

Future-Ready Solar: Industry Outlook and Inverted Technology Innovations

Sr. No.	Number of Sessions	Number of Registrations	Mode of Event	Collaborations
1	2	74	Offline	Department of Electrical Engineering, Institute of Technology, Nirma University, IEEE PELS, IEEE IES, IEEE IAS, IEEE SBNU

Date: 20th September 2025

Venue: A-101, Nirma University

No. of Participants: 74

Organized By: Joint session by EE Dept Nirma University, IEEE IAS, IES, PELS with IEEE SBNU

Guest Speakers:

1. Dr. Tanmoy Bhattacharya, Associate Professor, IIT Kharagpur
 2. Mr. Kayan Kalthia, Executive Director, Kosol Energies Private Limited
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Session 1

Topic: Understanding MMC – Building Block for HVDC Gateway Empowering Renewable Integration

- Dr. Tanmoy Bhattacharya, Associate Professor, IIT Kharagpur

Introduction

On 20th September 2025, IEEE Joint Chapter IE/I1S/PELS in collaboration with IEEE SBNU organised this expert session and thus had the privilege of hosting the two personalities Mr. Kayan Kathia, Executive Director of Kosol Energies Private Limited, and Dr. Tanmoy Bhattacharya, Associate Professor at IIT Kharagpur. The first session of the day began with a greeting to Dr. Tanmoy Bhattacharya, followed by a prayer recital in unison. Manisha Ma'am then introduced the speaker, highlighting his research expertise in Hybrid Vehicles and Renewable Integration.

Overview

Dr. Bhattacharya opened his talk by explaining the fundamentals of DC transmission, noting its distinct advantage of self-insulating during faults. He elaborated on how High Voltage Direct Current (HVDC) technology achieves cost savings over High Voltage Alternating Current (HVAC) once the breakeven distance is reached, and further emphasized the efficiency of submarine cable transmission in reducing heat loss. He gave several examples, particularly of Greece, of how they use such techniques and perform transmission at long distances. Having said that, he also pointed out that the absence of a DC transformer is a significant limitation for HVDC applications.

As the session progressed, Dr. Bhattacharya went further in depth with the fundamentals. With the exploration of inverter technologies, Dr. Bhattacharya discussed two-level, three-level, and five-level inverters. He also covered capacitor-clamped and cascaded H-bridge multilevel inverters, while highlighting the drawback of the latter due to the lack of a DC bus. All of this led to the participants immersing themselves in the development of an MMC. Moving to advanced configurations, he explained single-star and double-star cascaded bridges and described their two types of mode operations, namely common-mode and differential-mode operations. He also noted that a triple-star configuration is typically adopted for HVAC systems.

In the concluding segment, Dr. Bhattacharya provided an in-depth overview of Modular Multilevel Converters (MMCs), with particular emphasis on half-bridge submodules. He underlined how MMCs serve as the critical building blocks of HVDC gateways, enabling the large-scale integration of renewable energy into power grids.

The session, though technical, was delivered with clarity and precision. This gave the interested participants a comprehensive understanding of HVDC systems, inverter technologies, and MMCs as enablers of future-ready, sustainable power infrastructure.

Key Takeaways

- **Clarity on HVDC Advantages:** Participants learned how DC transmission self-insulates during faults and becomes cost-effective beyond a breakeven distance.
- **Awareness of System Limitations:** The absence of a DC transformer was highlighted as a key challenge in HVDC applications.
- **Understanding Advanced Configurations:** Attendees gained knowledge of single-star, double-star, and triple-star cascaded bridges, and their relevance in different transmission systems.
- **Role of MMCs in Renewable Integration:** Dr. Bhattacharya emphasized Modular Multilevel Converters, particularly half-bridge submodules, as the

backbone of HVDC gateways that enable large-scale renewable energy integration.

Conclusion

The session, though very technical, was delivered with clarity and precision. This gave the interested participants a comprehensive understanding of HVDC systems, inverter technologies, and MMCs as enablers of future-ready, sustainable power infrastructure.

Session 2

Topic: Futuristic PV Technology for Sustainable Energy

- Mr. Kayan Kalthia, Executive Director, Kosol Energies Private Limited

Introduction

The session started with a warm greeting and introduction by Manisha Ma'am. She initially marked the tone for the session and brought out the importance of innovation in solar energy and the remarkable increase in the production from 350 MW to 850 MW in Kosol Energie Engineers. The audience included students, professors, and professionals who were interested in knowing more about advanced solar technologies.

