TECHARENA

Global Talent Building the Future Together

Huawei Nuremberg Tech Arena 2025

€20,000 Prize Pool

OPENING WEBINAR

Agenda

- Timeline
- Prize Pool
- Challenge
- Competition Phases
- Evaluation Criteria
- Next Steps
- Discord
- Team Formation
- Finding teammates

TIMELINE

Registration Phase
Registration starts August 4

First Phase
August 27 - October 1

Selection Phase
October 2 - October 16

Second Phase
October 17 - November 2

Final Competition
November 10

Award Ceremony in Nuremberg
November 20

PRIZE POOL

Prize pool

Gold prize

The sum of 6,000 €
(divided equally between each member of the winning team)

One winning team in total.

Silver prize

The sum of 4,000 €
(divided equally between each member of the winning team)

There will be two winning teams.

Bronze prize

The sum of 2,000 €
(divided equally between each member of the winning team)

There will be three winning teams.

Opportunity for future research collaboration with Huawei.

The Challenge

Power the Future of Energy Optimization at Huawei Nuremberg Tech Arena 2025

Utility-scale Battery Energy Storage Systems (BESS) are essential for building a more flexible, resilient, and sustainable power grid.

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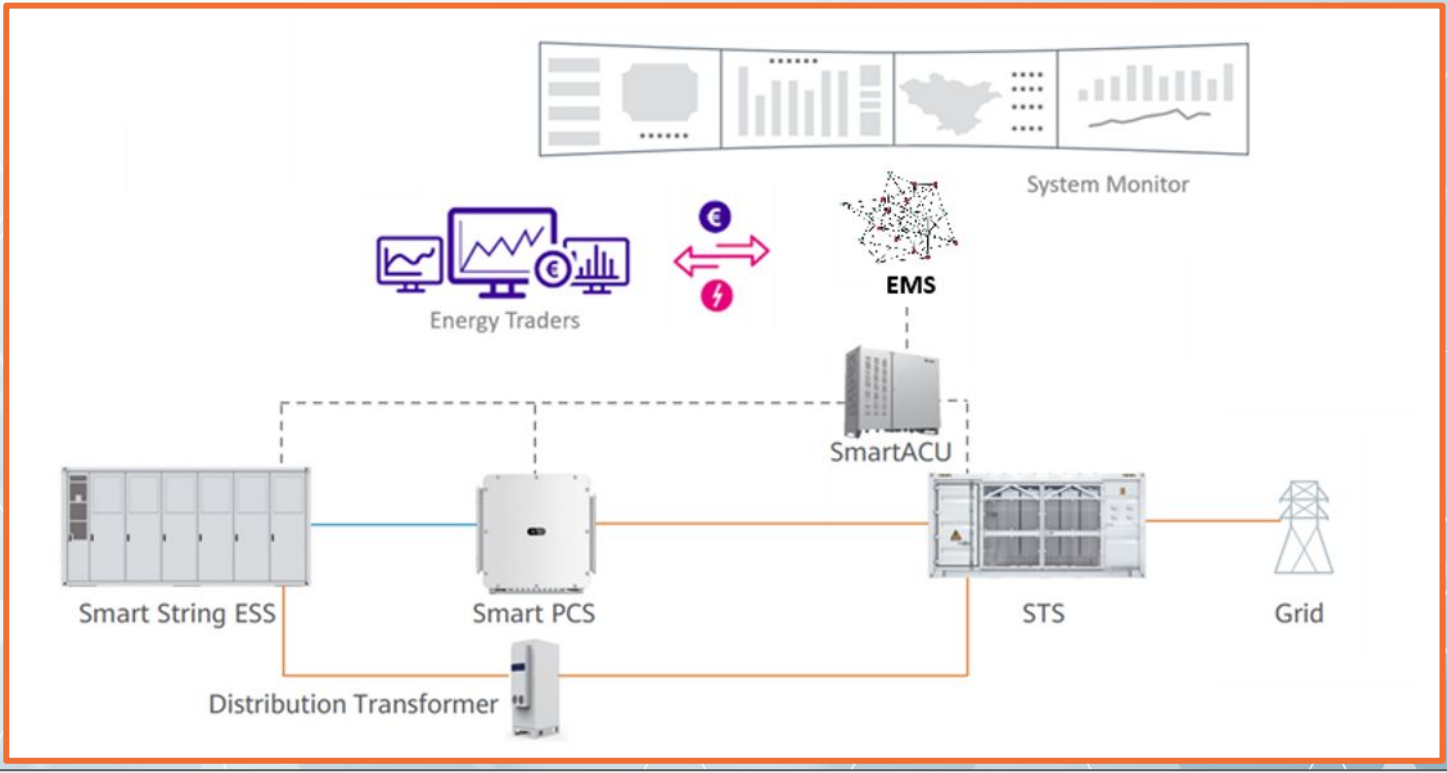
WELCOME

