SOUVENIR

TWO-DAY NATIONAL SYMPOSIUM ON ENERGY & ENVIRONMENT

GREEN HYDROGEN FOR A SUSTAINABLE FUTURE

DECEMBER 5-6 , 2025

CO - SPONSORED BY KSCSTE & ANERT

ORGANISED BY

Department of Electrical & Electronics Engineering

College of Engineering Muttathara

(CAPE - Govt. of Kerala)

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Message from Dr. Thajudin Ahamed V. I
Director, Cooperative Academy of Professional Education(CAPE)

Chief Patron

The organising of a National Symposium on "Green Hydrogen for a Sustainable Future" at the College of Engineering Muttathara is extremely fulfilling not only for the institution, but for the entire family of colleges under the Co-operative Academy of Professional Education (CAPE), established to provide quality professional education under the Department of Co-operation, Government of Kerala. CAPE has always believed that our institutions must be active contributors to the state's development priorities and to national missions of strategic importance.

This symposium has done exactly that by aligning academic inquiry and student engagement with India's National Green Hydrogen Mission and Kerala's visionary Hydrogen Valley Innovation Cluster, creating a vibrant platform where policy makers, scientists, industry leaders and young engineers could meet, learn and design pathways for collaboration.

As Director, CAPE, there is deep appreciation for the exemplary leadership shown by the Principal and the Convener, and for the meticulous efforts of the Organising Committee, faculty members, staff and students of the Department of Electrical & Electronics Engineering in conceiving and executing this national-level event. Their work reflects the core values of CAPE's academic excellence, social relevance and collaborative spirit. CAPE will continue to extend its full support to such forward-looking initiatives and will work to ensure that our institutions play a meaningful role in our nation's transition to a green hydrogen–powered, sustainable future.

Message from Dr. S. Jayakumar
Joint Director, Cooperative Academy of Professional Education(CAPE)

Chief Patron

The National Symposium on "Green Hydrogen for a Sustainable Future" hosted by the College of Engineering Muttathara is a commendable example of how institutions under the Co-operative Academy of Professional Education (CAPE) are aligning professional education with the emerging priorities of the state and the nation. As an autonomous society promoted by the Co-operation Department, Government of Kerala, CAPE has always envisioned its institutions as catalysts for high-quality technical education, meaningful research and socially relevant innovation.

This symposium has successfully brought together policymakers, scientists, industry leaders, faculty and students to engage with one of the most critical themes of our time green hydrogen and sustainable energy. The focused technical sessions, panel discussions, industry interactions and live demonstrations have not only expanded knowledge, but have also opened concrete pathways for collaboration and capacity building.

As Joint Director, CAPE, there is deep appreciation for the leadership of the Principal and the dedication of the Convener, Coordinator, faculty members, staff and students of the Department of Electrical & Electronics Engineering in organising this national level event with such professionalism and impact. CAPE looks forward to supporting more such initiatives that enhance the academic profile of our institutions and contribute to Kerala's and India's progress in advanced technology domains like green hydrogen.

Message from **Dr. V. Praseedalekshmi**
Principal, College of Engineering Muttathara

Principal

The successful conduct of the National Symposium on "Green Hydrogen for a Sustainable Future" marks a proud milestone for the College of Engineering Muttathara. As an institution, we remain committed to aligning our academic and research efforts with the National Green Hydrogen Mission and Kerala's Hydrogen Valley Innovation Cluster, and this symposium has further strengthened that resolve.

I warmly acknowledge the distinguished dignitaries, experts, collaborators, and industry partners who enriched this event with their presence, insights and support. I place on record my deep appreciation for Dr. C. Sreekanth, Convener of the symposium, for his vision, perseverance and outstanding leadership in conceptualising and steering this event from idea to impactful reality. Equal appreciation is due to the Coordinator Mr. Shyju K, Organising Committee members, and the entire Department of Electrical & Electronics Engineering for their meticulous planning, teamwork and tireless efforts that ensured the smooth and successful conduct of every session. Their dedication, along with the support of our collaborators, industry partners and students, has set a high benchmark for future academic and research initiatives of our college.

Message from **Dr. C. Sreekanth**

Associate Professor & Head, Department of Electrical & Electronics Engineering

Convener

Serving as Convener of the National Symposium on "Green Hydrogen for a Sustainable Future" has been one of the most meaningful milestones in this professional journey. The symposium, conceived to connect our institution with India's National Green Hydrogen Mission and Kerala's Hydrogen Valley Innovation Cluster, has evolved into a genuine platform where policy, research, industry and education converged to chart a shared path forward.

Over two intense days, the deliberations from national mission perspectives to advanced materials, safety, funding opportunities and live demonstrations deepened our understanding of green hydrogen and provided a clear institutional and state-level roadmap. The integration of College of Engineering Muttathara into the Kerala HVIC ecosystem and the new relationships forged with government, industry and research partners now place a special responsibility on us to translate discussions into pilots and scalable projects that serve Kerala's and India's clean energy goals.

This symposium is also a collective achievement. Heartfelt thanks are due to our distinguished dignitaries and speakers for their time, vision and scholarly contributions, which gave the event both stature and depth. Equal gratitude goes to our collaborators, associate partners and sponsors, whose trust, technical guidance and financial support formed the backbone of this initiative. I would also like to place on record my sincere gratitude to the Coordinator Mr.Shyju K, who stood by me with unconditional support at every stage, and to all Faculty members, Staff and Students of the Department of Electrical & Electronics Engineering for their dedication, hard work and teamwork in planning and executing this programme. Their commitment has transformed an ambitious idea into a successful national platform and will remain the driving force as we move from ideas to implementation in Kerala's green hydrogen journey.

