



# Integration of Distributed Energy Resource with Virtual Power Plant Platform : Opportunities, Challenges and Barriers in Thailand

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# CONTENTS

- 1 THAILAND CLEAN ENERGY TRANSITION
- 2 DISTRIBUTED ENERGY RESOURCES (DERS) POTENTIAL OF THE COUNTRY
- 3 VIRTUAL POWER PLANT (VPP) CONCEPT – DR IS VPP
- 4 VPP PROPOSE UNDER CURRENT POWER STRUCTURE
- 5 OPPORTUNITIES, CHALLENGES, BARRIERS OF VPP IN THAILAND



1

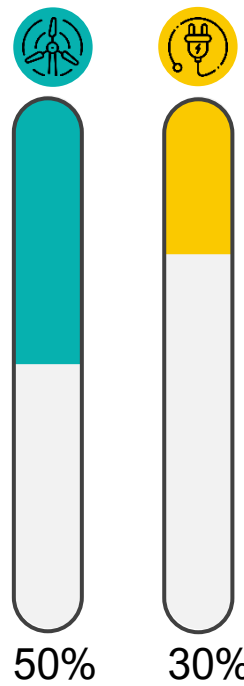
THAILAND CLEAN ENERGY TRANSITION

CURRENT



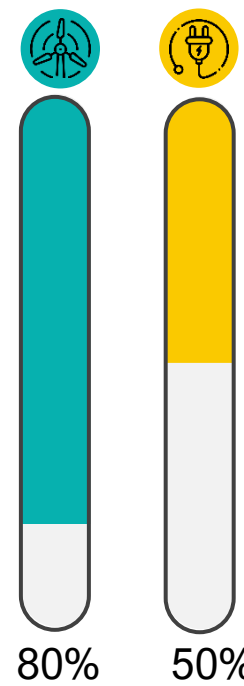
Electricity consumption  
≈ 200,000 GWh/y

SCENARIO 1:  
RE50/NEP/LowEV



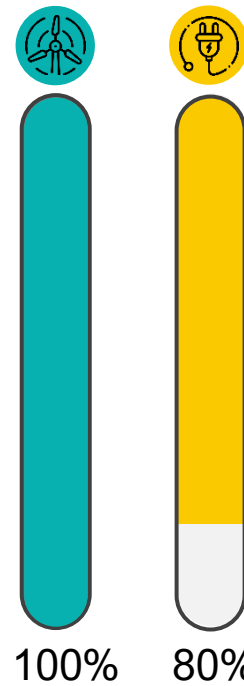
Electricity consumption  
≈ 220,000 GWh/y

SCENARIO 2:  
RE80/NEP/BAUEV



Electricity consumption  
≈ 260,000 GWh/y

SCENARIO 3:  
RE100/NEP/ +BAUEV



Electricity consumption  
≈ 320,000 GWh/y

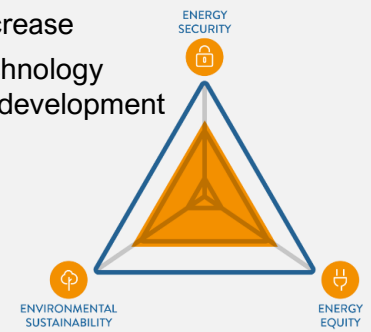
RENEWABLE SHARE IN  
ELECTRICITY GENERATION

ELECTRIFICATION SHARE  
OF FINAL ENERGY

Energy National Plan (NEP)  
Framework

Carbon neutrality & Net zero emission

1. Energy sector CO<sub>2</sub> reduction
2. Green energy investments
3. 4D1E
4. RE sharing increase
5. Smart grid technology infrastructure development

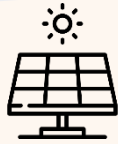


6<sup>th</sup> Wave 25 Years – Clean tech. | 7<sup>th</sup> Wave ? Years

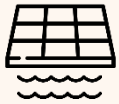
2020 2025 2030 2035 2040 2045 2050 2055 2060 2065

Carbon Neutrality Target: **THA**

Net Zero Emission Target: **US & EU & JP** | **CHINA** | **THA**



### PV ground mount system



### PV floating system



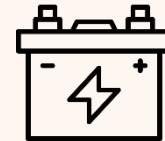
### PV rooftop system

Potential ... kW to MW scale ... grid parity  
in all range of capacity



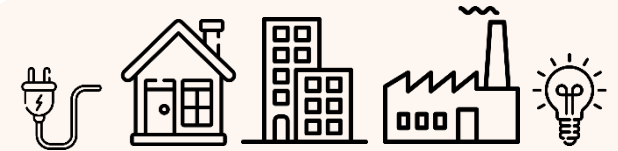
### Wind Energy

Potential ... kW to MW scale...  
**economically more attractive in MW scale  
in specific areas**