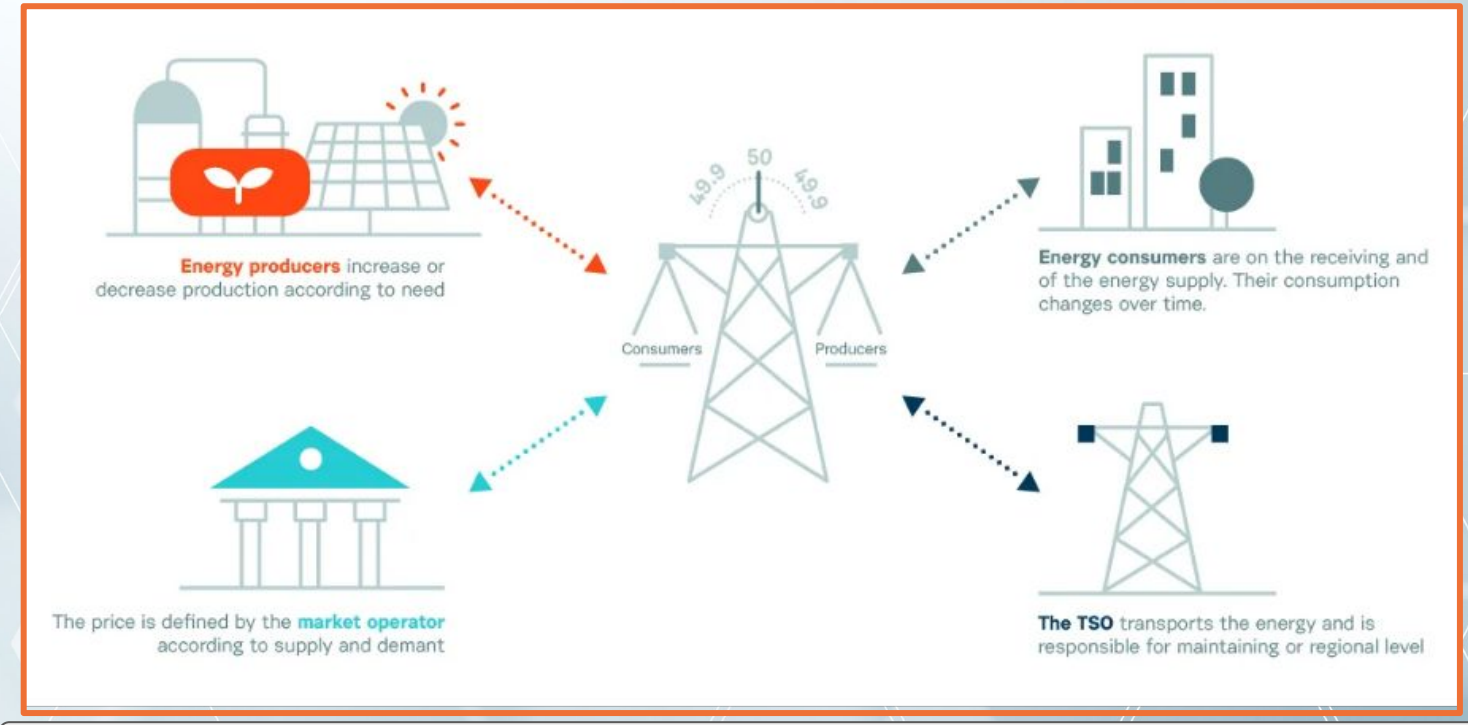
Dr. Mansour Alramlawi

Senior Engineer - Energy Storage System Algorithm

CHALLENGE



The EMS will need to optimize the battery's charge and discharge strategy based on **wholesale** electricity market prices and participation in ancillary service markets, such as Frequency Containment Reserve (**FCR**) and automatic Frequency Restoration Reserve (**aFRR**).



- The electricity market ensures a constant balance between generation and consumption in real time.
- Supply-demand mismatches can destabilize the grid and cause blackouts.
- Market mechanisms coordinate producers, consumers, and storage to maintain system reliability.