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Section 1

About the Symposium

Overview

The National Symposium on "Green Hydrogen for a Sustainable Future" was a landmark two-day event held on December 5–6, 2025, at the College of Engineering Muttathara, Thiruvananthapuram, Kerala. Organised by the Department of Electrical & Electronics Engineering with co-sponsorship from KSCSTE and ANERT, the symposium brought together policymakers, scientists, researchers, industry leaders, and academicians to deliberate on India's National Green Hydrogen Mission and Kerala's emerging Hydrogen Valley Innovation Cluster (HVIC–Kerala).

The event served as a crucial platform bridging policy, technology, industry and academia—fostering meaningful collaborations and identifying concrete opportunities for academic-industry partnerships in green hydrogen, a rapidly emerging sector critical to global energy security and climate change mitigation.

Event Statistics:

·**Duration**: 2 days

·**Venue**: College of Engineering Muttathara, Thiruvananthapuram, Kerala

·**Participants**: 40+ from academia, industry, government and research institutions

·**Technical Sessions**: 9 keynote and plenary talks

·**Dignitaries**: Senior officials from DST, MNRE, KSCSTE, ANERT

·**Industry Partners**: 8+ leading companies and start-ups

Media Coverage: Print and digital media representatives

Event Objectives & Scope

The symposium was designed to achieve five key objectives:

1. Policy & Mission Alignment

To understand the evolving policy and mission landscape of green hydrogen at the national level (National Green Hydrogen Mission) and state level (HVIC–Kerala), ensuring institutional work is aligned with government priorities.

2. Technology Showcase

To present emerging research, development and commercial technologies in electrolyser design, photocatalytic green hydrogen production, storage systems, and end-use applications including fuel cell vehicles and industrial decarbonization.

3. Institutional Capacity Building

To discuss how higher education institutions and research centres in Kerala can contribute to HVIC–Kerala through innovation, skilled manpower development, and demonstration projects.

4. Stakeholder Collaboration

To create a platform where government agencies, industry, start-ups, and academia can identify and initiate concrete partnerships aligned with Kerala's hydrogen vision.

5. Recognition of Excellence

To honour outstanding researchers and institutions contributing to green hydrogen research and sustainable energy transitions.

Section 2

Distinguished Dignitaries & Speakers

Shri K. R. Jyothilal, IAS
Additional Chief Secretary,
Finance Department, Government of Kerala

Chief Guest who delivered the inaugural address. As a visionary administrator instrumental in shaping Kerala's renewable energy and green hydrogen roadmap, Shri Jyothilal's leadership has been pivotal in bringing the ₹133 crore Hydrogen Valley Innovation Cluster (HVIC–Kerala) to fruition with national sanction under India's National Green Hydrogen Mission. His address emphasised Kerala's multifaceted advantages in hydrogen economy development, including solar energy potential, biomass availability, waste-to-resource opportunities, and the strategic Vizhinjam Port–Punalur corridor for future manufacturing.

Sri Harshil R. Meena, IAS
CEO, Agency for New and Renewable Energy Research and
Technology (ANERT), Government of Kerala

Sri Harshil R. Meena, outlined ANERT's strategic initiatives in green hydrogen development in the state.

He highlighted ongoing and proposed pilot hydrogen projects near Kochi and Vizhinjam, underscoring Kerala's growing role in hydrogen production, storage, and utilization.

He emphasized ANERT's financial and institutional support to the symposium and announced support for recognizing the College of Engineering Muttathara as part of the Kerala Hydrogen Valley Innovation Cluster (HVIC), marking a key milestone in the institution's green hydrogen research and capacity-building efforts.

Dr. Ranjith Krishna Pai
Senior Director & Scientist,
Department of Science & Technology (DST),Government of India

Keynote speaker and technology inauguration lead. Dr. Pai articulated India's national green hydrogen strategy, explained DST funding schemes and collaboration pathways, and jointly inaugurated a new Technology Development Initiative in collaboration with Banaras Hindu University. His presentations bridged national mission imperatives with state and institutional-level implementation, emphasising India's emerging competitiveness in the global hydrogen sector.

Sujit Pillai
Scientist (F), Ministry of New and Renewable Energy (MNRE),
Government of India

Mr. Sujit Pillai, in his special online address, highlighted India's National Green Hydrogen Mission (NGHM) led by the Ministry of New and Renewable Energy (MNRE).

He outlined the mission's strategic priorities, long-term vision, and key milestones aimed at positioning India as a global hub for green hydrogen production, utilization, and export.

The address highlighted MNRE initiatives on green hydrogen capacity, electrolyser manufacturing, and supportive policy frameworks.

Dr.Aravind P V,
Professor and Chair of Energy Conversion,
University of Groningen, Netherlands

Dr. P. V. Aravind, graced the valedictory ceremony as Chief Guest and commended the College of Engineering Muttathara for organising a timely national symposium aligned with India's and Kerala's growing green hydrogen ecosystem under the HVIC framework.

He highlighted the India–Netherlands Hydrogen Valley Fellowship Programme, supported by DST, Government of India, enabling 1–2 years of advanced research in the Netherlands Hydrogen Valley ecosystem.

