Embedding Solar in the Energy Transition: Leveraging Emerging Technologies and Critical Minerals for a Resilient Future

6th August 2025, 09:30 hours – 11:00 hours (Chile time)

Place: JW Marriot, Santiago, Chile

Registration link: https://isa.int/rcm_lac

The need to tackle climate change has prompted a global shift towards renewable energy (RE) sources such as solar and wind. While these sources are clean and abundant, their intermittent nature pose a significant challenge in maintaining a stable and reliable energy supply. To address these challenges, the deployment of emerging technologies has become increasingly important.

Introduction

Storage: The intermittent nature of solar generation necessitates robust storage integration to ensure grid stability, enhance energy access, and optimize the use of renewable resources. Short- to medium- duration storage, such as advanced battery systems, flywheels and other technologies, offer promising solutions by shifting energy over seconds, minutes, or a few hours. Long Duration Energy Storage (LDES) technologies, such as pumped storage, green hydrogen (GH) and thermal storage systems, enable the storage of solar energy for extended periods, ensuring a stable power supply even when sunlight is not available.

In this context, ISA recently conducted two studies:

- Developing prioritization framework for Energy Storage System (short to medium duration storage) for accelerating solar project deployment in Least Developed Countries (LDCs) and Small Island Developing States (SIDS)

- Scaling solar integrated LDES: Developing implementation roadmap and identification of project pipelines in Developing Nations

In the first phase, insights were developed for 20 member countries, and a stakeholder consultation workshop was conducted for the Latin America and Caribbean (LAC) region to share the insights and solicit feedback.

Solar Electric Vehicles: Electric Vehicles (EVs) offer an opportunity to rapidly reduce GHG emissions, especially when powered by RE sources. Solar energy, with its rapidly falling costs and abundant availability, emerges as a viable and sustainable option for charging EVs. ISA conducted a study titled 'Readiness Assessment for Solar-Powered Electric Mobility: Developing an Implementation Framework for ISA's LDCs and SIDS' for 64 ISA member countries. In the first phase, Antigua and Barbuda, Barbados, Belize, Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, St. Kitts and Nevis, St. Vincent and the Grenadines, Suriname, and Trinidad

and Tobago were part of the study from the LAC region. A stakeholder consultation workshop was conducted for the LAC region to share the findings.

Green Hydrogen: GH is a promising solution to decarbonise various hard to abate sectors, including transportation, refineries, fertilisers, and steel industry, etc. Although this emerging technology is gaining traction across industries, it faces certain challenges like high production and operational costs, underdeveloped infrastructure, absence of dedicated policy and standards, lack of knowledge, shortage of specialized manpower and limited access to affordable financing. ISA conducted a study **'Ecosystem Readiness Assessment for Production and Utilisation of Green Hydrogen'** for ten countries, including Argentina, Peru and Trinidad and Tobago in the LAC Region. A stakeholder consultation workshop was conducted as part of the study. A report on Commercial Framework for the development of Green Hydrogen Hubs was developed for the countries. It provides an overview of the global infrastructure readiness for GH production highlighting the importance of green hydrogen hubs. Four specialised Green Hydrogen tools have been designed to assist countries in assessing project risks, evaluating readiness, estimating costs, and hydrogen carbon accounting. These tools available on GHIC portal.

Critical material as enablers for clean technology: With more renewables deployed across the globe, material needs for use in efficient climate technologies have also increased. Critical materials including lithium, and rare earths are necessary components of many clean technologies e.g. solar, wind, EVs, GH etc. To ensure a robust supply chain, there is a need to develop national policies and implementation strategies for critical materials. The LAC region has known reserves of several critical minerals like lithium, nickel, and rare earths. For example, Chile and Argentina are major producers of lithium, while nickel reserves are abundant in Brazil and Cuba. *ISA plans to work with the member nations to create an enabling environment for developing infrastructure and partnerships in this sector*.

Suggested Topics for Speakers

- **Sector Experts**: Current and emerging technologies, critical materials and policy landscape; global best practices
- **Member Country**: Policy and regulatory frameworks to accelerate storage, solar EVs and GH deployment, supply chain ecosystem; Demand creation
- **Industry**: Existing and emerging business models for large scale deployment; Manufacturing and supply chain including that of critical materials

Expected Outcome

- Identify possible areas of collaboration - Feasibility studies, Joint Pilots, Business Models, Country-specific Roadmaps
- Identify partnership opportunities with ISA's capacity building initiatives, e.g. STAR-C, Green Hydrogen Innovation Centre (www.isa-ghic.org), joint training programme

Agenda

Time 90 mins	Speakers
Inaugural Address (3 mins)	Mr Ashish Khanna, Director General, ISA
Context Setting **ISA Initiatives in Technology Roadmap and Policy** (5 mins)	Dr Mridula Bharadwaj, Programme Lead – Solar E-Mobility, Storage, and Green Hydrogen, ISA
Roundtable Discussion (70 mins) **Moderator** Dr Mridula Bharadwaj, Programme Lead – Solar E-Mobility, Storage, and Green Hydrogen, ISA **Regional Coordination** Mr Hugo Morales-Sosa (Regional Head, Latin America and The Caribbean, ISA).	**Panellists** 1. Mr Julio Maturana, Head of Sustainable Energies Division of the Ministry of Energy of Chile 2. Mr Dario Morales, Executive Director, ACESOL 3. Mr Alfredo Villavicencio Vieira, Evaluation Specialist, Climate Investment Funds 4. Dr Arjun Bhattarai, Co-Founder and Chief Technology Officer, VFlowTech 5. Ms Stephanie Kodish, Senior Global Director, Drive to Zero, CALSTART 6. Dr Sumit Chowdhury, Founder ,CEO, GreenEarthX 7. Mr Dan Millison, Consultant, Asian Development Bank 8. Dr DMR Panda, Executive Director (Hydrogen), NTPC & CEO-APNHAL 9. Dr Sam Bartlett, Director, Green Hydrogen Organisation 10. Mr Rishabh Jain, Senior Programme Lead, Council on Energy, Environment, Water 11. Dr Abhinav Mathur, Head – Strategic Initiatives, Attero
Key Takeaways and Next Steps (10 mins)	ISA – RCM participants
Closing Remarks **(**2 mins)	ISA