Session Overview

Mr Kayan Kalthia initiated his lecture by presenting an interesting video demonstrating the process of manufacturing solar panels at Kosol Energie Engineers. This visual presentation gave participants a first-hand experience of current production methods and established the stage for technical discussion.

He defined intricate terms like current binning and voltage binning, explaining why these operations are crucial for maximizing the efficiency and uniformity of solar modules. The presentation addressed the potential extent of growth in solar PV manufacturing, indicating recent improvements, disruptions, and the impact of changing market demands. Much of the session focused on comparisons of market share between TOPCon (n-type) and PERC (p-type) technologies. Mr Kalthia provided insights into reasons why TOPCon technology has dominated, attributing it to enhanced efficiency and flexibility in contemporary solar cells.

The presentation covered new solar thermal technologies, providing visitors with an insight into wider renewable energy trends. Mr Kalthia also presented ongoing developments at Kosol, for example, solar trackers, emphasizing technical issues confronted by his teams.

Stepping off the track, he touched on industry concerns such as the use of silver for panel production and how upcoming substitutes might redefine future production. The session also touched on the emergence of AC solar panels, which have the potential to simplify installations by reducing the use of power electronics components.

Interactive Q&A

The session ended on an interactive question-and-answer session, during which Mr Kayan efficiently answered questions and uncertainties from the audience, bringing transparency to complex technical and business areas.

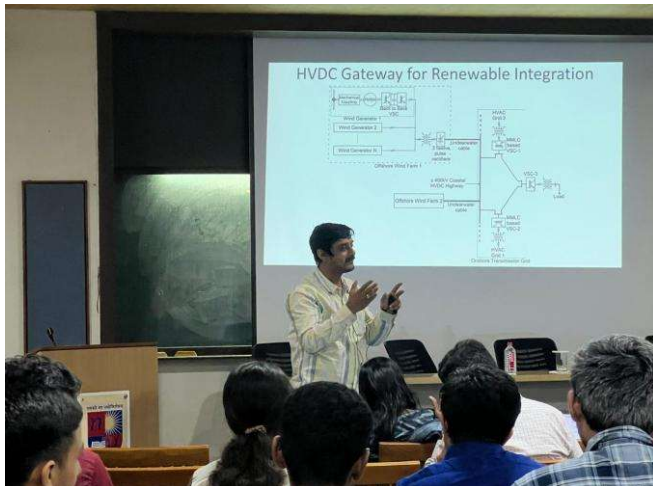
Key Takeaways

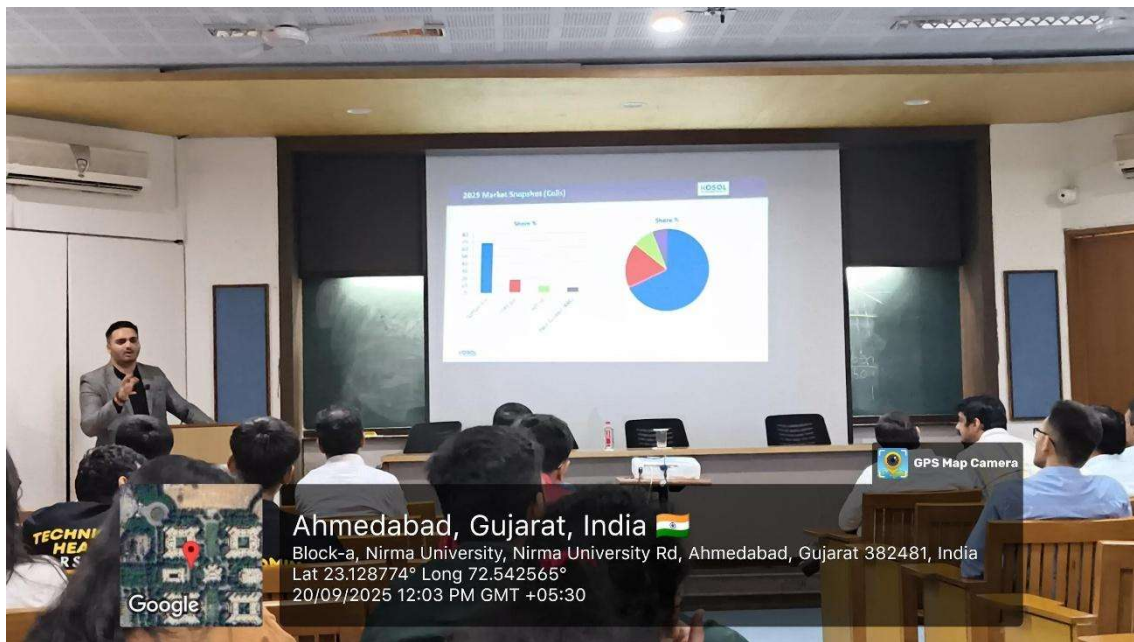
- Mr Kayan captured everyone's attention with a behind-the-scenes video of solar panel manufacturing at his company.
- Attendees learned about current binning, voltage binning, and their importance in ensuring panel quality.
- The talk explored the huge opportunities still ahead in solar PV manufacturing, especially as new tech keeps coming.
- Mr Kayan explained why TOPCon tech is taking the lead over PERC in the market, and touched on upgrades and industry changes.
- He also covered solar thermal technology, real-world project challenges (like solar tracker installations), and why silver use is a growing concern.
- The session ended on a lively note, with Mr Kayan answering audience questions and sparking lots of new ideas.