He highlighted international co-supervision, advanced facilities, and joint PhD/post-doctoral opportunities under the programme, encouraging Indo-Dutch collaboration in green hydrogen research.

Section 3

Distinguished Dignitaries & Speakers

Academic & Research Speakers

Dr. rer. nat. Somenath Garai
Assistant Professor, Banaras Hindu University

Presented on quantum-confined photocatalytic systems for solar-powered green hydrogen production, digital-twin simulation frameworks, and scaling pathways from laboratory to pilot scale. His work represents cutting-edge materials science advancing electrolyser efficiency and cost reduction

Dr. Sunitha AP
Associate Professor of Physics, SARBTM Government College, Koyilandy

Honoured for her Marie Curie Seal of Excellence Post-Doctoral Fellowship, Dr. Sunitha presented on research and funding opportunities in the hydrogen sector, drawing from her award-winning work on advanced materials for photocatalytic hydrogen production

Dr. Rakhi R. B.
Principal Scientist, Centre for Sustainable Energy Technologies Division, CSIR–Trivandrum

Presented research on molybdenum dichalcogenides and advanced electrocatalysts for hydrogen evolution reaction, demonstrating CSIR's contributions to materials innovation and the role of national laboratories in supporting commercialisation pathways

Distinguished Dignitaries & Speakers

Academic & Research Speakers

Dr. Krishna Seshagiri
Associate Professor, IIT Palakkad

Delivered a compelling analysis of green hydrogen as a solution to global energy security and climate change crises, presenting IIT Palakkad's research initiatives on hydrogen production, storage, end-use technologies, and campus-level pilot projects

Entrepreneur

Dr. Mallikarjuna Rao M.
CEO, Shakti Photon Solutions Pvt. Ltd., IIT Madras Research Park

Discussed photonic and optical approaches to hydrogen generation, advanced material solutions for storage, and the start-up ecosystem bridging academic research with commercial deployment and venture funding models

Industry Leader

Mr. Abhilash Savidhan
Team Lead, FCEV (Hydrogen Systems), Reliance Industries Limited, Bangalore

Shared industrial perspectives on hydrogen technology deployment, fuel cell vehicle design, safety protocols and standards, and Reliance's strategic investments in electrolyser manufacturing and hydrogen supply chains. Participated in the industry-academia panel discussion

Section 4

Day 1 Programme – Inauguration & Technical Sessions

Morning: Inauguration Ceremony (9:30 AM – 12:00 PM)

Silent Prayer (9:30–9:31 AM)

The ceremony began with a moment of silent prayer, setting a reflective and respectful tone for the gathering.

Welcome Address (9:31–9:40 AM) — **Dr. C. Sreekanth, Convener**

Dr. Sreekanth extended warm welcome to all dignitaries, speakers, media, and participants, emphasising the symposium's alignment with India's National Green Hydrogen Mission and Kerala's HVIC–Kerala initiative. He expressed deep gratitude to Shri K. R. Jyothilal, IAS, for his unwavering support and guidance

Presidential Address (9:40–9:50 AM) — **Dr. V. Praseedalekshmi, Principal**

The Principal delivered a comprehensive address highlighting:
Role of academic institutions in fostering innovation
College's commitment to emerging technologies
Importance of aligning research with national priorities
Institution's vision for sustainable development

Inaugural Address (9:50–10:10 AM) — **Shri K. R. Jyothilal, IAS, Chief Guest**

As Chief Guest, Shri Jyothilal formally inaugurated the symposium, emphasising:
Kerala's Hydrogen Potential:
Diverse applications across industry, transport and energy sectors
Multiple production pathways suited to Kerala's ecosystem (solar, biomass, photocatalytic)
Waste-to-resource opportunities aligned with circular economy principles
Strategic Infrastructure:
Hydrogen Valley Innovation Cluster (HVIC–Kerala) as a ₹133 crore state initiative with national sanction

Day 1 Programme – Inauguration & Technical Sessions

Vizhinjam Port–Punalur corridor's potential for rare-earth material production supporting hydrogen technologies

- Kerala's natural advantages in non-conventional energy (wave energy, marine renewable sources)

Call for Collaboration:

- Policy-driven innovation
- Seamless collaboration between government, academia, and industry
- Kerala's vision to become a lighthouse state for green hydrogen in India

Special Addresses (10:10–10:50 AM)

Sri. Harshil R. Meena, IAS Guest of Honour

- ANERT's strategic hydrogen initiatives and pilot projects
- Financial and technical support extended to symposium
- Official recognition of College of Engineering Muttathara as part of Kerala HVIC – A **milestone achievement**

Dr. Ranjith Krishna Pai Guest of Honour

- India's national green hydrogen roadmap
- DST schemes, grants, and collaboration opportunities for R&D
- Inauguration of new Technology Development Initiative with DST and BHU
- Global competitiveness of India's hydrogen sector

Sri. Sujit Pillai Guest of Honour

- National Green Hydrogen Mission priorities and milestones
- Importance of institutional participation in building capacity
- Commendation for symposium's role in raising awareness

Day 1 Programme – Inauguration & Technical Sessions

Honouring Ceremony (11:10–11:15 AM)

Special recognition of **Dr. Sunitha A. P.** for her prestigious Marie Curie Seal of Excellence Post-Doctoral Fellowship, celebrating her contributions to advanced materials research for hydrogen production

Technology Inauguration Ceremony (11:15–11:25 AM)

Dr. Ranjith Krishna Pai inaugurated "Quantum-Confined Photocatalytic Green H_2: A Digital-Twin Framework"—a cutting-edge research initiative representing state-of-the-art work in photocatalytic hydrogen production with digital-twin modelling for real-time optimisation and scaling.

