



Solar PV plant and its risk management

20 June 2023

Young Jun Lee

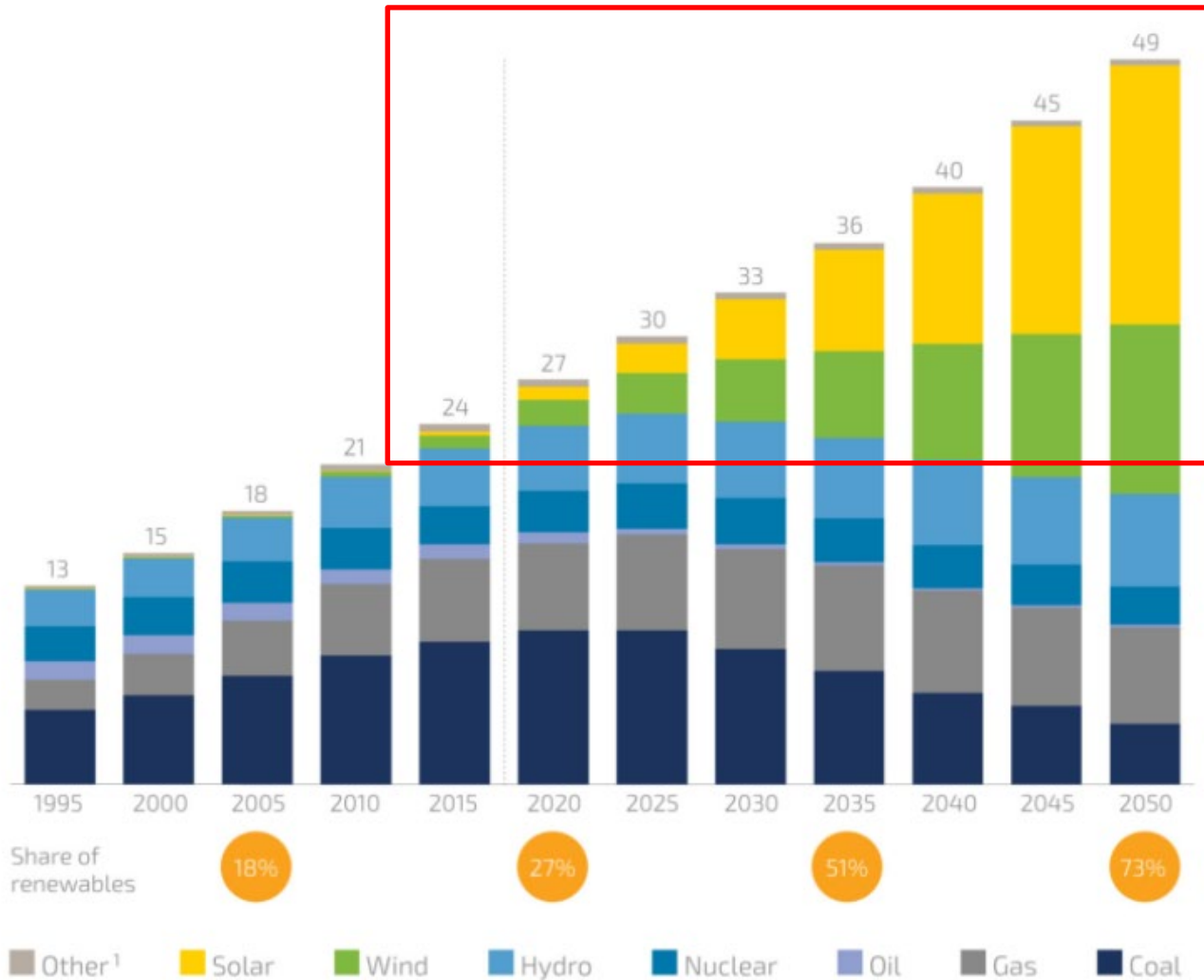
Country Lead, Engineering



Contents

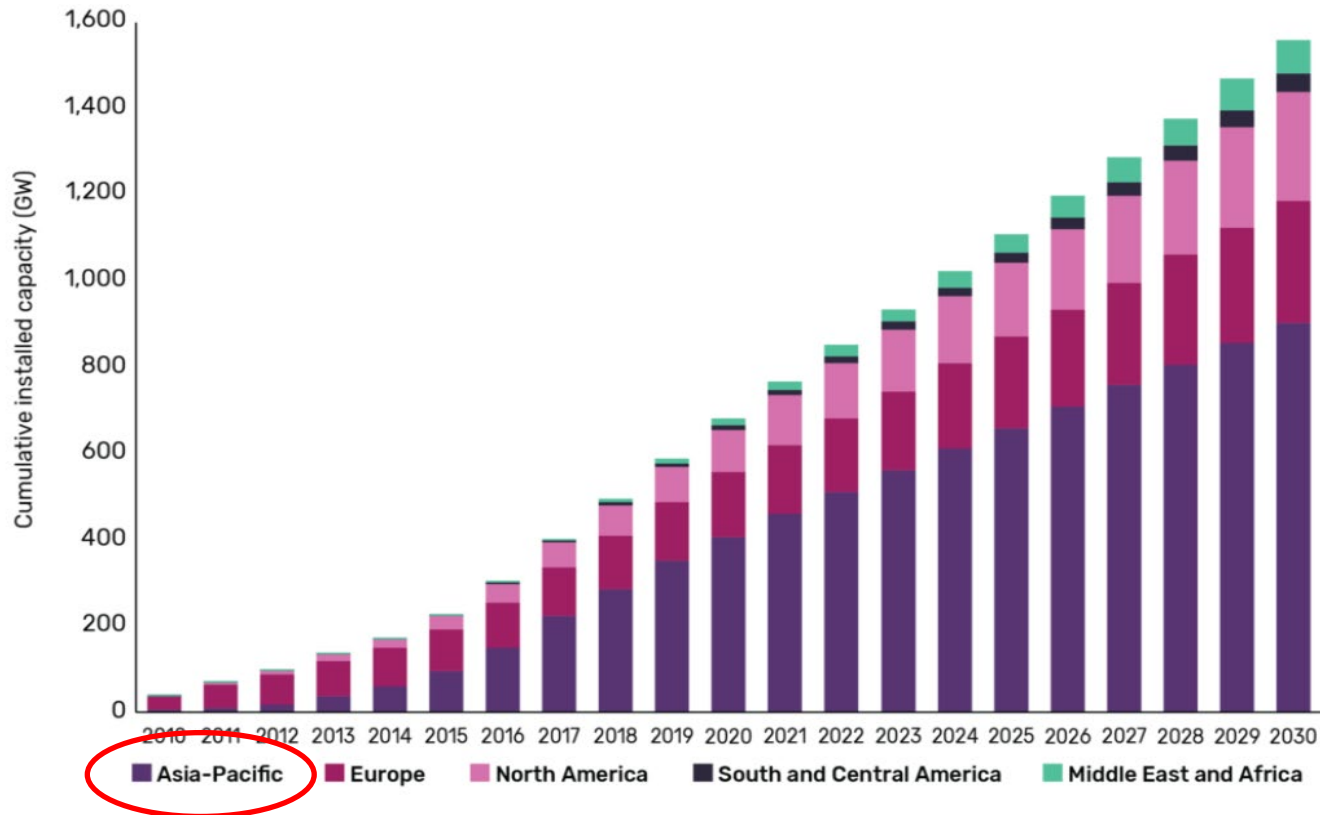
- 1. Solar power market overview**
- 2. Solar power 101**
- 3. Types of solar power plants**
- 4. Loss cases and major perils**
- 5. Underwriting**
- 6. Q&A**