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Optimal Operation

Maximize revenue by determining the optimal charge/discharge strategy for the BESS. The BESS will participate in

- **wholesale day ahead**
- **FCR**
- **aFRR capacity**

Optimal Investment

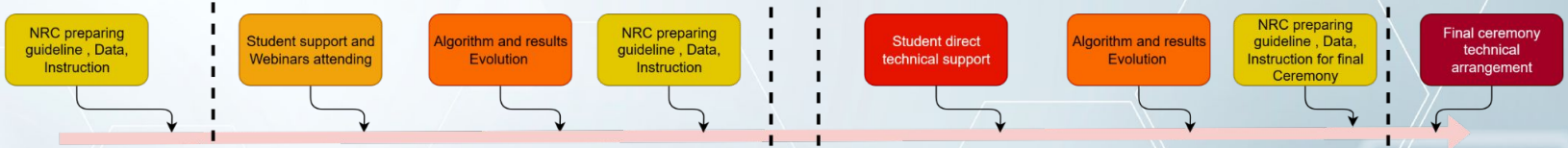
Identify the best European country to install a BESS by considering the country- specific markets, aiming to achieve the highest return on investment (**ROI**) over a 10-year period. Selected countries include

- **Germany** (DE)
- **Austria** (AT)
- **Switzerland** (CH)
- **Hungary** (HU),
- **Czech Republic** (CZ).

Optimal Configuration

Participants are tasked with determining the optimal configuration for the utility scale BESS by identifying the best configuration that balances profitability, performance, and longevity, considering

- **Daily number of cycles**
- **C-rate**



Phase 1

In the first phase,

1. **Operation Optimization**:
   Maximize revenue by determining the optimal charge/discharge strategy for a BESS based on market prices and participation in ancillary services.
2. **Investment Optimization**:
   Identify the best European countries to achieve the highest return on investment (ROI) over a 10-year period by installing a utility-scale BESS.

3. Configuration Optimization: Optimize the BESS configuration

Phase 2

In the second phase,

1. **Operation Optimization**:
   Maximize revenue by determining the optimal charge/discharge strategy for a BESS based on market prices and participation in ancillary services.

   participants will further improve their EMS algorithm operation with focusing on battery degradation cost
2. **Investment Optimization**:
   Identify the best European countries to achieve the highest return on investment (ROI) over a 10-year period by installing a utility-scale BESS.

3. Configuration Optimization: Optimize the BESS configuration.

EVALUATION CRITERIA

- **Revenue maximization (50%)**. This will evaluate how well the algorithm maximizes revenue based on market prices. A linear scaling formula will be used to map all submission values between the minimum and maximum observed

- **Investment optimization (20%)**. This will evaluate the assessment of optimal investment locations and markets. The evaluation will consider

- **Configuration optimization (20%)**. This will evaluate the assessment of the most relevant configuration parameters on BESS revenue.

- **Code Quality and Documentation (10%)**. This will evaluate the clarity and structure of the code.

Dr. Paolo Gabrieli

Principal Engineer- Energy management System Algorithm

1. Historical electricity prices for 2024 relevant for Phase 1.

Electricity price	Time resolution	Description
Day-ahead wholesale electricity price	15-minute	The day-ahead market is a wholesale electricity trading platform operated by EPEX SPOT across the selected countries, where participants submit hourly or quarter-hourly bids one day before delivery.
Settlement price for contracted Frequency Containment Reserves (FCR)	4-hour	The FCR market is jointly coordinated via regelleistung.net for Central Europe, providing fully automatic, symmetric reserves that respond within 30 seconds to frequency deviations.
Settlement price for contracted automatic Frequency Restoration Reserves (aFRR)	4-hour	The aFRR capacity market is operated via regelleistung.net, where providers bid daily to deliver flexible reserves, activated through the PICASSO platform to maintain balance within five minutes.

2. Investment market conditions

Country	Weighted-average cost of capital (WACC)	Inflation rate
Germany (DE)	8.3%	2.0%
Austria (AT)	8.3%	3.3%
Switzerland (CH)	8.3%	0.1%
Czech Republic (CZ)	12.0%	2.9%
Hungary (HU)	15.0%	4.6%

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3. System Configuration

Huawei's **LUNA2000-4.5 MWh** Battery Energy Storage System (BESS). It shows the unit as a 20-foot containerized module outfitted with liquid cooling components for enhanced capacity and performance.