### Battery Energy Storage

Potential ... kW to MW scale... including  
utility scale & end user ... **economically  
more attractive in near future**



### Demand Response Resources (DRRs)

Potential ... - kW to - MW scale ... including  
residential, commercial and industry (C&I)  
sector ... **high potential is C&I**



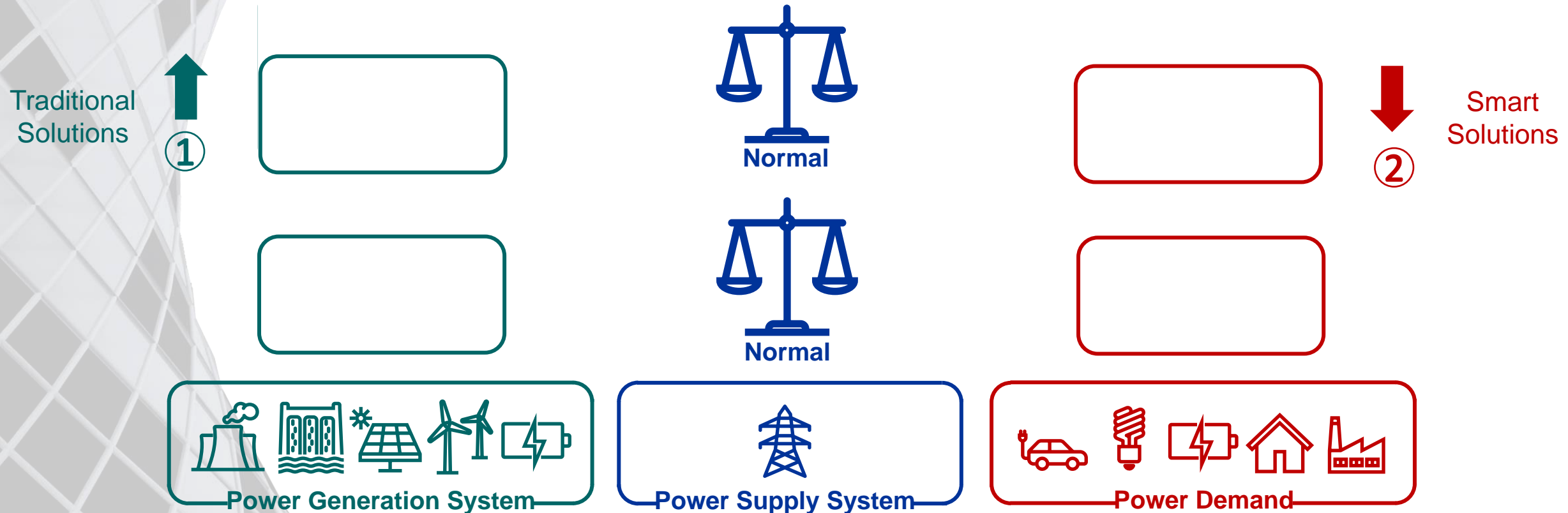
### EV Integration

Potential ... kW to MW scale... more  
techno-economic study requires ...  
**economically more attractive in future**

3

VIRTUAL POWER PLANT (VPP) CONCEPT – DR IS VPP

Demand Response (DR) is a **dynamic change of electrical demand** from normal patterns in specific period that **responds to price or incentive of a utility signal** to suggest a **demand response resource (DRR)** to **reduce electrical demand** during a **period of peak demand** to **secure the electrical system** (FERC, 2021).