Annexure

ISA's initiatives

Programme on **'Scaling Solar E-Mobility & Storage'**

ISA supports member countries in developing policies and regulations to accelerate solar energy adoption through its 'Scaling Solar E-Mobility & Storage' programme. This initiative promotes diverse storage technologies like batteries, compressed air, gravity storage, and pumped hydro. ISA conducted a study titled 'Developing Prioritisation Framework for short to medium duration storage for Accelerating Solar Project Deployment in Least Developed Countries (LDCs) and Small Island Developing States (SIDS)'. The study is intended to serve as an assessment report for short to medium duration deployment in ISA member countries, particularly focusing on LDCs and SIDS [1,2,3]. ISA also conducted a study titled 'Scaling Solar integrated LDES Technologies: Developing Implementation Roadmap and Identification of project pipelines in Developing Nations'. This study explores the opportunities, challenges, and strategies for deploying LDES technologies [4,5].

To support large-scale e-vehicle deployment, ISA is actively fostering an enabling ecosystem focused on two approaches: (a) solar-powered vehicle and battery charging stations, and (b) Vehicle Integrated Photovoltaic technology. These approaches are designed to address the multifaceted challenges and opportunities associated with the large-scale deployment of solar-powered EVs. In this context, ISA conducted a study on "Readiness Assessment for Solar-Powered Electric Mobility: Developing an Implementation Framework for ISA's LDCs and SIDS." In this study, ISA prepared a detailed roadmap for transitioning to solar-powered electric mobility in LDCs and SIDS through the in-house developed Solar EV Ecosystem Readiness Assessment (SEERA) framework [6]. This initiative included global case studies showcasing success stories [7].

Programme **'Solar for Green Hydrogen'**

The transition to a low-carbon future necessitates the rapid development and deployment of clean and sustainable energy sources. Recognizing the pivotal role of GH in achieving global climate goals, ISA launched a programme on 'Solar for Green Hydrogen' in its Fourth Assembly held in October 2021. The objective of this programme is to accelerate GH production, utilization, and trade in ISA Member Countries.

Under this programme, ISA has carried out capacity building activities, analytics and advocacy, country insights and feasibility studies for its member countries [8-15]. ISA in partnership with ADB, under the G20, 2023 India Presidency has created a virtual 'Green Hydrogen Innovation Centre'. This Centre of Excellence will support the production, utilization, and trade of GH, besides providing a platform for knowledge sharing and building competency across the GH value chain. The GHIC will also provide opportunities to incubate Start-Ups, provide certified training, and host Expert Working Groups to support the scale-up of the GH ecosystem in member countries. The platform was launched at the G20 Energy Transitions Ministerial Meeting (ETMM), and subsequently, was included in the G20 Leaders' Summit Delhi Declaration in September 2023.Building on these advancements, ISA introduced a new initiative—Global Green Hydrogen Start-up Challenge [16]. The objective of this initiative is to identify and support GH startups engaged in developing innovative, scalable and commercially viable solutions within the steel and transport sectors. This initiative will serve as a global platform for these start-ups to incubate and grow. The challenge will invite applications from eligible start-ups, and ~20 selected startups will receive seed grants along with strategic acceleration support.

ISA Storage, Solar EV and Green Hydrogen Publication Links

1. Framework for Energy Storage Prioritization to Boost Solar Deployment in LDCs and SIDS
2. Summary report on Framework for Energy Storage Prioritization to Boost Solar Deployment in LDCs and SIDS
3. Summary report for Scaling Solar integrated LDES Technologies: Developing Implementation Roadmap and Identification of project pipelines in Developing Nations
4. Framework for Energy Storage (Short and Medium Duration) Prioritisation to Boost Deployment in LDCs and SIDS
5. Scaling Solar integrated LDES Technologies: Developing Implementation Roadmap and Identification of project pipelines in Developing Nations
6. Readiness Assessment for Solar-Powered Electric Mobility: Developing an Implementation Framework for ISA's LDCs and SIDS
7. Charging for Change: Solar Electric Mobility Global Learnings
8. Blueprint for Ecosystem Readiness Assessment for Green Hydrogen
9. Africa Solar Hydrogen Project (ASHyP)
10. A Roadmap for Developing and Scaling the Green Hydrogen Ecosystem
11. ISA-INAE Green Hydrogen Report for India
12. Green Hydrogen Innovation Centre
13. Readiness Assessment of Green Hydrogen in African Countries
14. Green Hydrogen Policy Accelerator Training Handbook
15. Ecosystem Readiness Assessment for Production and Utilisation of Green Hydrogen
16. Global Green Hydrogen Startup Challenge