Conclusion

This masterclass presentation offered practical insights into the newest solar PV manufacturing trends and technologies. The attendees left with an enhanced knowledge of both technical developments and actual industry issues, with a motivation to find more renewable energy opportunities.

Glimpses of The Event

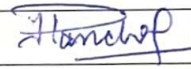
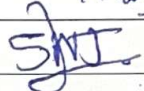
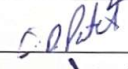
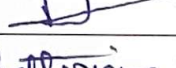
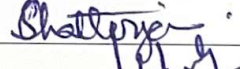
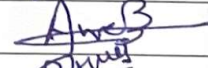
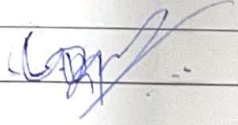






IEEE IES-IAS-PELS Joint Chapter
Future-Ready Solar: Industry Outlook and Inverted Technology Innovations

Date: 20/09/2025

Sr. No.	Name of Candidate	Signature
1.	Dr. Siddharthsingh K. Chauhan	
2.	Dr. S. C. Vora	
3.	Dr. P. N. Tekwani	
4.	Dr. Akhilesh Nimje	
5.	Dr. Kuntal Bhattacharjee	
6.	Dr. A. N. Patel	
7.	Dr. C. R. Mehta	
8.	Dr. M. T. Shah	
9.	Dr. T. H. Panchal	
10.	Dr. S. N. Jani	
11.	Prof. C. B. Bhatt	
12.	Prof. S. S. Kanojia	
13.	Dr. S. D. Godwal	
14.	Prof. Chintan Patel	
15.	Prof. V. V. Satyanarayana Karri	
16.	Dr. Tarun Tailor	
17.	Dr. Soumesh Chatterjee	
18.	Dr. Mahesh A. Patel	
19.	Dr. Amar Kumar Barik	
20.	Dr. Ajay Kumar Maurya	
21.	Dr. Anand Kumar	
22.	Dr. Viral Rathod	
23.	Prof. Samyak Shah	
24.	Dr. Das Sudhansu Sekhar	
25.	Prof. Chirag Raval	



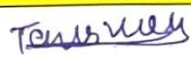
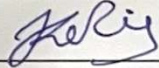
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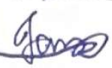
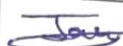
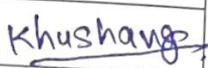
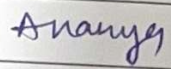
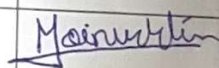
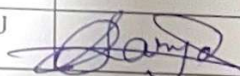
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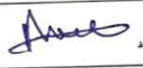
FUTURE READY SOLAR INDUSTRY OUTLOOK AND INVERTED TECHNOLOGY INNOVATIONS

DATE: 20th SEPTEMBER 2025

TIME: 9AM ONWARDS

Sr no.	Name	Roll No.	Institute	Sign
1	Tanay Vora	24BEE121	ITNU	
2	Dev Patel		ITNU	
3	Manthan Murdia	24BEE069	ITNU	
4	Tirth Bhandari		ITNU	
5	siddharth chauhan	23BEE112	ITNU	
6	Jay Panchal	24BEE124	ITNU	
7	Kenil Radadiya	24BEE036	ITNU	
8	Chandpara Meet	24BME144	ITNU	
9	Yash Vasoya	24BME141	ITNU	
10	Dhruv Prajapati		ITNU	
11	Dhairya Gajjar		ITNU	
12	Shriya Maheshwari		ITNU	
13	Tirth Patel		ITNU	

