



Thailand's Hydro-Floating Solar Hybrid Project

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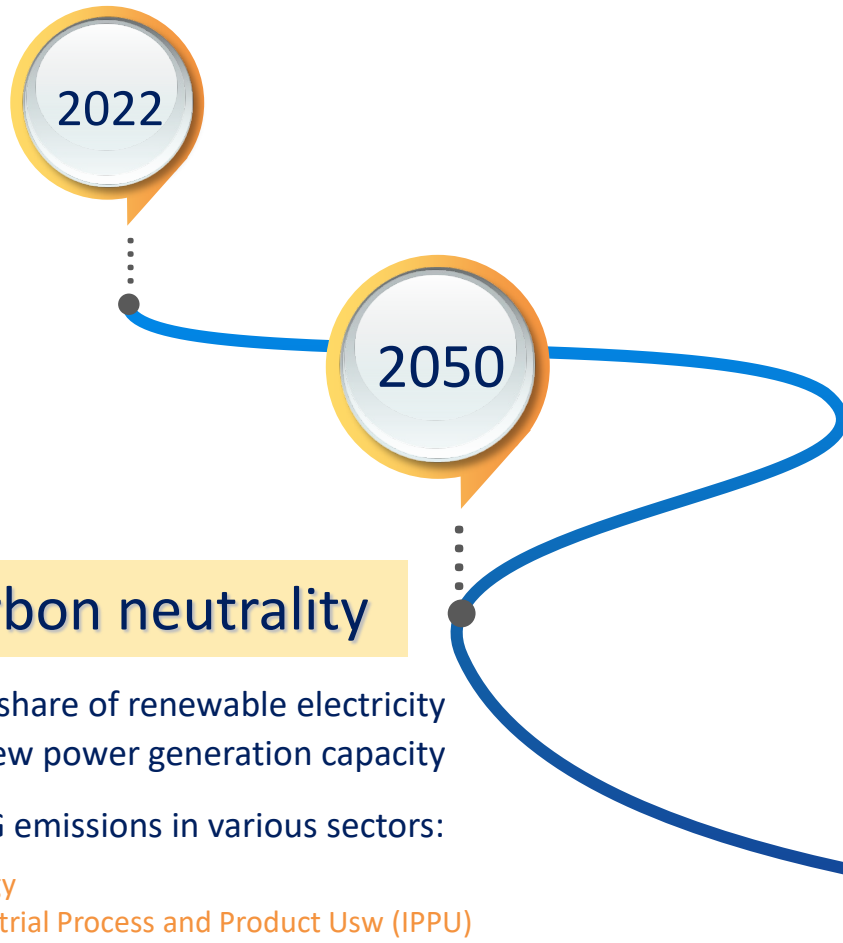
- Thailand Policy
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- EGAT's Potential for Hybrid Projects



01 : Thailand Policy

Thailand Policy

Thailand announce in Conference of Parties 26 (COP26)



Thailand Carbon Neutrality Target

- Increase the portion of renewable energy at least 50% and consider the cost of long-term energy storage system
- Change in the transport sector to green electricity with EV technology to reduce greenhouse gas and to solve PM 2.5
- Improve energy efficiency by more than 30%
- Restructuring the energy industry to support energy transition trends, including Decarbonization, Digitalization, Decentralization, Deregulation and Electrification

Carbon neutrality

50% share of renewable electricity generation of new power generation capacity

Reduction of GHG emissions in various sectors:

- Energy
- Industrial Process and Product Use (IPPU)
- Agriculture
- Waste
- Land Use, Land Use Change, and Forestry