Felicitations (11:25–11:55 AM)

Recognition extended to institutional partners and supporters:

Dr. Binuja Thomas, Senior Principal Scientist, KSCSTE

Dr. Thajudin Ahamed V. I., Director, CAPE

Dr. Boby Philip, Chair, IEEE Power & Energy Society, Kerala Chapter

Dr. Savier J S, Director (SPFU)

Dr. S. Jayakumar, Joint Director, CAPE

Vote of Thanks (11:55 AM–12:00 PM) **Sri Shyju K., Co-Coordinator**

Day 1 Programme – Inauguration & Technical Sessions

Forenoon: Technical Sessions

Keynote Address — **Dr. Ranjith Krishna Pai**

- Title: "Accelerating India's Green Hydrogen Ecosystem: National Mission Priorities and the Nation's First Hydrogen Valley Innovation Clusters"

Comprehensive strategic presentation covering:

- National Green Hydrogen Mission priorities and deployment targets
- Hydrogen Valley Innovation Clusters as proof-of-concept models
- Kerala's HVIC–Kerala as flagship state-level initiative
- Policy enablers and international partnerships
- Technology roadmaps for electrolyser, storage, and end-use applications
- Role of higher education and research institutions

Plenary Talk 1 — **Dr. rer. nat. Somenath Garai,**

Title: "Quantum Technology in Green Energy Application: Advancing 'Solar-Green H_2' to Pilot Scale and Facilitating Real-Time Implementation through Digital-Twin Simulation"

Cutting-edge presentation on:

- Quantum confinement effects in nanostructured photocatalytic materials
- Scaling pathways from laboratory to pilot demonstration
- Digital-twin simulation for real-time monitoring and optimisation
- Cost reduction through materials innovation
- Integration with renewable energy systems

Day 1 Programme – Inauguration & Technical Sessions

Plenary Talk 2 **Dr. Sunitha AP**

- Title: "Exploring Research and Funding Opportunities in the Green Hydrogen Sector"

Comprehensive overview including:

- National and international funding schemes (DST, MNRE, DST-FIST, SERB)
- Marie Curie Fellowship opportunities and international collaboration frameworks
- Industry partnerships and venture funding models
- Capacity-building and postdoctoral opportunities
- Building research networks and centres of excellence

Networking lunch

Afternoon: Technical Sessions

Plenary Talk 3 **Dr. Rakhi R. B**

Title: "Molybdenum Dichalcogenides as Advanced Electrocatalysts for the Hydrogen Evolution Reaction"

Advanced materials research presentation covering:

- Novel materials science approaches to electrolyser catalysts
- Low-cost alternatives to platinum-based catalysts
- Hydrogen evolution reaction mechanisms and efficiency enhancements
- CSIR contributions to materials innovation and scaling
- Integration of advanced catalysts in electrolyser systems

Day 1 Programme – Inauguration & Technical Sessions

Plenary Talk 4 — **Mr. Abhilash Savidhan**

Title: "Hydrogen: Understanding the Molecule, Ensuring the Safety"

Industrial perspectives on hydrogen deployment:

- Fundamental hydrogen properties and chemistry
- Safety protocols, standards, and infrastructure requirements
- Fuel cell vehicle design, performance and commercialisation pathways
- Reliance's strategic investments in electrolyser and supply chains
- Real-world deployment lessons and industrial best practices
- Scaling from pilots to commercial hydrogen mobility ecosystems

Closing Tea

Day 1 Programme – Inauguration & Technical Sessions

Exhibitions and Live Demonstrations

Major Exhibition Attractions:

- Live Electrolyzer Operation – Real-time water electrolysis demonstration powered by renewable energy
- Renewable-Energy-Integrated Hydrogen Production – Integration of solar and wind systems
- Industrial and Mobility Applications – Hydrogen use in industrial processes and fuel cell vehicles
- Safety Systems and Infrastructure – Hydrogen delivery, storage, and safety solutions

Exhibiting Partners:

- Swagelok Bangalore
- Wattsun Energy India Pvt. Ltd.
- Adithya Solar
- Indian Bank
- ARCITE
- ASAP Kerala
- Emerging hydrogen technology start-ups and research prototypes
- Interactive Learning: Students, researchers, and professionals engaged directly with demonstration teams for hands-on learning experiences

Section 5

Day 2 Programme – Technical Sessions & Panel Discussion

Forenoon: Technical Sessions

Plenary Talk 5

Dr. Krishna Seshagiri

Title: "Green Hydrogen as a Solution to a Global Crisis"

Compelling analysis of hydrogen's role in global energy transition:

- Energy security and net-zero climate targets
- Applications across energy, transport, industry, and power sectors
- Decarbonisation pathways for hard-to-abate sectors
- Renewable integration strategies for hydrogen production at scale
- IIT Palakkad's research initiatives and campus-level pilot projects
- International hydrogen economy emergence

Plenary Talk 6

Dr. Mallikarjuna Rao M

Title: Technology Innovations in Photonic Hydrogen Production and Advanced Storage Solutions

Bridging academic research with commercial deployment:

- Photonic and optical approaches to hydrogen generation
- Advanced material solutions for hydrogen storage and delivery
- Start-up ecosystem and commercialisation pathways
- Academic-industry collaborations for rapid scaling
- Technology demonstration at IIT Madras Research Park
- Investment and venture funding models
- Overcoming market adoption barriers

Day 2 Programme – Technical Sessions & Panel Discussion

Industry Interaction Session 1 — **Swagelok Bangalore**

Presentation on:

- Fluid handling and component solutions
- Hydrogen delivery infrastructure systems
- Safety systems and industrial applications

Industry Interaction Session 2 — **Wattsun Energy India Pvt. Ltd**

Discussion on:

- Renewable energy systems integration
- Locally-developed solutions for hydrogen projects in Kerala

Networking Lunch

Afternoon Session

Poster Presentation & Review

Research papers and innovative projects showcased through posters on:

- Advanced electrolyser design and materials
- Hydrogen storage solutions
- Fuel cell technologies
- Hydrogen applications in industry and transport
- Policy and economic analysis of green hydrogen
- Integration with renewable energy systems
- Expert panelists provided feedback and insights for researcher refinement.

Day 2 Programme – Technical Sessions & Panel Discussion

Panel Discussion

Title: "Catalysing Kerala's Hydrogen Innovation Cluster (HVIC): Unleashing Innovation Through Industry–Academia Synergy"

Moderator

Dr. Krishna Seshagiri, Associate Professor, IIT Palakkad

Panelists

1. **Mr. Premkumar K,** Scientist- F, ANERT, Trivandrum
2. **Mr. Harikishen E. S**, Assistant General Manager, Strategic & Advanced Solutions, Cochin Shipyard Limited
3. **Mr. Abhilash Savidhan**, Team Lead, FCEV (Hydrogen Systems), Reliance Industries Limited, Bangalore
4. **Dr. Nishanth K. G.**, Principal Scientist, CSET Division, CSIR - NIIST, Trivandrum
5. **Mr. Laiju I. P. Nair**, HOD-COE & Skill Demand Aggregators ASAP Kerala

Critical Discussion Themes:

- Investment requirements and financial models for hydrogen projects
- Technology maturation and commercialisation timelines
- Skill gaps and manpower development needs
- Policy incentives for deployment acceleration
- Role of higher education institutions in hydrogen economy
- International collaboration and technology transfer
- Kerala's regional competitive advantages and positioning

Day 2 Programme – Technical Sessions & Panel Discussion

Valedictory Function

The symposium concluded with a Valedictory Function, summarising key outcomes and learnings from the two-day event. The Participants appreciated the comprehensive coverage of policy, technology, industry, and research perspectives in the Symposium during their feedback on the event. Dr.P.V Aravind, Professor, University of Groningen, The Netherlands was the Chief Guest and Mr.Premkumar K, Scientist-F, ANERT, Govt. of Kerala was the Guest of Honour for the function. The participation certificates and certificates for the winners of the poster presentation were distributed by Dr. S. Jayakumar, Joint Director, CAPE, and Dr. V. Praseedalekshmi, Principal, College of Engineering Muttathara.

The First Prize winners were

Fasna K and Najeera P. C. from MES Kalladi College, Mannarkkad.

The Second Prize winners were

Rahul S and Pridhun V from Government College of Engineering, Kannur.

The vote of thanks was delivered by Dr. C. Sreekanth, Event Convener.

Closing Tea

Section 6

Key Outcomes & Impact

Eight Major Achievements

1. Comprehensive Technical Knowledge Transfer

- Nine high-quality technical sessions covering:
- National green hydrogen mission strategy
- Advanced electrolyser technologies and quantum confinement
- Photocatalytic hydrogen production and digital-twin simulation
- Advanced electrocatalysts (molybdenum dichalcogenides)
- Hydrogen chemistry, safety, and industrial applications
- Green hydrogen as solution to global energy crisis
- Photonic and advanced material solutions
- Funding opportunities and research ecosystem

Impact: Participants gained state-of-the-art knowledge spanning science, engineering, policy, and commercialisation.

2. Live Demonstrations and Hands-On Learning

- **Interactive exhibitions** showcasing electrolyzer operation, renewable-powered production, and industrial/mobility applications.
- **Impact**: Practical, experiential learning complementing theoretical knowledge; direct engagement with demonstration teams; inspiration for innovation.

Key Outcomes & Impact

3. Industry-Academia Collaboration Framework

Panel discussion outcome: Identified critical collaboration areas:

- Applied research partnerships on electrolyser optimisation
- Skill development aligned with industry requirements
- Demonstration project opportunities at HVIC sites
- Technology transfer and commercialisation pathways
- Safety standards and industrial implementation frameworks

Impact: Clear roadmap for institutionalising partnerships and translating symposium networks into concrete projects.

4. Workforce Development Imperatives

Key conclusions:

- Need for hydrogen systems technician training programmes
- Higher education curriculum updates required
- Industry-sponsored internships and fellowships
- Centre of Excellence models (ASAP Kerala example)
- Skills aggregation across production, distribution, and end-use sectors

Impact: Identified actionable pathways for addressing critical manpower gaps in emerging hydrogen sector.

5. Investment and Financing Pathways

Identified funding mechanisms:

- National and international schemes (DST, MNRE, SERB, Marie Curie)
- Concessional financing for hydrogen infrastructure
- Viability gap funding for technology demonstration
- Performance-based incentives for technology developers
- Public-private partnership models and venture funding

Impact: Institutions and researchers now aware of multiple pathways to access national and international funding for hydrogen R&D

Key Outcomes & Impact

6. Recognition of Excellence

Honouring of Dr. Sunitha A. P. for Marie Curie Seal of Excellence Post-Doctoral Fellowship.