14	Khan Anas Pathan		ITNU	
15	Vihar Shukla	24BEE076	ITNU	
16	Tanay Milind Parikh	23BEE126	ITNU	
17	Smit Patel		ITNU	
18	Jay Bhatt	23BEE016	ITNU	
19	HARSHSHIROYA		ITNU	
20	Chirag Chauhan	23PTNDE264	ITNU	
21	Khushang Ghael	24BME138	ITNU	
22	Kadivar Ruhan	24BME136	ITNU	
23	Kushagra Tripathi		ITNU	
24	Ananya Singh	23BEE005	ITNU	
25	Bhavya Vasavada		ITNU	
26	Manav Patel		ITNU	
27	Moinuddin sarvaiya	24BEE009	ITNU	
28	Harsh Vankar		ITNU	
29	Aaryan		ITNU	
30	Santoshkumar C. Vora		ITNU	
31	Akshita Birla		ITNU	
32	Dhruv Prajapati		ITNU	
33	Het Shah		ITNU	
34	Jadeja Kanaksinh		ITNU	
35	Swastik Singha		ITNU	
36	Aarya Barot	23BEE001	ITNU	

37	Solanki Yuvrajsinh	23BEE137	ITNU	
38	Ansh Vachhani		ITNU	
39	Meet Chauhan		ITNU	
40	Dhruv Prajapati		ITNU	
41	PRUTHVIPANDYA		ITNU	
42	Mitul yadav		ITNU	
43	Anirudh Jalan	23BEE006	ITNU	
44	Khan Anas Ayajhusen	25MST004	ITNU	
45	Patel Neel Bhupendra		ITNU	
46	Dhruv lakhani		ITNU	
47	Tirth Patel		ITNU	
48	Poojan Oza	24BEE017	ITNU	
49	Meet maniya	24BEE016	ITNU	
50	Bhuva jay chetanbhai	24BME130	ITNU	
51	Krish Patel	24BME149	ITNU	
52	SARTHAK KAKADIYA	24BEE004	ITNU	
53	Khan Anas Ayajhusen	25MST004	ITNU	

Sr no.	Name	Roll no.	Institute	Sign
54	Yeshav Shah	23BEE135	ITNU	Yeshav
55	Kavya Patel	24BME066	ITNU	K.D. Patel
56	Kausthal Patel	22BEE088	ITNU	K. Patel
57	Devansh Thakre	22BEE021	ITNU	Devansh
58	Anushka Singh	23BEE009	ITNU	Anushka
59	Lakshya Jain	24BEE090	ITNU	Lakshya
60	Tirth Bhunia	23BEE017	ITNU	Tirth
61	Rudra Sharma	23BEE105	ITNU	Rudra
62	Meet Mehta	23BEE039	ITNU	Meet
63	Mishti Dhangra	23BEE061	ITNU	Mishti
64	Kohina Bhargava	23BEE046	ITNU	Kohina
65	Jay Patel	22BEE053	ITNU	Jay
66	Vishal Dangar	23BEE502	ITNU	Vishal
67	Rushil Patel	22BEE082	ITNU	Rushil
68	Dhyey Gopani	22BEE038	ITNU	Dhyey

69	Taksh Kalthia	22BEE054	ITNU	Taksh
70	Darshan Bhatt	22BEE023	ITNU	Darshan
71	Vedant Kayastha	23BEE044	ITNU	Vedant
72	Riddhesh Soni	23BEE092	ITNU	Riddhesh
73	Dhruvi Modha	23BEE026	ITNU	Dhruvi
74	Manthan Bhatt	24BEE513	ITNU	M.s. Bhatt
75	Deeksha Singh	22BEE030	ITNU	Deeksha

76) Varun Butani 23BEE133 ITNU

77) Kritika Somani 23BEE048 ITNU

78) Rachhika Upadhyay 22BEE092 ITNU

79) Vinati Mehta 22BEE127 ITNU

75) Tanish Desai 22BEE120 ITNU

76) Ajinkya Chavre 22BEE007 ITNU

77) Atharva Billore 22BEE021 ITNU

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Butani

~~Rachhika~~
~~Upadhyay~~
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