2065

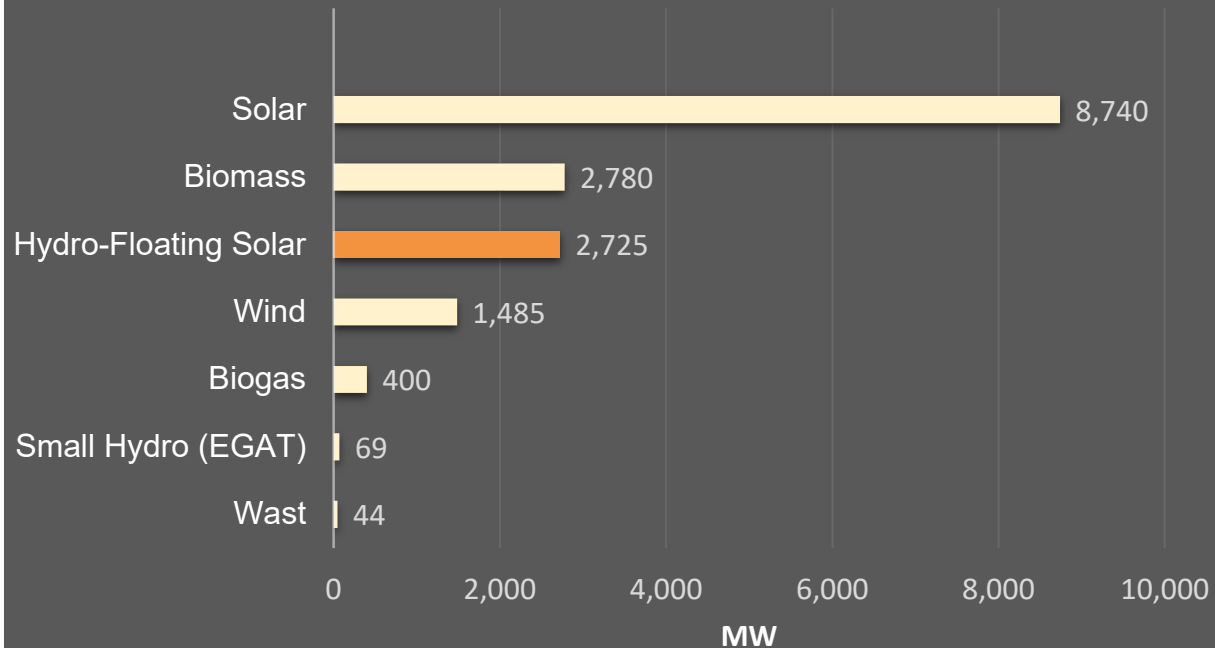
Achievement of

NET-ZERO Emission

* GHG : Greenhouse Gas

Thailand Power Development Plan 2018 Rev.1

New Renewable Energy Plan (2018 - 2037)



Total New Capacity 16,243 MW

Target in 2037 

Total Capacity **77,211 MW**

Renewable Energy Target **30%**

Hydro-Floating Solar Hybrid **2,725MW**
 in 9 Dam (EGAT's Multipurpose Dams)



02 : EGAT Business



Generation

Installed Generation Capacity
16,082 MW

To generate electricity by 52 power plants

- 3 Thermal power plants
- 6 Combined cycle power plants
- 9 RE power plants
- 29 Hydro power plants
- 4 Diesel power plant
- 1 Other



Transmission

Transmission Line Length
37,840 circuit-km.

To solely operate the transmission system. There are 4 main voltage levels 500, 230, 115 and 69 kV.



Power Purchase

Contract Capacity
30,600 MW

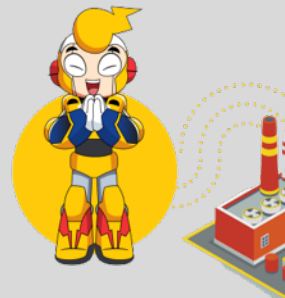
To purchase bulk electricity from IPPs and SPPs, as well as from neighboring countries.



Affiliates

EGAT's Investment
35,625 Million Baht

To Invest in electricity generation and energy-related businesses in 7 affiliates.





03 : Guidelines Development Hydro-Floating Solar Project

Concept Development of Hydro-Floating Solar Hybrid

Cost

- Optimize economy of scale in project size
- Utilize water surfaces of EGAT's reservoirs
- Maximize the use of existing hydropower facilities

Technology

- **Flexibility:** combining hydro and floating solar power into a hybrid system
- **Stability:** combining the hybrid system with battery storage to enhance stability of hybrid generation
- **Security:** building Renewable Energy Control Center (RECC) to manage RE plants across the country with one platform, and integrating AI technology in the future