Impact: Demonstrated Kerala's capacity for world-class research and showcased international recognition and funding pathways in hydrogen and sustainable energy.

7. Technology Showcase and DST Initiative

Technology Inauguration: "Quantum-Confined Photocatalytic Green H_2: A Digital-Twin Framework"

New Initiative: Joint Technology Development Initiative with DST and Banaras Hindu University

Impact: Positioned Kerala as hub for cutting-edge R&D; established distributed network of hydrogen research excellence across institutions.

8. Institutional Recognition and HVIC Integration

Major Milestone: College of Engineering Muttathara may be considered as a part of Kerala's HVIC (Hydrogen Valley Innovation Cluster), based on the request from the Principal to the ANERT CEO during the Inaugural Ceremony.

Impact: Positions the College of Engineering Muttathara as a key institutional partner in this state-led initiative, sanctioned under the National Green Hydrogen Mission. This integration unlocks significant strategic, financial, academic and societal benefits across multiple dimensions.

Section 7

Recommendations & Way Forward

Three-Tier Action Plan

Immediate Actions (3–6 Months)

1. **Leverage HVIC Integration**

- Engage with ANERT, DST, and MNRE immediately
- Access dedicated funding and pilot project opportunities
- Align institutional R&D with state and national priorities

2. **Access DST Schemes and Grants**

- Apply for DST schemes and research grants
- Pursue collaboration with BHU-DST Technology Development Initiative
- Leverage international funding pathways (Marie Curie, etc.)

3. **Establish Research Partnerships**

- Initiate projects with Reliance Industries, Swagelok, Wattsun Energy
- Translate symposium networks into concrete collaborations
- Formalise MoUs with industry partners

4. **Conduct Student Competitions**

- Launch competitions on renewable energy innovation and hydrogen technologies
- Build entrepreneurial interest in the sector
- Inspire young researchers

Recommendations & Way Forward

Medium-Term Initiatives (6–12 Months)

5. **Establish Green Hydrogen Research Consortium**

- Link with IIT Palakkad, Banaras Hindu University
- Coordinate with CSIR–Trivandrum and industry partners
- Align efforts with HVIC–Kerala and National Green Hydrogen Mission

6. **Launch Joint Demonstration Projects**

- Identify sites at HVIC locations (Kochi, Vizhinjam)
- Form academia-industry teams
- Build on live demonstration experiences

7. **Create Skill Development Pathways**

- Collaborate with ASAP Kerala and polytechnics
- Develop hydrogen systems technician training programmes
- Address manpower gaps

8.Develop Academic Curricula

- Design undergraduate and postgraduate programmes
- Focus on green hydrogen technologies, fuel cells, storage
- Incorporate DST and MNRE guidance

Long-Term Strategic Directions (12+ Months)

9. **Facilitate Technology Transfer**

- Establish incubation mechanisms
- Support venture funding for hydrogen start-ups
- Focus on photocatalytic hydrogen production and quantum-confined mater

Recommendations & Way Forward

10. **Strengthen International Collaboration**

- Build partnerships with global hydrogen research clusters
- Participate in international technology transfer programmes
- Leverage India's emerging hydrogen competitiveness

11. **Build Policy Advocacy**

- Work with ANERT, DST, MNRE, KSCSTE
- Ensure sustained institutional support
- Advance regulatory clarity and financial incentives

12. **Establish Centre of Excellence in Green Hydrogen**

- Leverage the institution's HVIC membership and DST support to establish a Centre of Excellence in Green Hydrogen.
- Develop the Centre as a dedicated hub for advanced research, training, skill development, and technology demonstration in green hydrogen technologies.
- Strengthen the proposal through the successful completion of two evaluation levels by the College of Engineering Muttathara team for the Defence Presentation – Centre of Excellence under the National Green Hydrogen Mission (NGHM), Ministry of New and Renewable Energy (MNRE), Government of India, with the final results currently awaited
- Attract national and international collaborations and foster strong industry–academia partnerships.
- Contribute significantly to India's green hydrogen ecosystem and national clean energy objectives.
- Further reinforce the initiative through the Memorandum of Understanding (MoU) signed with the Additional Skill Acquisition Programme (ASAP), Government of Kerala, enabling structured skill development, certification, and workforce readiness in emerging green hydrogen technologies.

Section 8

Sponsors & Partners

Co-Sponsors

- Kerala State Council for Science, Technology and Environment (KSCSTE)
- Agency for New and Renewable Energy Research and Technology (ANERT)

Associated Partner

- IEEE Power & Energy Society – Kerala Chapter

Industry Partners

- Swagelok
- Wattsun Energy India Pvt. Ltd.
- Adithya Solar
- ARCITE
- Additional Skill Acquisition Programme (ASAP) Kerala

Section 9

Acknowledgements

Special Recognition

We gratefully acknowledge:

Government Leadership

- Shri K. R. Jyothilal, IAS – For visionary leadership, unwavering support, and consistently encouraging our green hydrogen research journey

Government Agencies & Mission Leaders

- Department of Science & Technology (India)
- Ministry of New and Renewable Energy (India)
- Agency for New and Renewable Energy Research and Technology (ANERT)
- Kerala State Council for Science, Technology and Environment (KSCSTE)
- Department of Cooperation (Government of Kerala)

Academic Institutions & Research Laboratories

- IIT Palakkad
- Banaras Hindu University
- CSIR–Trivandrum
- SARBTM Government College, Koyilandy
- APJ Abdul Kalam Technological University

Industry Partners

- Reliance Industries Limited
- Swagelok Bangalore
- Wattsun Energy India Pvt. Ltd.
- Shakti Photon Solutions Pvt. Ltd.
- Adithya Solar
- Indian Bank
- ARCITE
- Additional Skill Acquisition Programme (ASAP) Kerala

Kerala State Council for Science, Technology and Environment (KSCSTE), Government of Kerala

The Kerala State Council for Science, Technology and Environment (KSCSTE) is an autonomous body under the Government of Kerala, functioning to promote and support scientific research, technological innovation, and environmental conservation in the state.