Global Power Generation



Solar is the fastest growing alternative energy source in the world

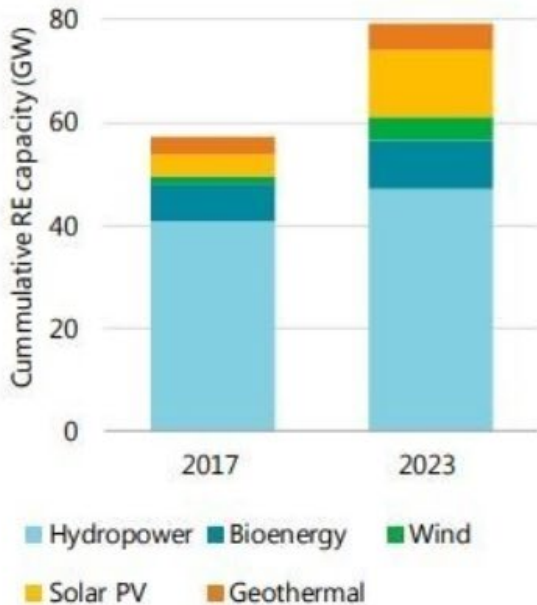
Solar power market per region



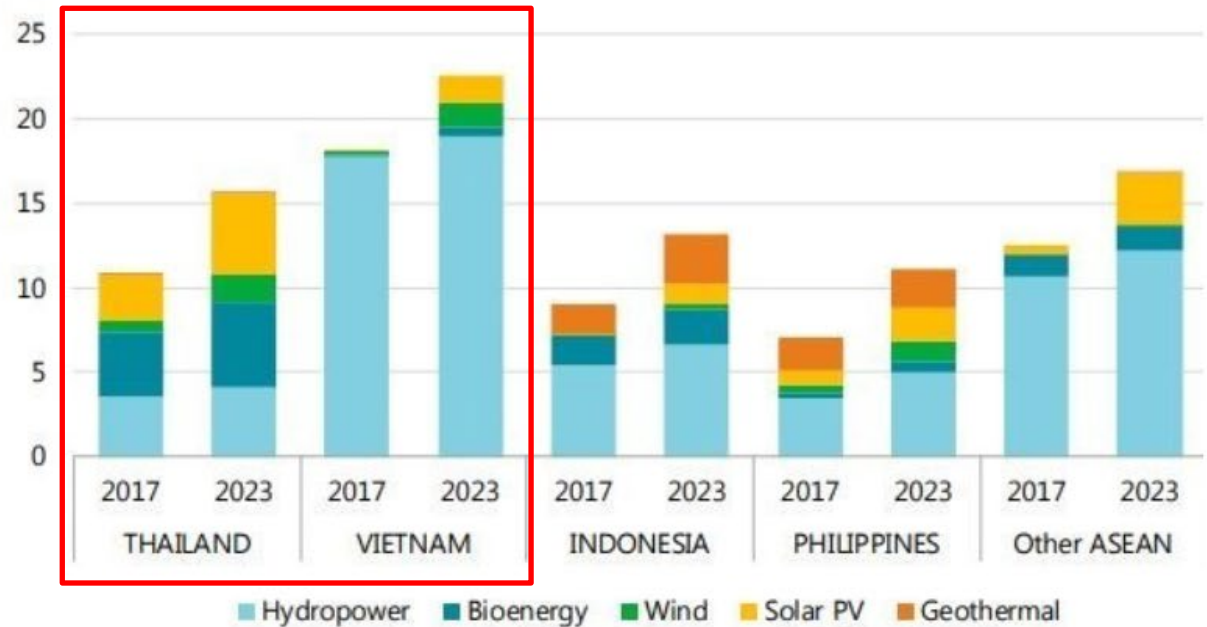
- Asia is the fastest growing regions in renewable energy market
- The installed capacity will be double in 2030

Renewable Energy in ASEAN countries

ASEAN cumulative renewable capacity, 2017 and 2023



Good opportunities considering NatCat, infrastructures, quality



Source: Adapted from IEA (2018a), *Renewables 2018: Analysis and Forecasts to 2023*.