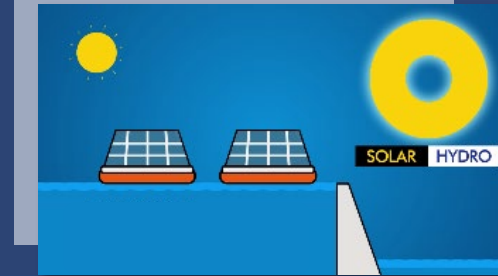
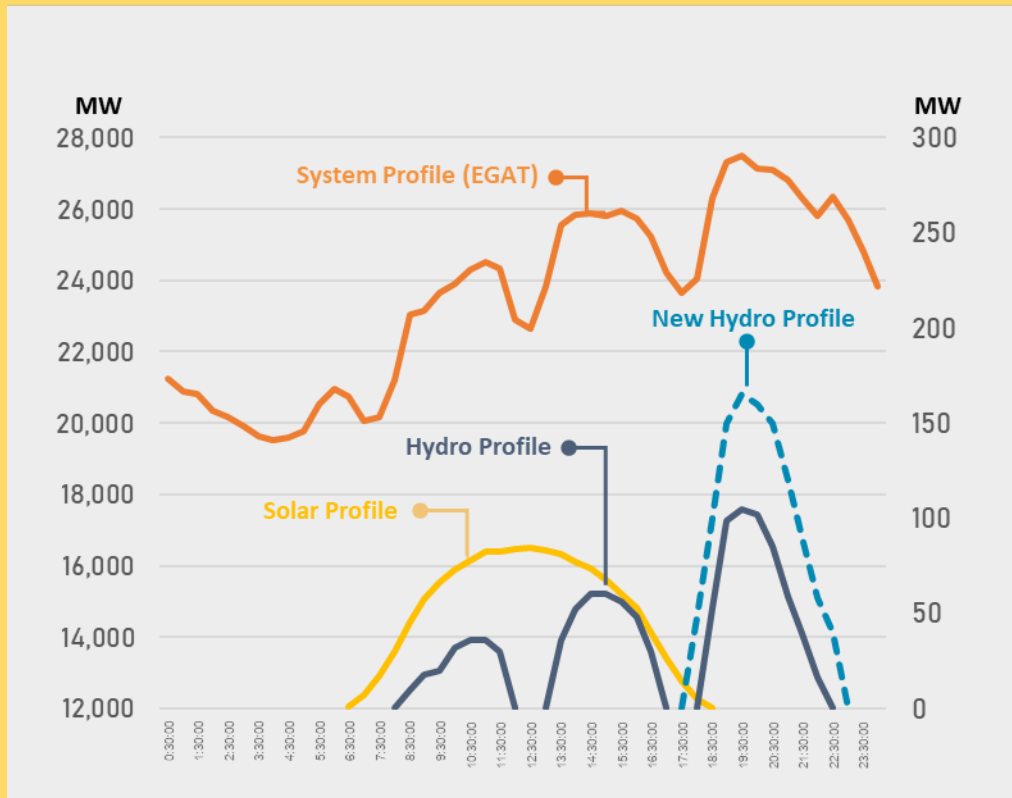
Social & Environment-Friendly

- Conduct environmental assessment (CoP & ESA)
- Selecting project site on unused water surface
- Using eco-friendly materials and carrying out environmental measures
- Delivering social and economic benefits to the locals for a sustainable well-being

Main features of Hydro-Floating Solar Hybrid

Hybrid Solar and Hydro by Energy Management System (EMS)