Feature	Specification
Energy Capacity	~4,472 kWh
Power Rating	~2,236 kW
Charge/Discharge C-rates	0.25 C□, 0.33 C□, 0.50 C□
Daily Number of Cycles	1.0, 1.5, 2.0
Cooling Method	Liquid cooling

Model: LUNA2000-4.5MWH-2H1
Smart String ESS (Preliminary)

Ultra Safety | Native Stability | Higher Revenue | Smart O&M

Battery Container	
Model	LUNA2000-4.5MWH-2H1
DC Rated Voltage	1,331.2 V
DC Max. Voltage	1,500 V
Nominal Energy Capacity	4,472 kWh
Charge & Discharge Rate	≤ 0.5 C
Rated Power	2,236 kW
Dimension (W x H x D)	6,058 x 2,896 x 2,438 mm
Weight	≤ 41 t
Operation Temperature Range	-30°C – 55°C
Storage Temperature Range	-40°C – 60°C
Relative Humidity	0 – 100% (Non-condensing)
Max. Operating Altitude	4,700 m
Cooling Method	Liquid Cooling
Fire Suppression System	Water Sprinkler, Novec 1230 (Optional)
Communication Interface	Ethernet / SFP
Communication Protocol	Modbus TCP
Protection Degree	IP55
Anti-corrosion Degree	C5-Medium
Standards Compliance	
RoHS, IEC62477-1, IEC62040-1, IEC61000-6-2, IEC62933-5-2, UL9540A, IEC62619, UN38.3, etc.	
Battery Pack	
Cell Material	LFP
Number of Cell	104
Nominal Capacity	280 Ah / 93.18 kWh
Protection Degree	IP65
Weight	670±10 kg
Dimensions (W x H x D)	785 x 249 x 2182 mm

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Mangesh Mankar

Senior Data Engineer

Fair, Fast, and Consistent Evaluation System

We've implemented a state-of-the-art **automated evaluation system** that assesses submissions immediately upon upload, designed with three core principles:

Fairness

Every submission is evaluated using identical criteria - no human bias, no inconsistencies

Speed

Evaluation feedback within minutes, not hours or days

Transparency

Clear, actionable feedback helps you understand exactly what needs improvement

Important note: This automated system is used exclusively by our evaluation team. The validation tools and criteria are **not shared with participants** to maintain evaluation integrity and prevent system gaming.

Comprehensive Technical Assessment

What we evaluate

Submission Structure & Compliance

ZIP file organization, naming conventions, required files, and proper directory structure

Code Quality & Executability

Python code runs without syntax errors, proper imports, and basic quality indicators

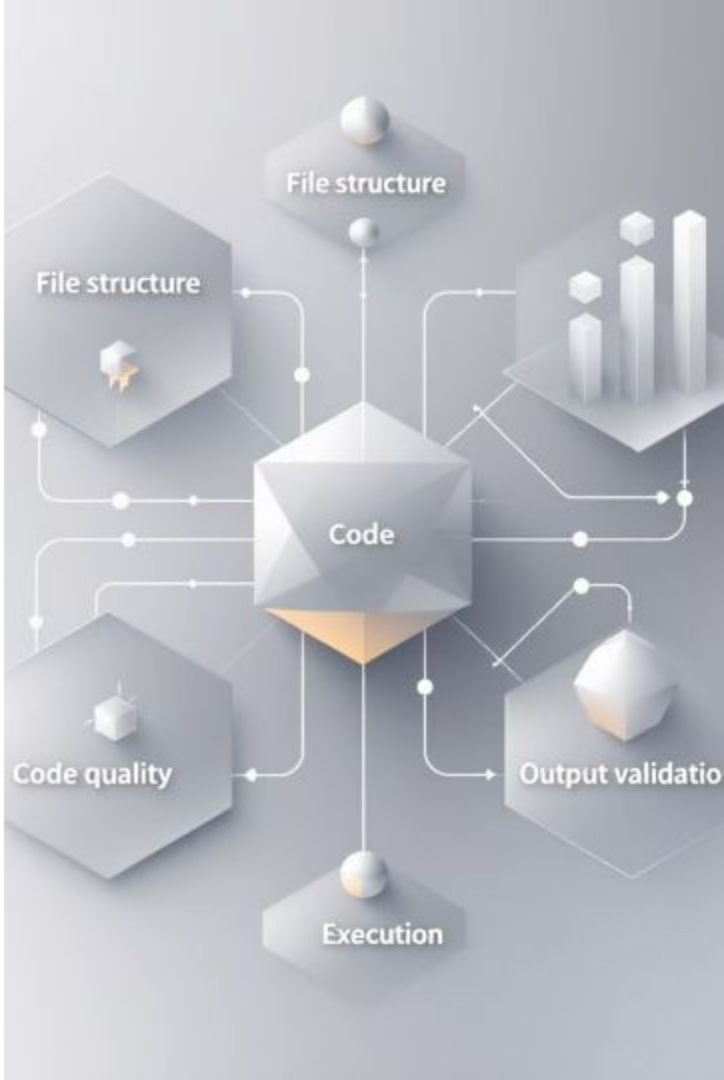
Technical Execution

Script runs in clean environment, dependency compatibility, execution time and resources

Output Validation

All required output files generated with correct formats, naming, and specifications

The beauty of this system is **consistency** - every team's submission goes through exactly the same evaluation process.



