

# DEPLOYING FLOATING SOLAR: Key Factors for Decision-Making

Experiences from Singapore

Asia Clean Energy Forum 2018

Deep Dive Workshop

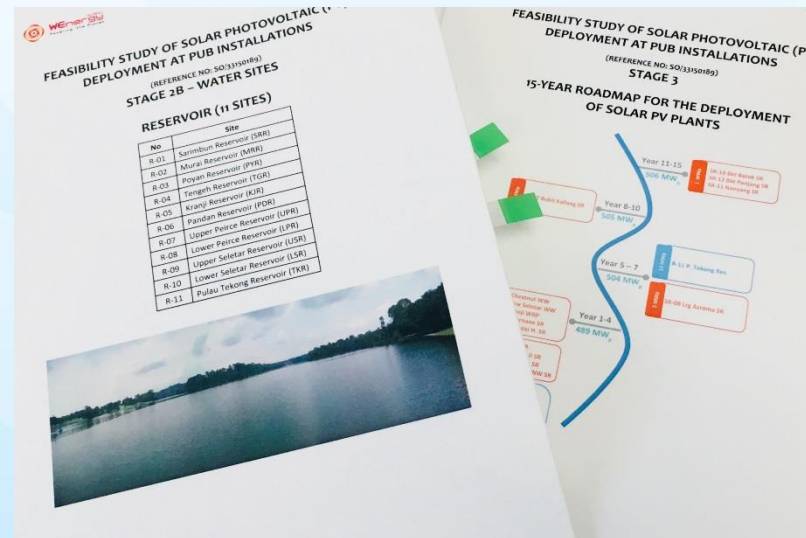
Gigatech Solutions for Gigaton Problems: Floating Solar Practice and Potential

By

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ADB HQ, Manila, June 8<sup>th</sup>, 2018