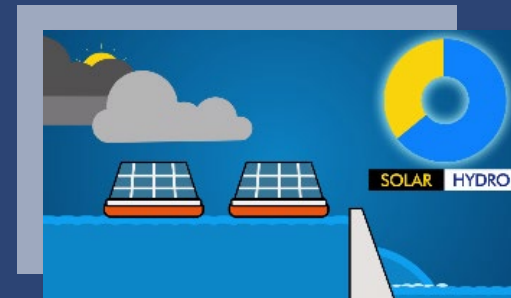
Daily Electricity Profile



Daytime
Solar Generation

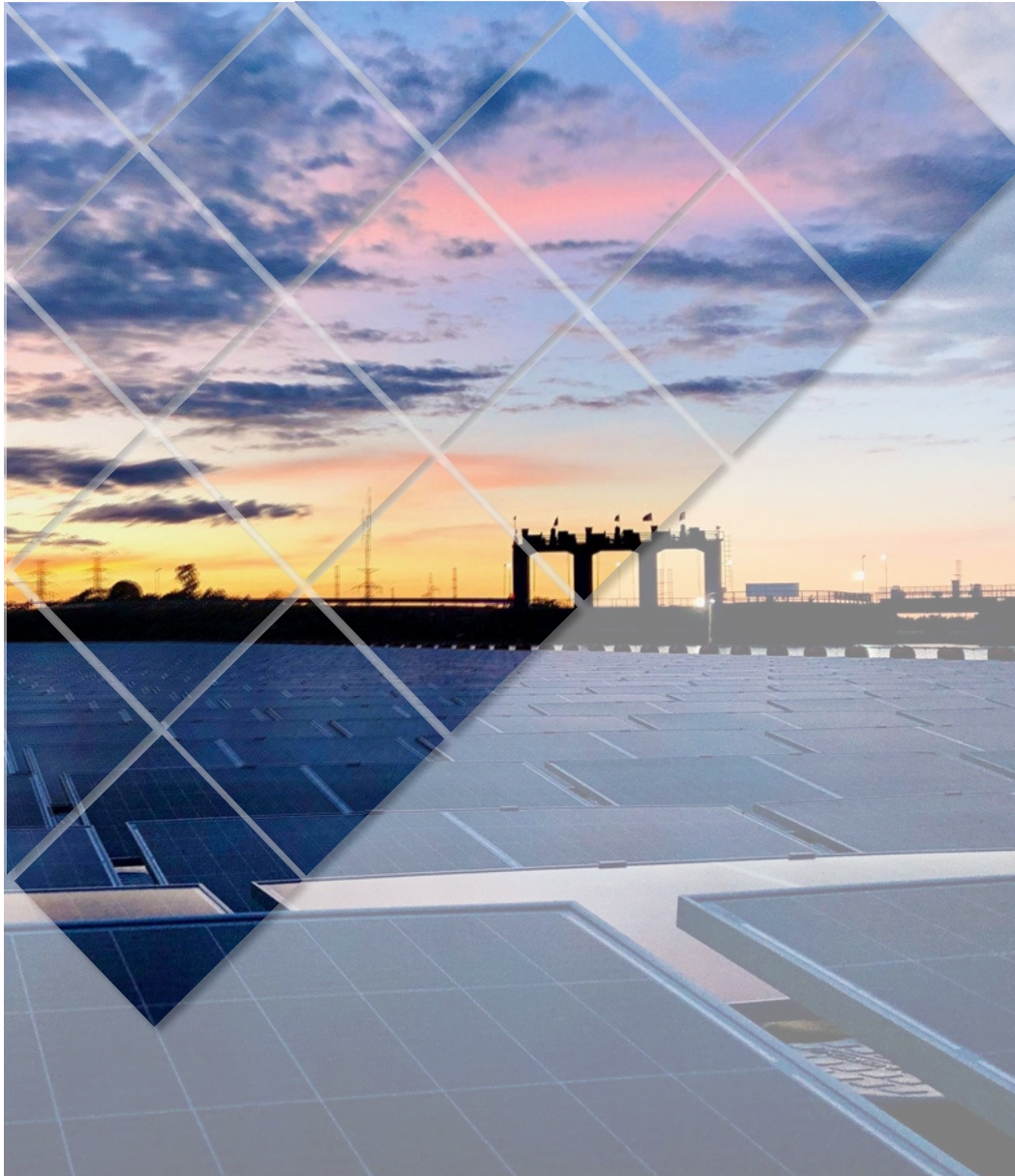


Nighttime
Hydro Generation



Anytime
Optimize energy at any time
Hybrid (Solar+Hydro)

Pilot Project: Hydro-Floating Solar Hybrid at Sirindhorn Dam



Project Profile

Capacity : Solar 45 MW Hybrid with Existing Hydro 36 MW

Location : SIRINDHORN DAM, UBON RATCHATHANI

Installed Area : 720,000 sq.m. (450 RAI)