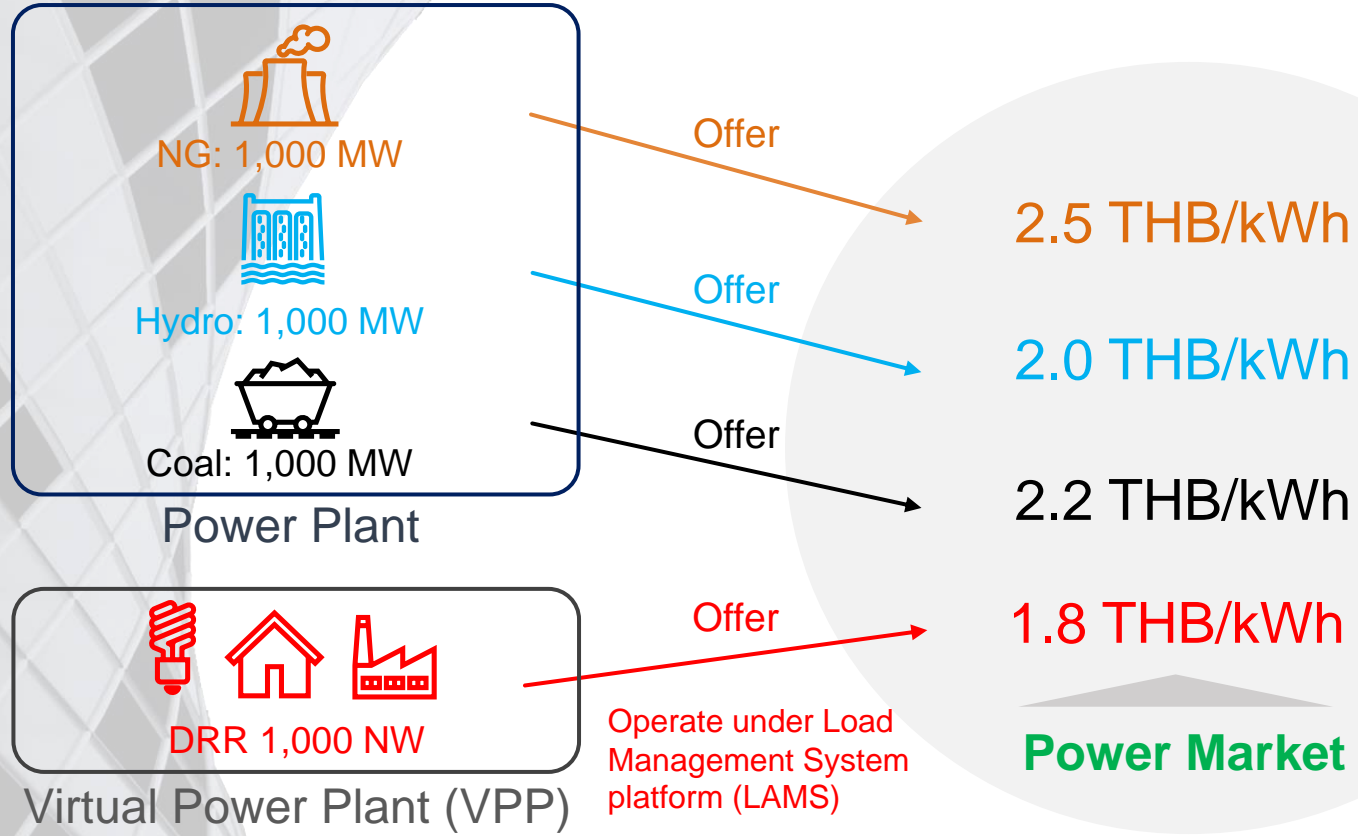




3

VIRTUAL POWER PLANT (VPP) CONCEPT – DR IS VPP

▶ DEMAND RESPONSE (DR) DEFINED AS VPP