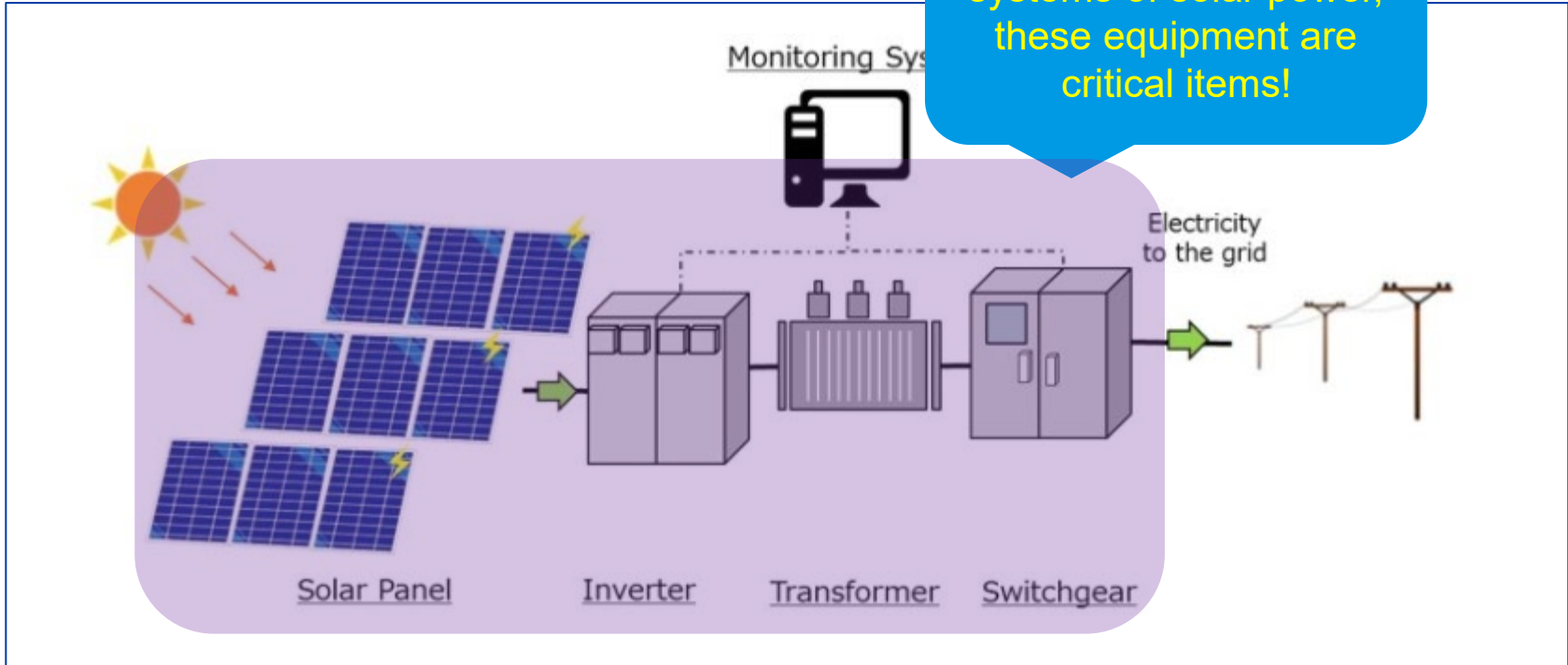
Solar PV basics (101)



SOLAR CELLS

Basic structure of solar PV power

Considering the simple systems of solar power, these equipment are critical items!



- We learned that solar PV generate DC. That's why **this system needs "Inverter" to change DC to AC**
- Eventually **we need transformer to increase the voltage** for electricity to send far away!

Types of solar power

1. Solar PV power plant
2. Roof top solar power plant
3. Floating solar power plant
4. Thermal solar power plant

Solar PV plant (normal)