KSCSTE plays a pivotal role in strengthening the science–academia–industry ecosystem by providing financial assistance, policy guidance, and infrastructure support to academic institutions, researchers, and innovators.

Major Objectives of KSCSTE:

- Promotion of science and technology research in universities and colleges
- Support for student projects, faculty research, and innovation initiatives
- Encouragement of environmental studies and sustainable development
- Bridging academia, industry, and society
- Nurturing young researchers and innovators in Kerala

Key Support Areas:

- Research grants for faculty and institutions
- Student project funding and fellowships
- Infrastructure development for laboratories and research centres
- Innovation and entrepreneurship support
- Seminars, conferences, and academic events

The Organising Committee of the Two-Day National Symposium on “Green Hydrogen for a Sustainable Future” gratefully acknowledges the financial and academic support extended by KSCSTE, which has significantly contributed to the successful conduct of this academic event.

Acknowledgements

College & Institutional Support

- Dr. Thajudin Ahamed V. I, Director, CAPE
- Dr. S. Jayakumar, Joint Director, CAPE
- Dr. V. Praseedalekshmi, Principal, College of Engineering Muttathara
- Faculty and staff of College of Engineering Muttathara

Student Volunteers & Support Staff

- Student volunteers of Department of Electrical & Electronics Engineering
- Technical and administrative staff who ensured smooth conduct of the event

Media & Communications

- Asianet news for extensive coverage and dissemination of symposium messages

All Participants

- Every speaker, panelist, and participant who contributed ideas, insights, and energy to making the symposium impactful and memorable

Section 11

Contact Information & Follow-Up

Department of Electrical & Electronics Engineering

College of Engineering Muttathara

Thiruvananthapuram-695008

Kerala, India

- Phone: 8547796964, 9994174075
- Email: hod.eee@cemuttathara.ac.in
- Website: https://cemuttathara.ac.in

For Collaboration & Partnership Enquiries

Please contact the Department of EEE or the Convener directly for discussions on:

- Research collaborations
- Faculty Development Programmes
- Skill development Programmes
- Industry partnerships
- Student internships and fellowships

Future Events

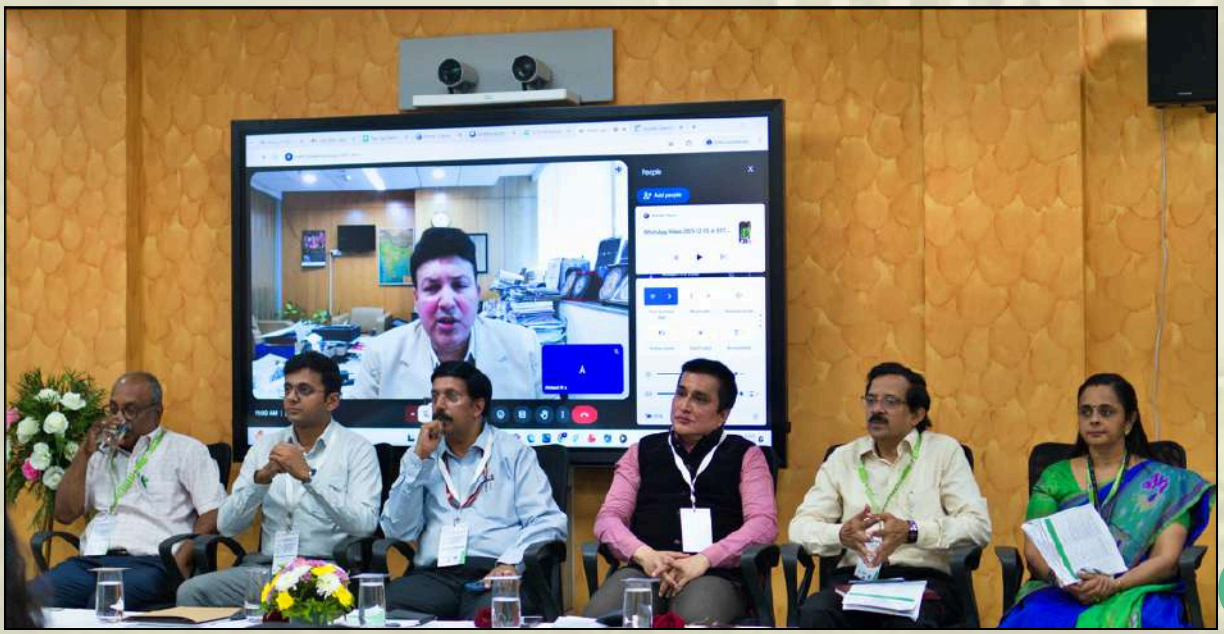
Information about upcoming symposia, workshops, and research seminars will be available on the college website and social media platforms. Interested participants are encouraged to register for updates.

