



## STORAGE RESEARCH INFRASTRUCTURE ECO-SYSTEM

### RI Information sheet 2022

SINTEF Energy Research, National Smart Grid Laboratory (NSGL),  
Trondheim, Norway

Technology of Energy Storage: Electrochemical

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Project Acronym	StoRIES
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Project Start Date	01-11-2021
Project End Date	31-10-2025
Duration	48 months

## 1. Photo



*Fig. 1. Picture of the National Smart Grids Laboratory*



*Fig. 2. The Energy Storage Laboratory*

## 2. Geographical coordinates

63°25'47"N 10°23'36"E

## 3. Description of the research infrastructure for the webpage

The National Smart Grid Laboratory (NSGL) is located in Trondheim at the campus of the Norwegian University of Science and Technology (NTNU) and jointly operated by SINTEF and NTNU. The core of the National Smart Grid Laboratory is a facility (250 m<sup>2</sup>) providing a reconfigurable electrical infrastructure for conducting experiments at low voltage levels (e.g. 400 V ac or 800 V dc) and for power ratings in the range of 100 kW. The laboratory is versatile with most components on wheels and can be reconfigured as wished. In addition, the connections established among the NSGL, the smart house and the energy storage laboratory enables wide range of testing activities.

The energy storage laboratory is located on the same floor with the smart grid laboratory but in a separate room. There is both AC and DC cable connection setup with the smart grid lab together with fiber optic communication. The lab is also connected with the smart house with AC cable and fiber optic communication.

The energy storage laboratory contains equipment such as: battery module tester (battery emulator), climate chamber, two PV-emulators, inverter for PV and battery, lead acid battery with integrated converter to AC/DC and Li-ion battery.

#### Battery tester

- 32 independent channels, each 200V/30A/2.5kW
- Paralleling gives up to 200V/960A/80kW
- Logging and storage of measurements (10ms)

#### Lead-acid batteries with integrated converter

- 8x Lead-acid batteries from EnerSys (SBS 190F)
- 12V / 190Ah / 2.28kWh each
- 48V / 380 Ah / 18.24 kWh total
- Three phase converter with 3x2kW single phase inverters

#### Li-Ion Energy storage

- 10x Li-Ion modules mounted in a rack
- 400 – 480V DC, 25 kWh
- Battery Management System

#### PV emulators

- Output voltage: 0 – 600V DC
- Output current: 0 – 17A / 0 – 25A
- Maximum power: 10kW / 15kW

#### PV inverter

- 5 kVA, 230V/400V 3-phase inverter
- PV input: 150 -1000V DC 16A
- Battery connection: 120 – 480V DC 16A
- Build-in maximum power point tracking (for solar)

#### Climate chamber

- Useful capacity: 553 liters
- Maximum weight of test object : 100 kg

- Temperature range: 40...+180 (°C)
- Humidity range (T=-3/+94°C): 10...98 (%)
- Maximum thermal Load (T=+25°C) : 4500 (W)

Some of the services offered by the SINTEF NSGL energy storage laboratory include:

- Energy storage system validation and integration testing
- Characterization of integration charging infrastructure in distribution systems for electric transport system
- Validation testing of services offered by flexibility resources.

#### 4. Availability of the research infrastructure

(Please indicate time periods in which infrastructure will not be available for StoRIES in the next 2 years – if already known)

There are no specific dates of availability that can be mentioned beforehand. However, the planned visit must be communicated to the laboratory in good time to fit it in the booking system in accordance with other activities.

#### 5. Special considerations (confidentiality / NDA agreements, insurance requirement, special training, HSE training)

- There will be a SINTEF confidential agreement to be signed by the user.
- The USER must have the appropriate insurances to cover all members of the User Group during the stay period. This includes:
  - Medical insurance.
  - Travel insurance (accidents during travels made for work purposes and accidents on the way to work and back from work).
  - General Liability insurance for at least NOK 10 million.
- Courses and training
  - General online laboratory HSE course
  - Onsite visit with local laboratory HSE responsible person

#### 6. Energy storage technology that can be analysed/studied by using the research infrastructure

- Electrochemical
- Chemical
- Thermal
- Mechanical

- Superconducting Magnetic
- Cross-cutting  (Specifically: ... )

7. Key words for the webpage

Battery, smart grid, flexibility, real time simulation, climate chamber, PV-emulators

8. TRL level (if applicable):

- 1-3
- 4-6
- Above