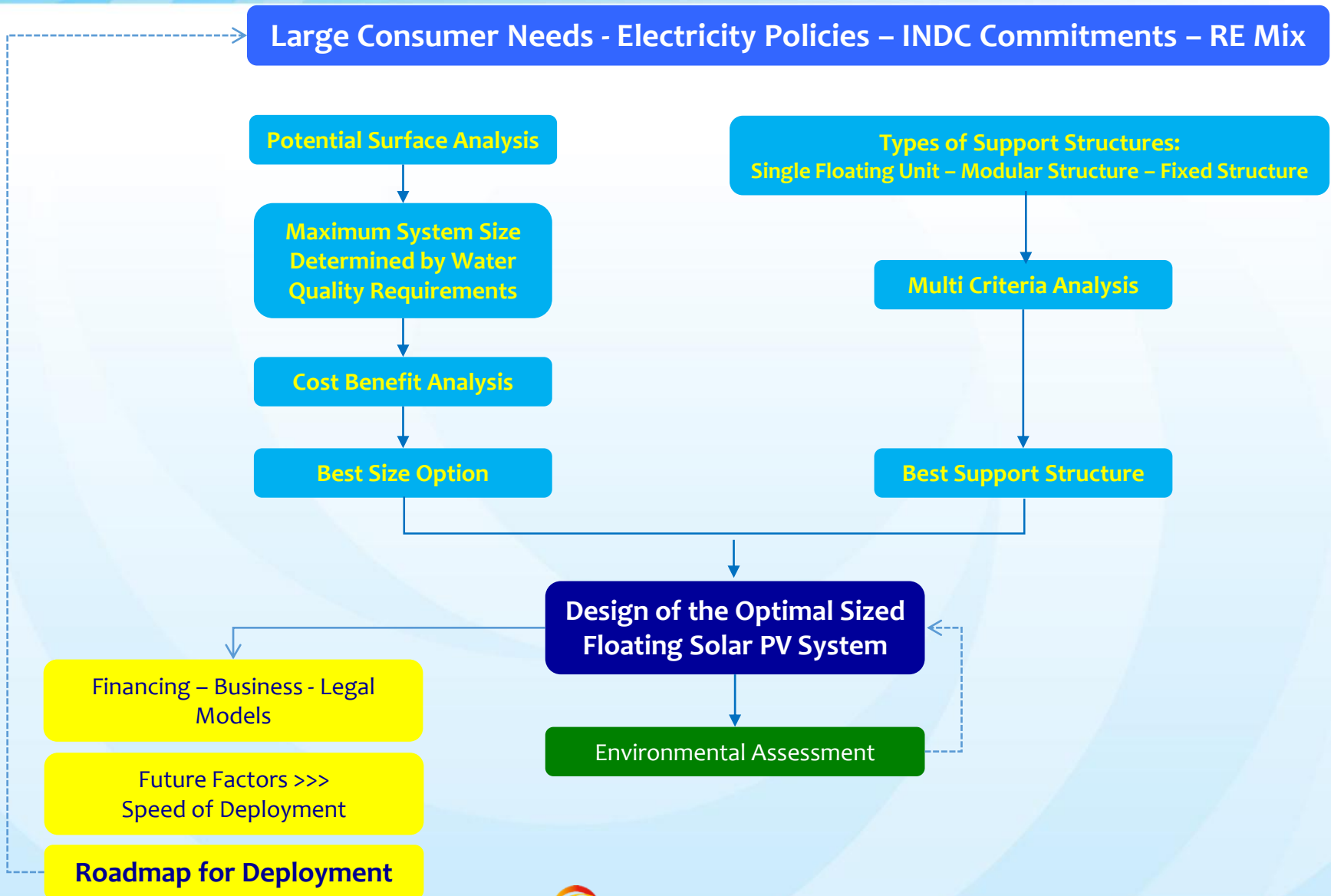


# Singapore Water Reservoirs



Minimum Deployment could address 80% of the “8% target” of Peak Electricity Demand  
Reduce CO<sub>2</sub>e emissions per year by 282,000 metric tons (approx. 0.7 – 1% of existing total emissions)

# Planning Approach – Not only about Equipment

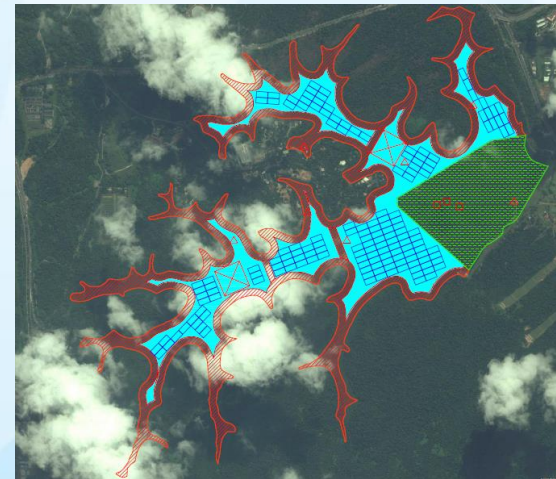
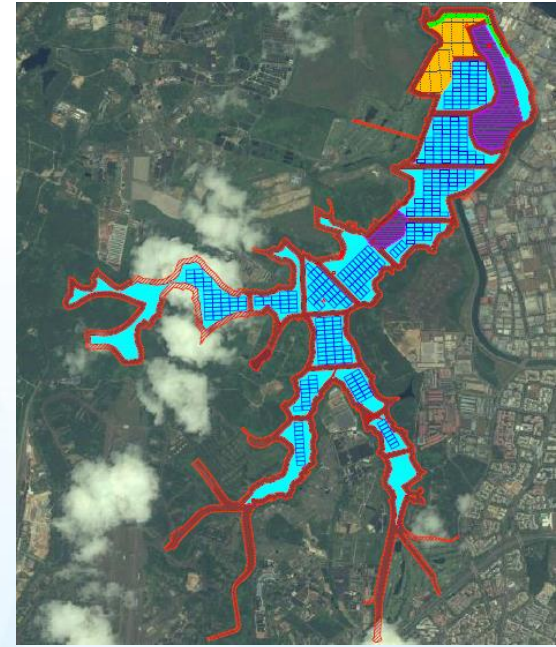




# Potential Surface Analysis (PSA)

Structure and Systems Approach to Multiple Opportunities and Challenges

- **Restricted zones/Areas used by public entities**
  - Military
  - Airports
  - Heli-bucket zone - firefighting
  - Water quality sampling zone by water authorities
  - Areas in the vicinity of dike and tidal gates
  - Navigable waterways for reservoir maintenance vessels
  - Navigation/Maritime/Fishing
- **Aquatic environment and vegetation**
- **Areas used for recreational activities**
- **Objects on the bottom of reservoirs**
  - Areas with aeration lines and pumping stations
  - Power cables
  - Shipwrecks
- **Distance from shores**
- **Locations of electrical connection points**



# Environmental Considerations

## Aquatic and Eco-system Factors

- Negative Impact of Light Reduction ?
- Negative Impact of Utilized Materials ?
- Negative Impact of Structure ?
- Negative Impact of Construction / Logistics / Dismantling (End of Life Cycle) ?

