Research topics

Topic 1: Green Hydrogen/PtX

Research proposals focused on the development and application of models, tools or mechanisms for the sustainable production, storage and use of Green Hydrogen/PtX, also referred to as indirect electrification. The proposals must consider one or more of the specific or general subtopics.

Topic 2: Direct Electrification and Energy Storage

Research proposal focused on the development and application of models, tools or mechanisms for (i) direct electrification in the context of sector coupling (urban mobility or industry) and (ii) for energy storage. The proposals must consider one or more of the specific or general subtopics.

Subtopics

Specific subtopics of Green Hydrogen/PtX

How can green Hydrogen and derivates* lead to sustainability and economic development?

Production**

How can the technical and economic development of green H2 production lead to the expansion of renewable energies and the sustainability of the Brazilian energy system?

- **Technologies** - What are the optimal technological approaches to produce green H2 and derivates considering the Brazilian context (geography, climate, etc.)? And how to enable the production of green H2 through different technological approaches in Brazil?
- **Efficiency** - How to improve the energy efficiency of the green H2 production technologies to achieve economic feasibility?
- **Scaling up** - How to scale up the production of green H2 in Brazil?

Storage and distribution

How to implement storage, transport and distribution of green H2 and its derivatives for the domestic and export markets?

- **Local conditions** - What are optimal solutions to store and distribute Green H2 for the domestic market considering the Brazilian context (geography, climate, regulatory framework, etc.)?

Application

How can green H2 and derivates contribute to the decarbonization in different sectors (transport, industry and agriculture)?

- **Business Models** - How can new business models facilitate the adoption of green H2 and derivates in the industry and transport sectors?
- **Market development** - How to promote a sustainable market for green H2 inBrazil (both domestically and for export)?

Additional Sector Coupling Topics

How to best decarbonize different sectors through direct and indirect electrification?

Mobility

- **Battery Vs green H2 -** Which choice is best suited for mobility considering green H2 (fuel cell) and battery to decarbonize mid and long range transportation of goods and passengers, taking into account local conditions?
- **Charging Infrastructure -** How to best integrate green H2 and battery into the mobility sector, considering the adaptation of infrastructure?

Isolated Systems

Which are the best solutions to integrate clean energy sources in isolated systems through direct electrification and/or Green Hydrogen?

Industry

Which industry sectors are best suited for direct electrification, indirect electrification, and energy storage in the Brazilian context?

Storage

What is the best storage solution (battery system and/or green H2) to contribute to the stabilization of the Brazilian electrical system?

Specific Subtopic of Direct Electrification

Battery Operated urban transportation and logistics

- **Polices (national and subnational levels)** - How to connect the local, state and federal policies to promote public fleets and electrical buses?
- **Business models** - How can new business model facilitate the implementation and operation of electrical buses and public fleets?
- **Local conditions -** Which are the optimal solutions (in batteries, charging and infrastructure) considering particular climate, geographic and other relevant conditions in Brazil?

Industry

- **Potential analysis of industrial processes – process mapping -**What are the mainindustry sectors suited for being electrified in Brazilian context?
- **Replacing Fossil Fuels with Clean Energy** - Which industrial processes are best suitedto be electrified in order to replace fossil fuels?
- **Process to stabilize the power system -** How can electrifying industrial processes effectively contribute to stabilize the power system?

Specific Subtopic of Energy Storage

Energy Storage in vehicles

How can energy storage in vehicles contribute to the electrical system by providing system services? (vehicle-to-grid, charging, smart grids, stability ofthe electrical system)

- **Vehicle-to-Grid (V2G) -** How can V2G contribute to the stability/reliability of the electrical system?
- **Integration of charging infrastructure to existing grids -** How to integrate charging infrastructure into existing grids?
- **Second-life batteries -** How can second-life batteries contribute to electrical system stability?

Regulation - How can regulation facilitate the implementation of V2G?

Cross topics of production, storage/distribution and application

- **Implementation Barriers**- How to overcome social-economical, technological and safety barriers regarding the production, storage/distribution, and application of green H2 and derivates?
- **Value Chain Development** - How to develop a feasible production value chain for green H2 and derivates in Brazil?
- **H2 Hubs and Valleys -** How can Hubs and green H2 valleys contribute to the development of a sustainable green H2 economy in Brazil?
- **Certification** - How to certificate green H2 and its derivates?

Isolated Systems

- **Economical Feasibility** - How can batteries (including second-life) contribute to the economical feasibility of isolated systems?
- **Battery technologies -** What battery technologies can be best applied into isolated systems (particularly regarding climate effects on battery life cycle - hot and humidity conditions and their impact on logistics and transportation)?
- **Substitution of fossil fuels with renewable energy -** How can batteries contribute to the substitution of fossil fuels in isolated systems?

*** green ammonia, methanol and e-fuels**

** Considering renewable sources and
in the case of Biomass only residues should be considered, where: the production process contributes to the significant reduction of GHG emissions, the feedstock does not compete with fertile agricultural land and does not impair biodiversity through agricultural expansion and the biomass feedstocks do not require purpose-grown bioenergy corps