% Water Surface Area : 0.27%

Grid-Connection : EGAT System

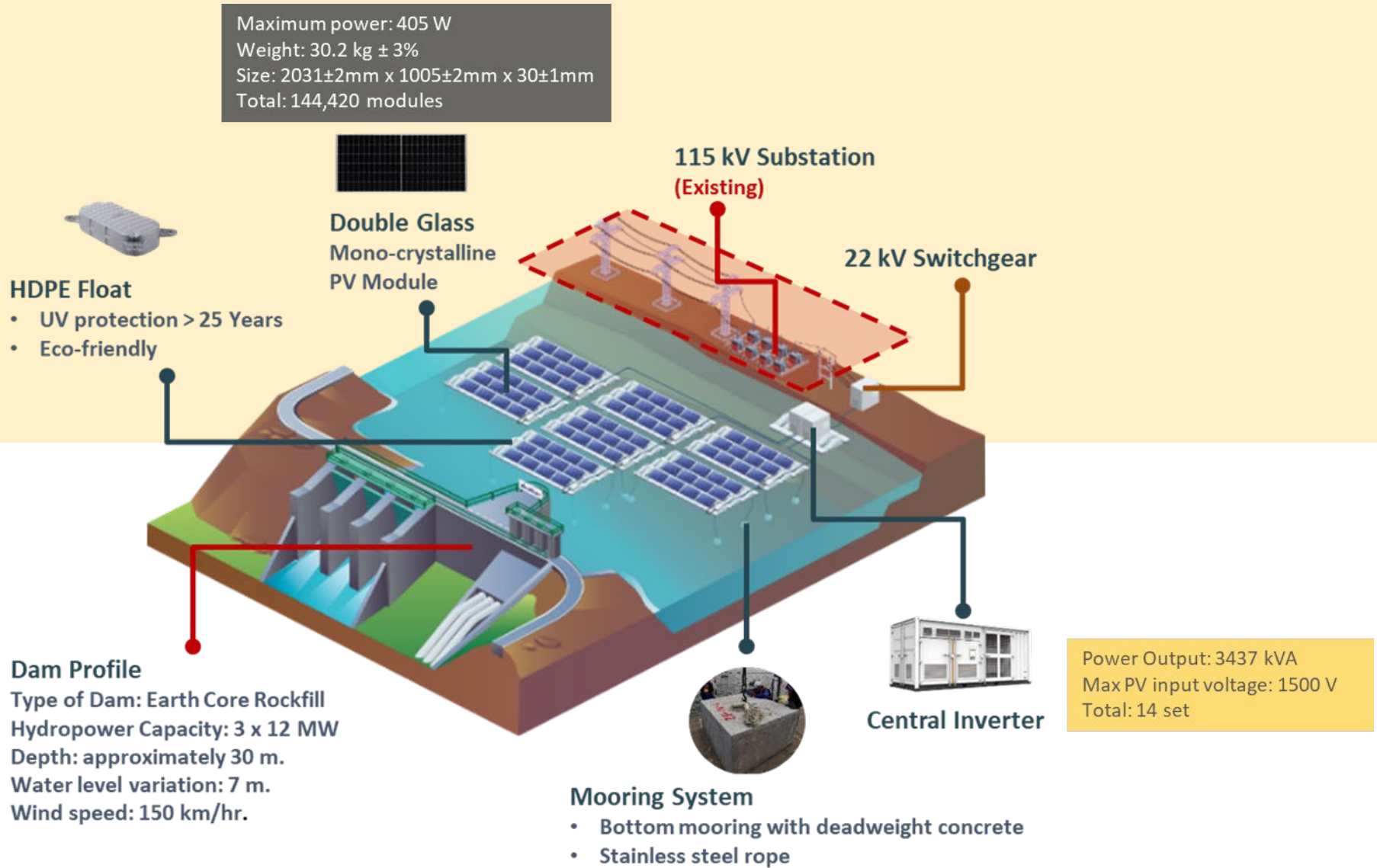
Cost : 1,147.60 MB
(EPC, EMS, Operating Expense and Others)