Roof top solar PV

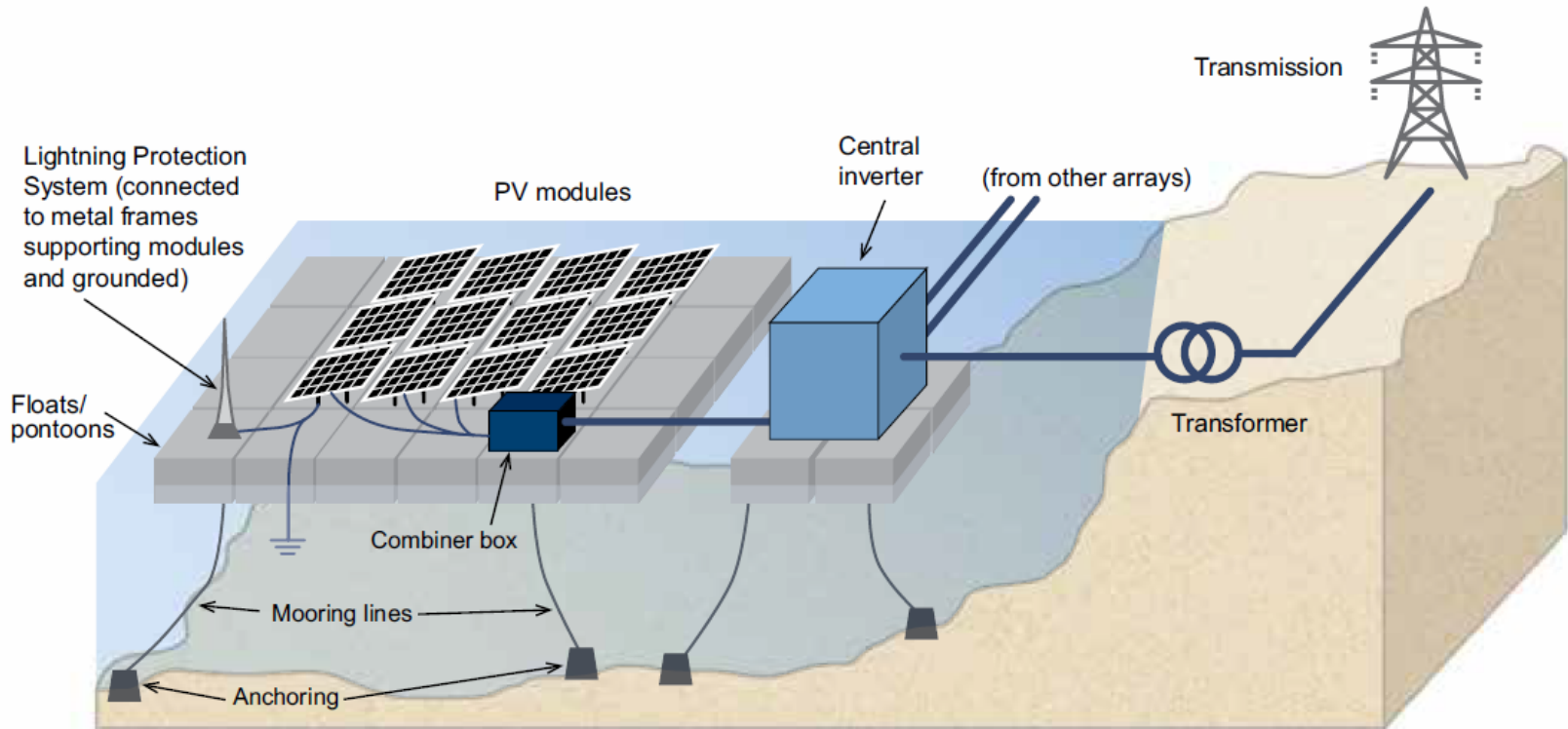


As PV is attached to a building, fire on the building is one of the biggest concerns !!

Floating solar



Floating solar power



Source: Solar Energy Research Institute of Singapore (SERIS) at the National University of Singapore (NUS).

- The basic structure is the same as normal PV plant
- However, there are additional add-ons to balance, stay afloat, be connected together for the possible losses

Solar thermal power

CSP



Is this a loss or not?





Sometimes the actual situation is very different from what we can imagine.....