Evaluation Process Flow: From Submission to Feedback in Minutes

Step 1: Secure Upload & Extraction

- ZIP file uploaded to secure platform
- System extracts submission in isolated environment

Step 2: Automated Validation

- Structure and file compliance checking
- Code quality and syntax validation
- Dependency resolution

Step 3: Execution Testing

- main.py runs in controlled sandbox
- Output files generated and captured
- Performance metrics recorded

Step 4: Reporting

- Detailed validation report generated
- Clear feedback on pass/fail status
- Specific improvement recommendations

All of this happens within minutes of your submission!

Your Success Strategy

Follow the Guidelines Precisely

- Stick exactly to the provided file structure and naming conventions
- Include all required files in the correct locations
- Test your submission structure before final upload

Test Early and Often

- Don't wait until the deadline to test your complete submission
- Create your ZIP file and test the entire workflow multiple times
- Verify your main.py runs successfully in a clean environment

Focus on Robustness

- Write code that handles edge cases gracefully
- Use relative paths, never absolute ones
- Include proper error handling and meaningful output messages

Next Steps

JOIN THE DISCORD

TEAM FORMATION

TEAM FORMATION

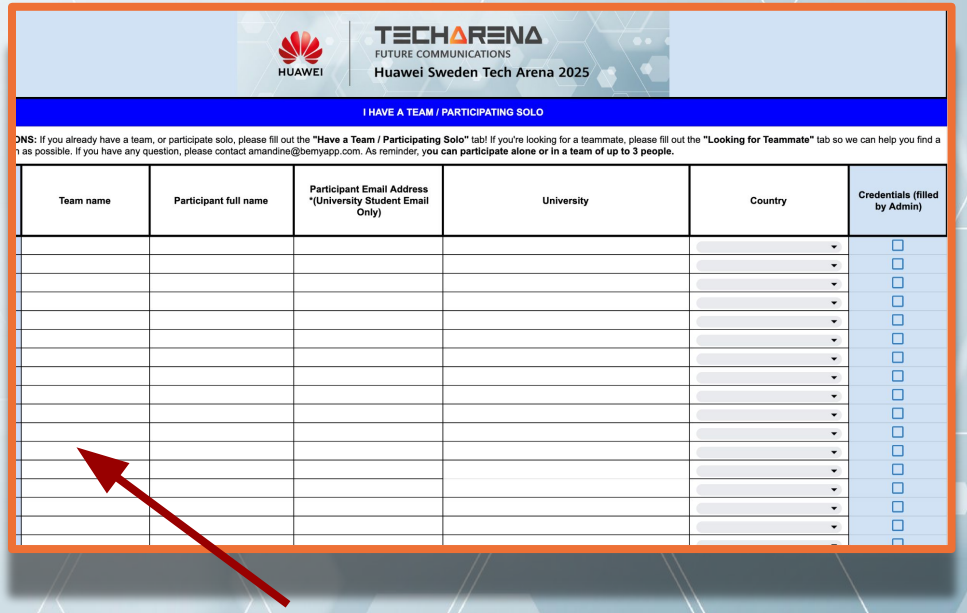
Let's Get You Set Up!
Make sure to complete the **team formation Excel sheet** so we can give you access to the Data.

- If you already have a team or are participating solo, fill out the **"Have a Team / Participating Solo"** tab or **confirm your information by checking the box** if it's already there.

  **If you register solo and later decide to form a team, just update the Excel sheet.*

- If you're still looking for teammates, fill out the **"Looking for a Teammate"** or **confirm your information by checking the box** so we can match you with others!

Reminder: You can join the hackathon **solo or in a team of up to 3 people.**



FILL OUT THE EXCEL SHEET

HOW TO FIND TEAMMATES?

Looking for a Team?

Head over to the **#looking-for-a-team** channel on Discord to introduce yourself, connect with other participants, and form a team. Once your team is ready, don't forget to add it to the **Excel sheet**.

Note: If you have a friend who wants to join the challenge with you, make sure they register first using the registration form **here** — everyone must register individually.

CHALLENGE DATA ACCESS

You'll receive an email with **a link to download the data to begin your challenge** on **Wednesday, August 27th**.

That's where your hackathon journey officially begins!

The **LINK** will include everything you need: **key details, competition guidelines, and submission instructions.**

ANY QUESTIONS?

If you have any questions, please contact
amandine@bemyapp.com

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GOOD LUCK & ENJOY!