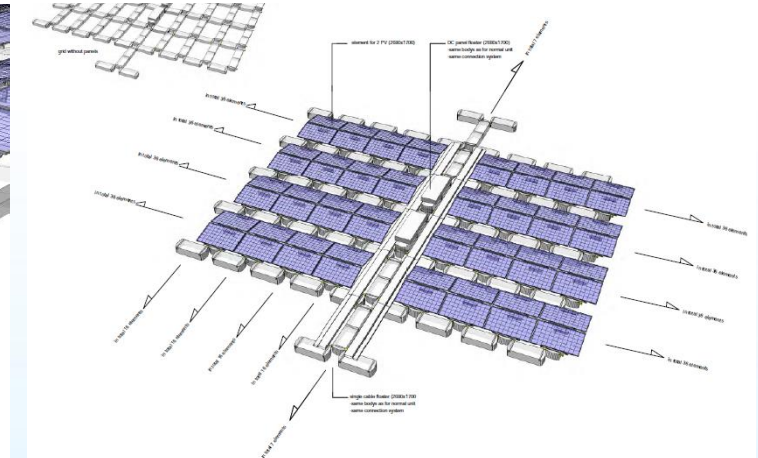
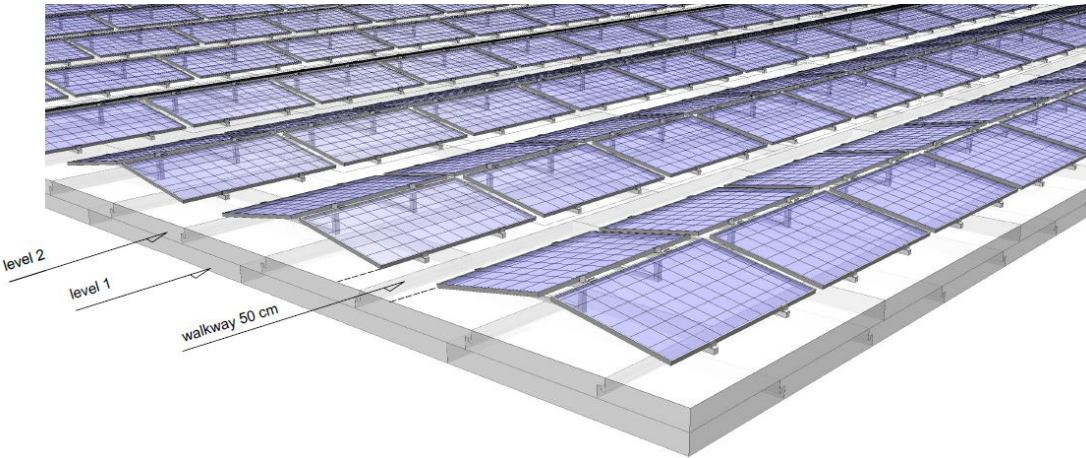


- Positive Impact: reduction of CO<sub>2</sub>-equivalents ?
- Positive Impact: reduction of evaporation ?
- Positive Impact: reduction of unwanted weeds / algae ?