Rooftop solar fire loss





Major perils – Hail storm



Major loss – Inverter



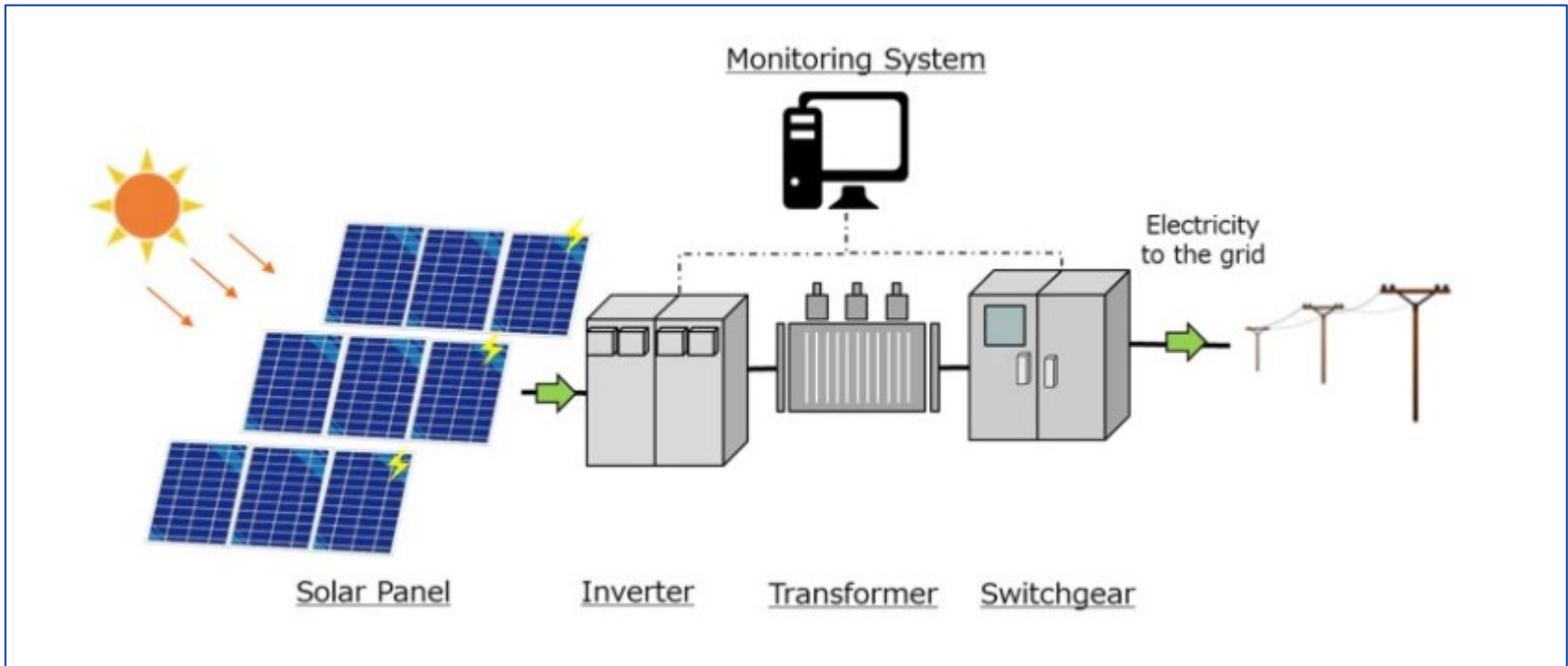
Major perils - Theft



Major perils - Lightning



Lightning protection concept



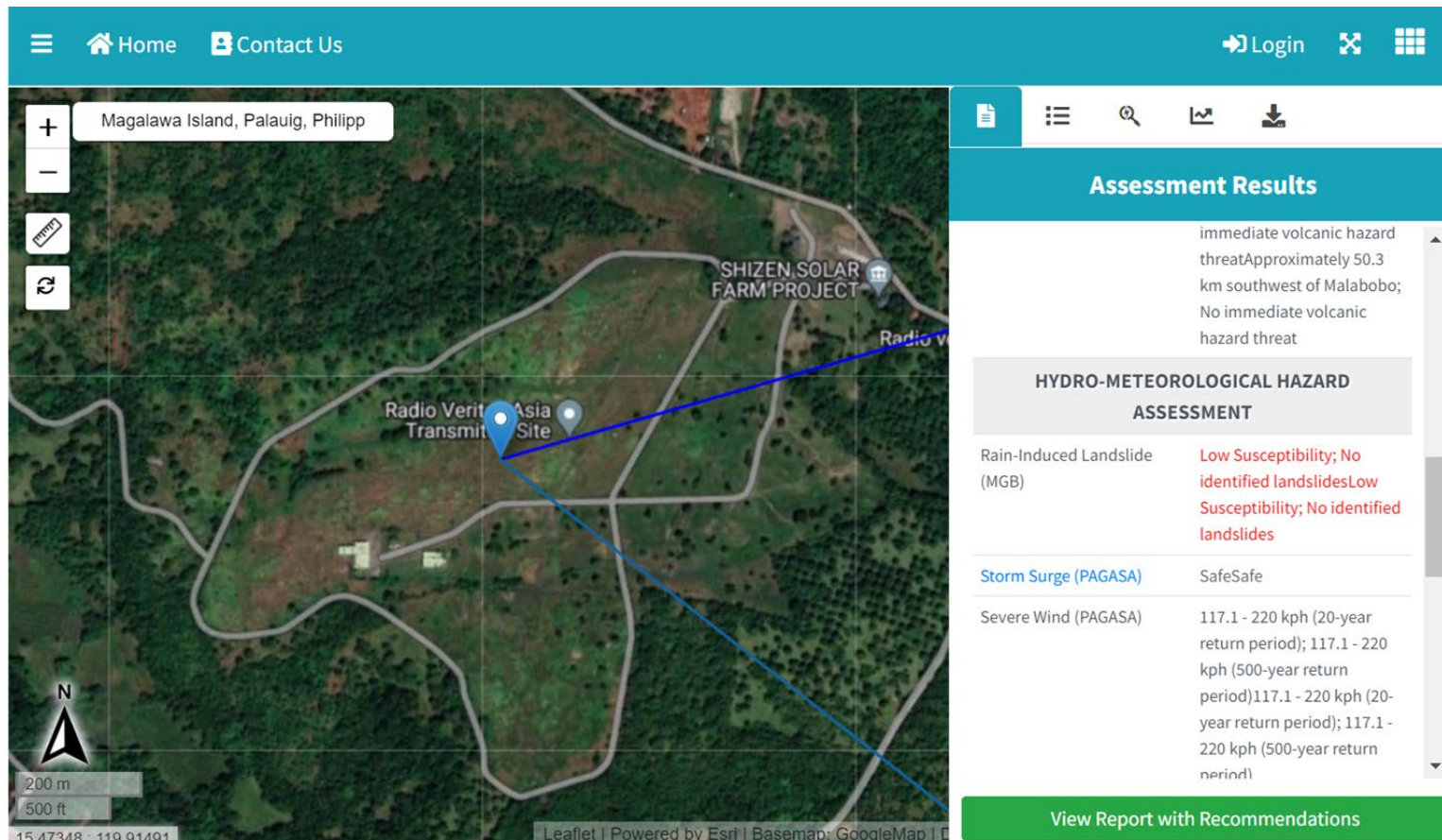
- Overall design standard (IEC 62305)
- Installation standard (IEC 62561)
- Surge protection standard (IEC 61643)

QBE's basic questionnaire on Lightning system

Is your asset installed with lightning protection system?

- a. If yes, is it designed according to **IEC 62305 standard**?
 - i. If yes, please attach Risk Assessment Report (According to **IEC 62305 Part 2**)
 - ii. If yes, for structure and human life protection, are components tested according to latest **IEC 62561** series at time of installation?
 - iii. If yes, for electrical and electronic protection, are components tested according to latest **IEC 61643** series at time of installation?
 - iv. If yes, please attach sign-off document from a qualified body (person or company)
- b. If yes, when was the last inspection date?
 - i. Please attached inspection report