COD : 31 October 2021

Benefits

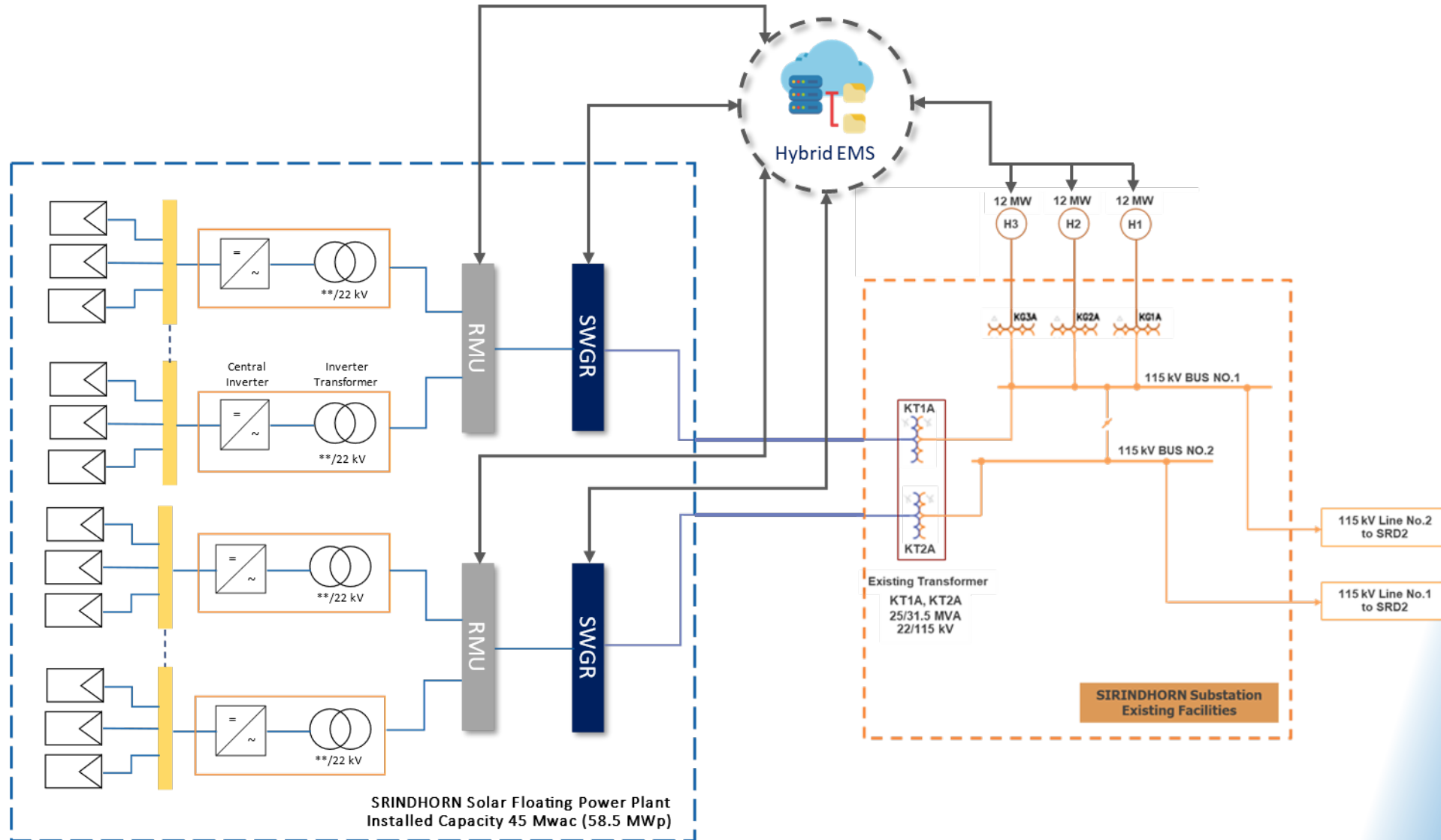
- More firm green energy
- Reduce CO₂ 47,000 tons/year
- Reduce water evaporation 460,000 m³/year
- Improve community's quality of life
- Stimulate local economy with new land mark

Pilot Project: Hydro-Floating Solar Hybrid at Sirindhorn Dam



Pilot Project: Hydro-Floating Solar Hybrid at Sirindhorn Dam

Hydro-Floating Solar is a combination of Hydro and floating solar power controlled by **Energy Management System (EMS)**.