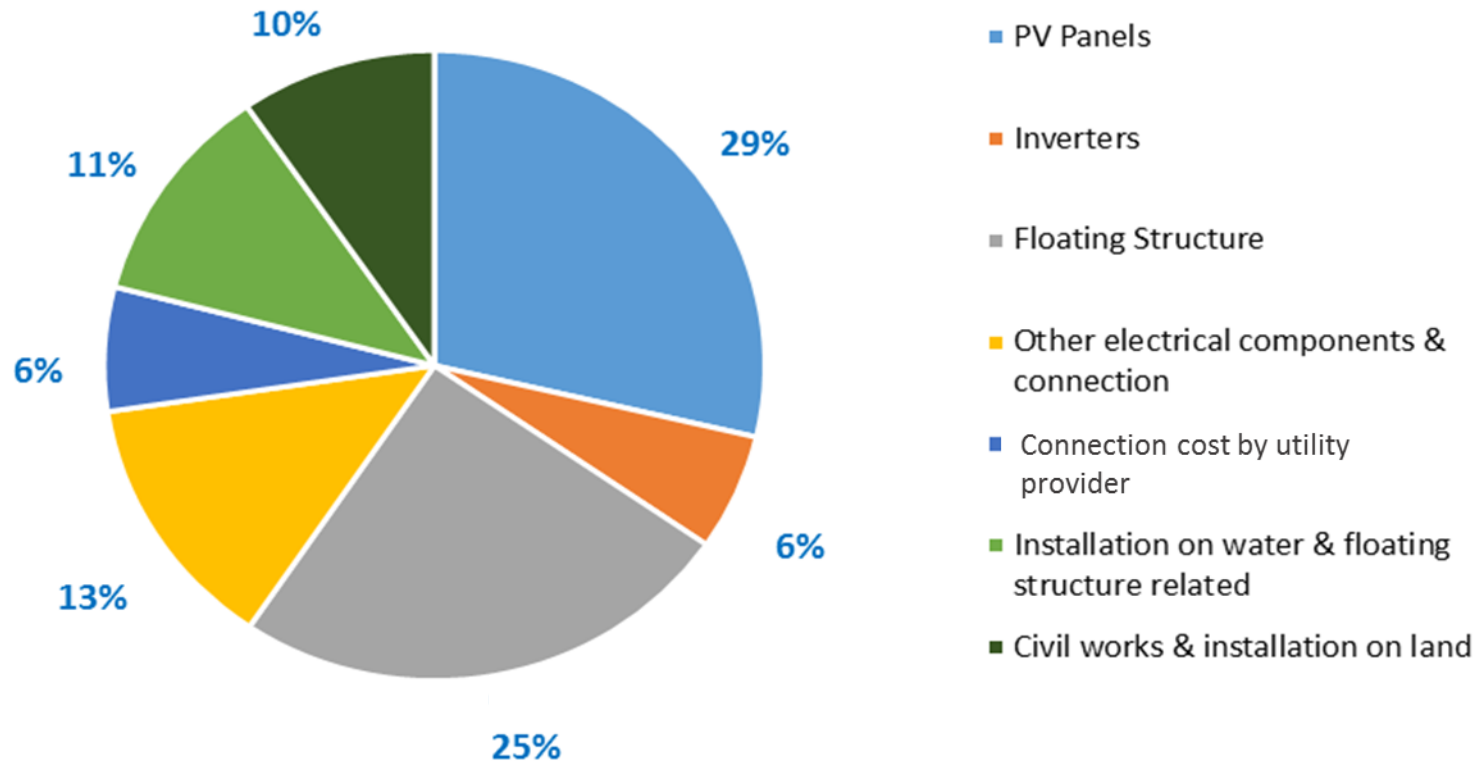
# Expanded Polystyrene – Single or Modular

## Local Manufacturing – Local Economic Benefit?



# CAPEX (in the Singapore Context)

Can we reduce cost of floating structures?



# Speed of Deployment of Floating Solar PV

## Factors for Consideration in Decision-Making

- **Strategic drivers for national development**
  - Energy Security and Sustainability – Carbon Tax?
  - Choices of Business Models for Solar PV Power Plants
    - ❖ National Agency as Owner
    - ❖ Third Party as Owner (PPA – Fixed Tariff)
    - ❖ Third Party as Owner (PPA – Fixed Discount)
- **Readiness of Enabling Physical Infrastructure**
  - The Power Grid – Robustness and Regulations
  - Administrative Approvals - Complexity
  - Financing Enabling Infrastructure (*Who should pay for what: Government vs Private Sector*)
- **Market Attractiveness and Investment Climate**
  - Electricity Price and Existing Contracts and Policies
  - Third Party / Private Investors' Expectation
  - Advancements in Solar Technology and Costs
  - Execution Capacity / Contractors' Capabilities





# The Future is Promising: Thank You!