Underwriting – NatCat analysis



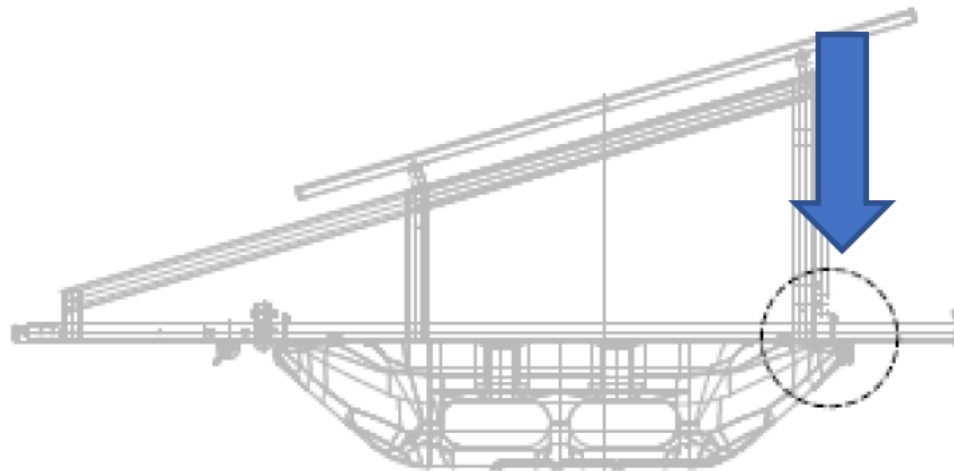
- Overall wind speed in the Philippines : max 250 – 300km/hr
- National standards for wind design criteria : 200km/hr
- What is the actual design applied against typhoon?



Floating solar – structure loss



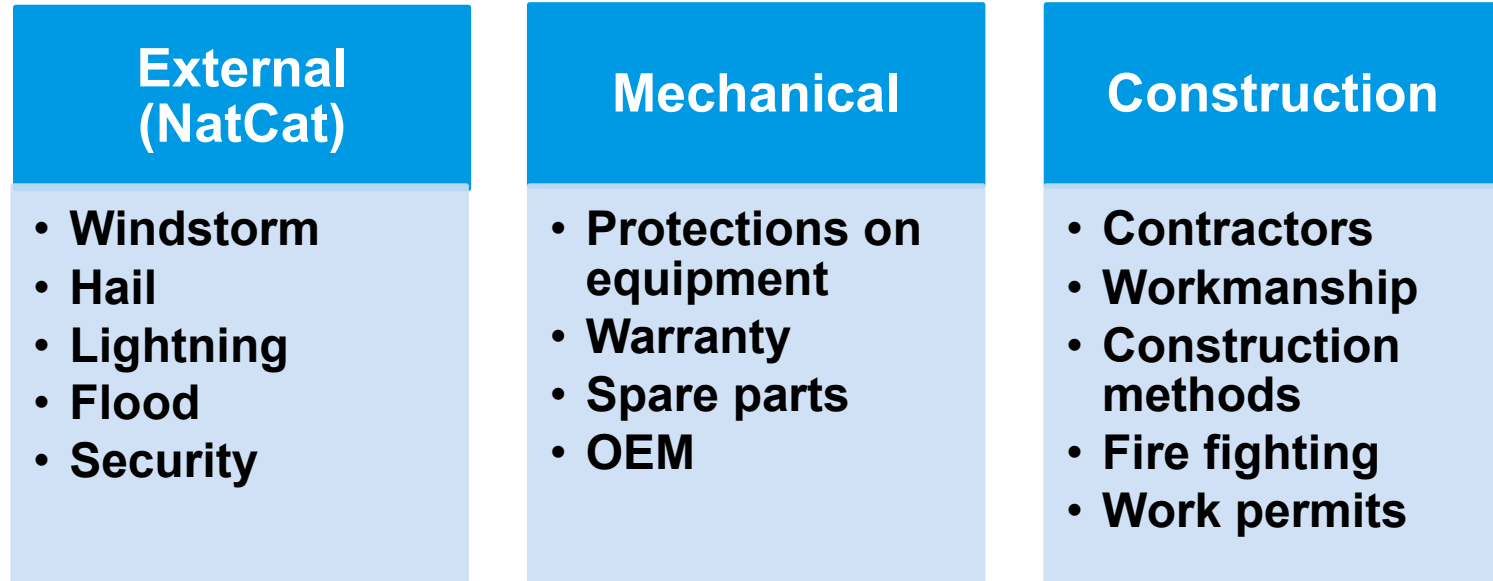
Reason for the loss



- Fracture on the bolts
- What's wrong?
Design? Material?

What should be considered to write solar power?

Conclusion



Based on the information on the factors above, we can provide relevant terms and price eventually

The reality is.....

- **The size of solar is small.**
- **The number of risks are enormous.**
- **Open cover/facility program?**
- **Can we do risk engineering to identify risks?**
- **Is the profit enough to compensate losses or admin costs?**



Thank you!