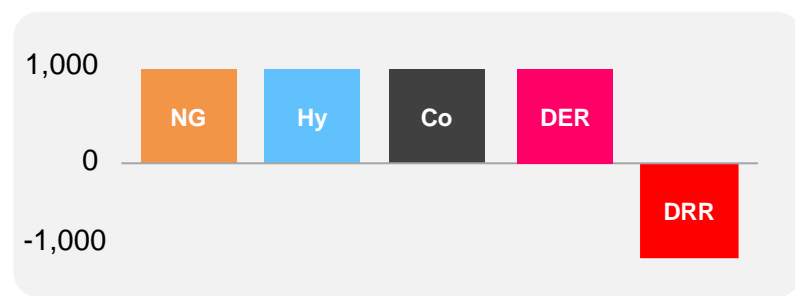
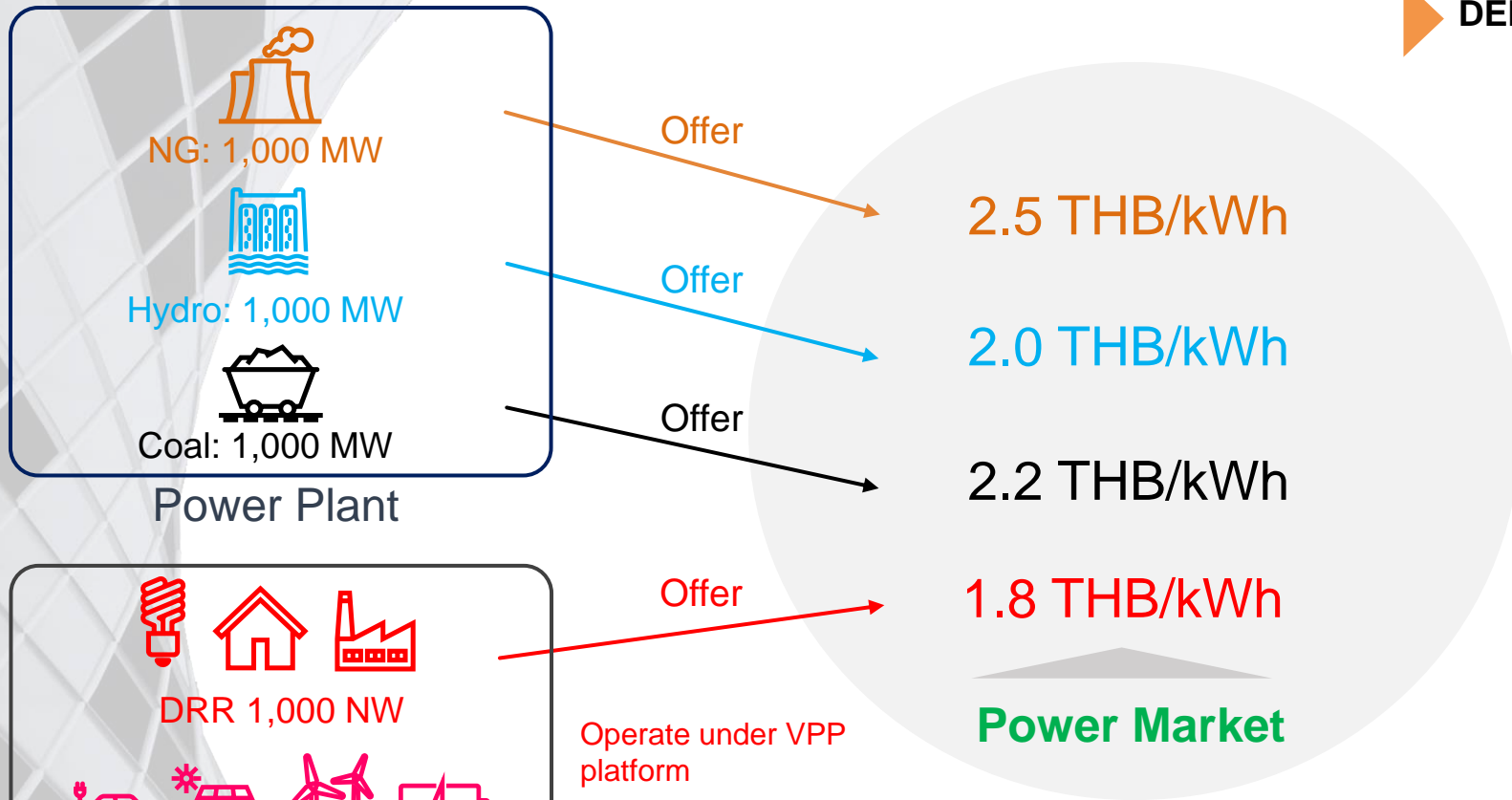
Power supplier  
(Bidder)