Pilot Project: Hydro-Floating Solar Hybrid at Sirindhorn Dam

Overall Project Plant Area

Project designed **7 PV islands**
on water surface **0.27%**



Pilot Project: Hydro-Floating Solar Hybrid at Sirindhorn Dam

Inverter & Transformer
Floating System



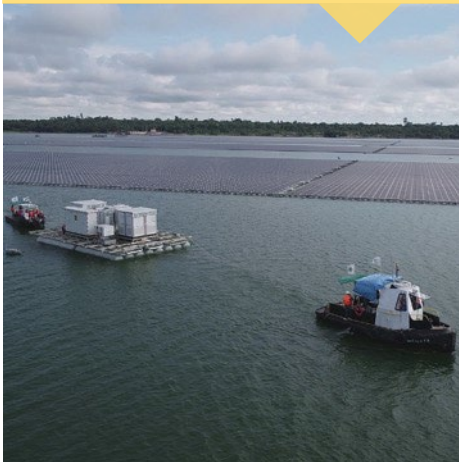
Floating Solar
Power Plant



Nature Walkway



Assembly Platform



Mooring System





04 : EGAT's Potential for Hybrid Projects

EGAT's Potential for Hybrid Projects

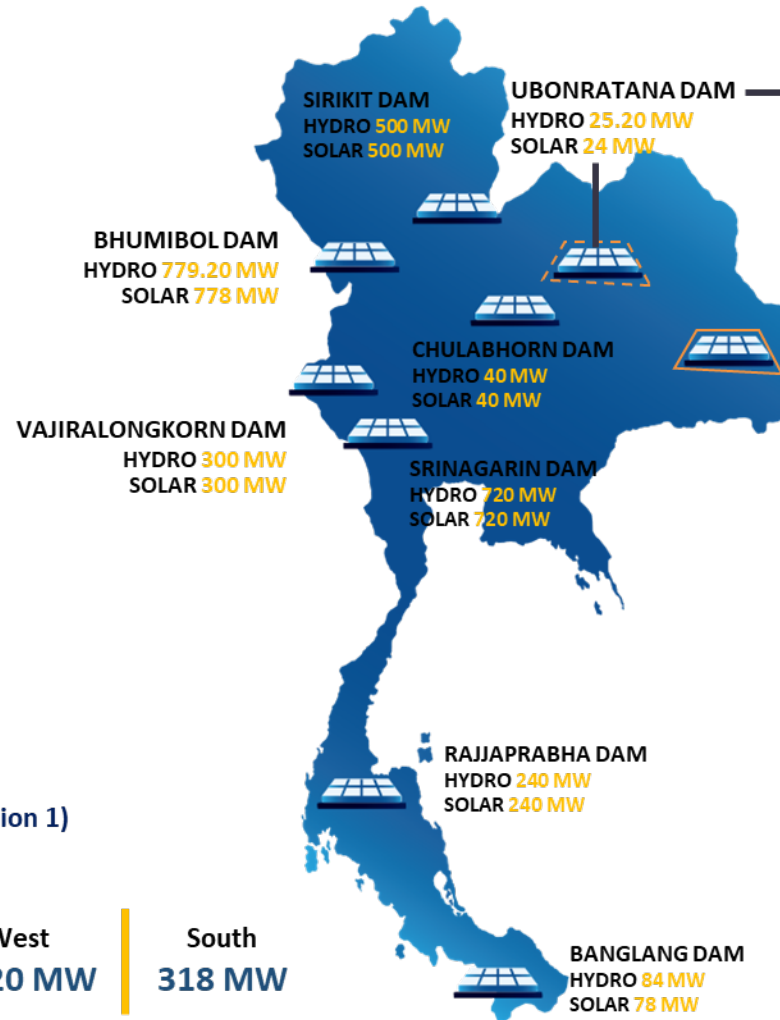
2nd Pilot Project

UBOL RATANA DAM

- Hydro-Floating Solar Hybrid
- Flexible Generation by EMS
- More Stability with Battery Storage 6 MWh

1st Pilot Project (COD 31 Oct 2021)

SIRINDHORN DAM
 HYDRO 36 MW
 SOLAR 45 MW



Challenges

- Larger Capacity (+100 MW)
- Deeper water level
- More Firm and Stability

Hybrid Projects

▶ **16 Projects**

In EGAT's Multipurpose Dams

▶ **2,725 MW**

During 2018-2037 (PDP 2018 Revision 1)

North	Northeast	West	South
1,278 MW	109 MW	1,020 MW	318 MW

" Each project covers 1-2% of the reservoir "



Thank you

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