15+ countries**. It was the largest such gathering ever held in India, and highlighted the many opportunities available in a fast-growing market. Energy Storage India 2014 was attended by a diverse, business-focused group that included utilities, developers, energy storage OEMs, solution providers, Government of India ministries, regulatory and policy officials, commercial/industrial end users, and other industry stakeholders. We also saw a very strong interest in developing long term strategic partnerships, which is essential in developing this sector. Here is a link to the post show report: <http://www.esiexpo.in/PDF/Post Show Press Release ESI 2014.pdf>



Highlights of the Previous Year

❖ **India Energy Storage Alliance (IESA) is a founding member of Global Energy Storage Alliance (GESA):**

The newly created Global Energy Storage Alliance (GESA) has been established as an international non-profit organization to bring



together many of the world's leading energy storage and clean energy industry associations to advance education, collaboration, and proven frameworks about the benefits of energy storage.

❖ **ESA joined standing committee on energy storage and hybrids solutions formed by Ministry of New and Renewable Energy (MNRE), Govt. of India**

Increasing the penetration of wind and solar energy in the grid required development and use of electricity energy



Government of India
Ministry of New and Renewable Energy
Renewable Energy is Green, Clean and Sustainable

storage technologies and hybrid solutions for storage and grid stability, to make renewable power more firm and reliable. The world over, electrical storage systems are being developed to provide ancillary services such as grid frequency regulation, voltage support and operating reserves, thereby enhancing grid stability and reliability. In the aforesaid context, Ministry of New and Renewable Energy has constituted a standing committee on energy storage and hybrid solutions to explore solutions for renewable integration challenges in India. IESA has been invited to join the committee as a member and **Dr. Rahul Walawalkar, Executive Director IESA** is in the panel as an expert to contribute to the standing committee.

❖ **India Energy Storage Alliance (IESA) signed a partnership Memorandum of Understanding (MoU) with Strategen Consulting, LLC ("Strategen") for International Energy Storage Database (IESDB):** The DOE's IESDB is a publicly accessible database of worldwide energy storage projects and policies, and is the go-to place for unbiased, accurate, and up to date information on energy storage projects and policies. IESA is helping to list the Indian Energy Storage Projects in the database. Some of the projects are already listed and you can find the details on both the websites www.indiaesa.info and www.energystorageexchange.org

- ❖ Customized Energy Solutions hosted two IESA technical tours in October 2012 and April 2013 in India to encourage one-on-one dialogue between technology companies and key Indian stakeholders. The **First IESA Tech Tour** kicked off in New Delhi on 29th of October 2012 with a meeting at Central Regulatory Commission. The companies represented in the inaugural IESA tech tour included **Altairnano, DynaPower, Deeya Energy, Ecoult / East Penn, EnerDel, Google.org and ZBB**, covering a wide spectrum of interests from advanced Li-Ion batteries, Advanced Lead Acid batteries, Inverters, Microgrids and flow batteries.



The **2nd IESA Technology tour** from **April 15th to April 20th, 2013**, brought together delegates from leading energy storage and emerging technologies companies such as **Applied Material, Imergy Power (formerly Deeya Energy), S&C Electric Company, Urban Electric Power, United Technologies (UTC), BVES (German Energy Storage Alliance) and US India Business Council.**

Thanks to all our supporting Partners



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