Section 12

Photo Gallery

Photo Gallery

Photo Gallery



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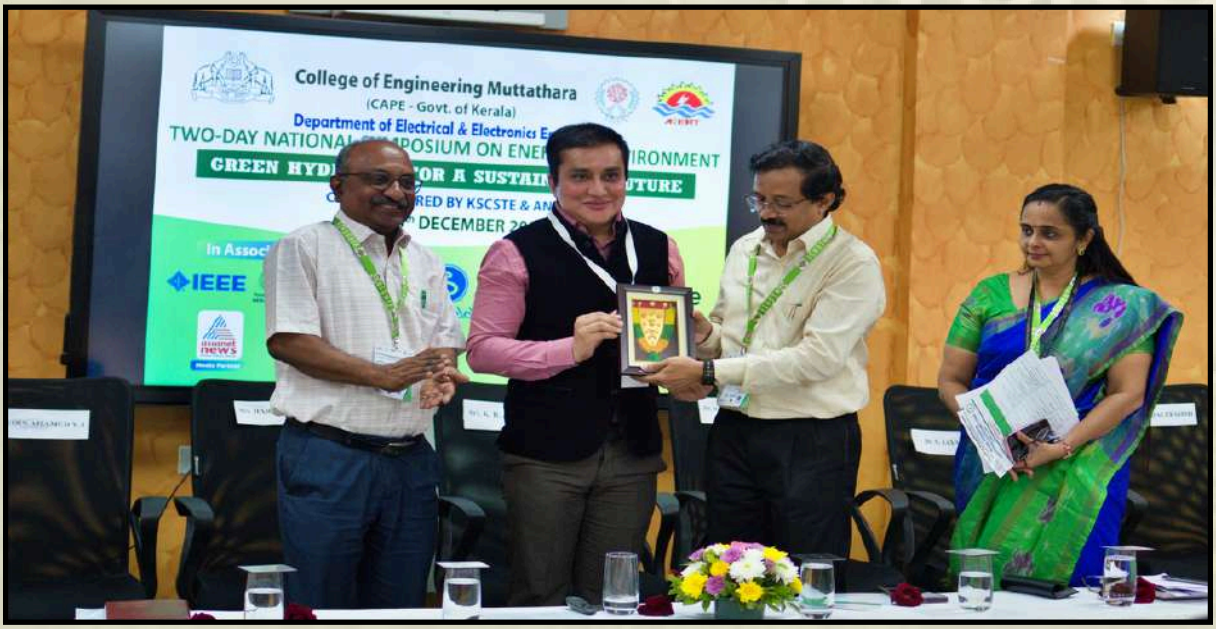

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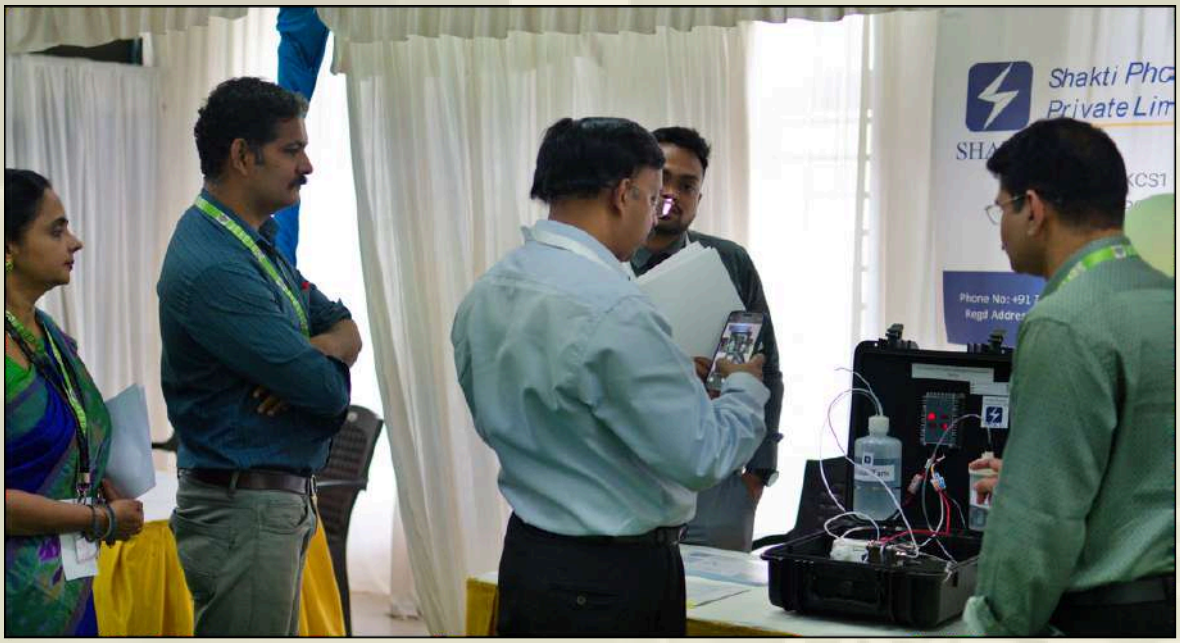
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Let us decarbonise the planet together.

@_VIDH_YUTH_

Department of Electrical & Electronics Engineering
College of Engineering Muttathara
(CAPE - Govt. of Kerala)