# 3

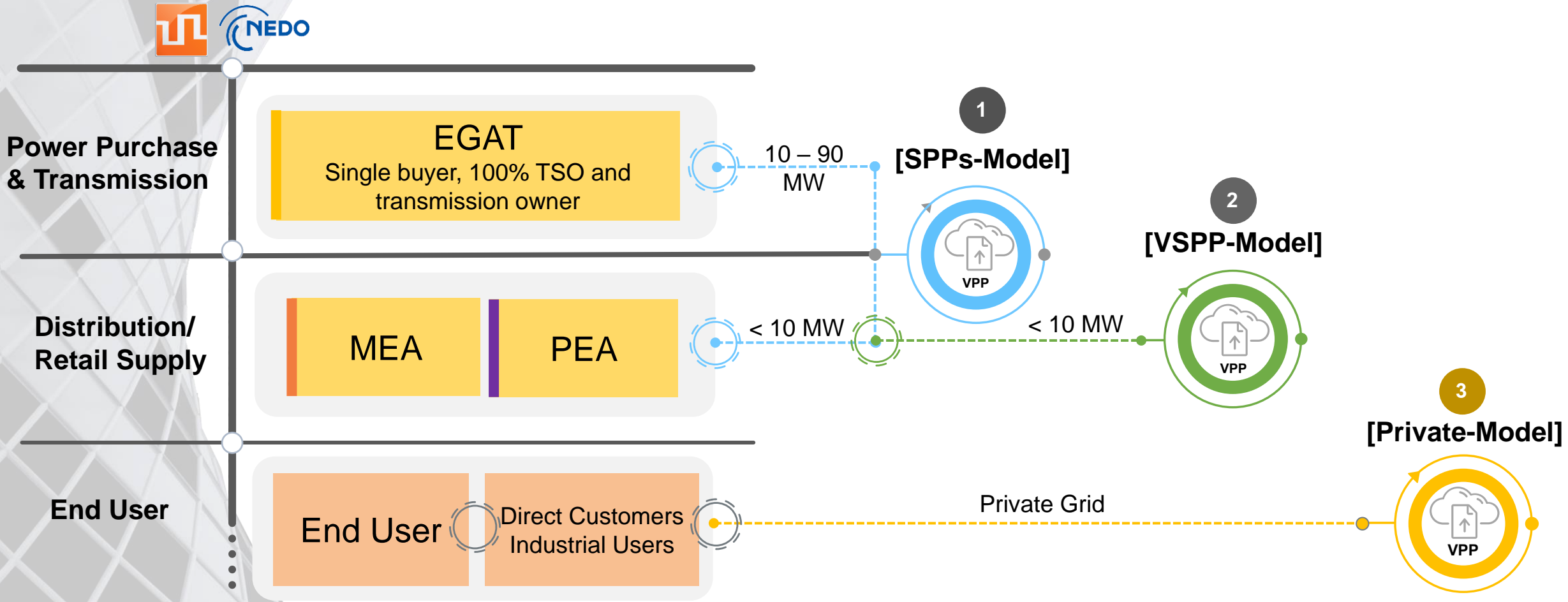
## VIRTUAL POWER PLANT (VPP) CONCEPT – DR IS VPP

▶ DEMAND RESPONSE (DR) DEFINED AS VPP



Power supplier  
(Bidder)

# 4 VPP PROPOSE UNDER CURRENT POWER STRUCTURE







## OPPORTUNITIES

- High DERs potential
- Public awareness (in Clean Energy) increasing
- Clear national policy direction (Carbon neutrality & Net zero emission)
- Private sector motivation (Active)
- High percentage of electricity access (99%) ... people can participate in energy production esp. from RE



## CHALLENGES

- How to utilization & manage of high DERs potential
- How to maintain of public awareness and increase it level, including amount
- How to implement energy policy to achievement
- Continue of private sector motivation and sharing economy to people
- How to utilization/increase benefit of high percentage of electricity access



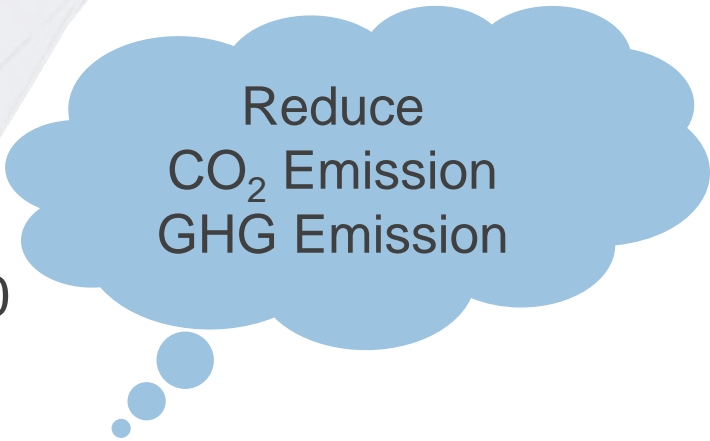
## BARRIERS

- Current Energy/Power market & ecosystem not supported
- High investment of power infrastructure (smart meter eg.)
- Regulatory, Bureaucracy system
- Data sharing and data privacy policy
- Utility perspective in clean energy transition

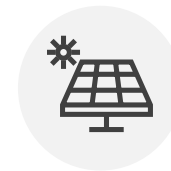
# KEY TAKEAWAY

## Major driver of VPP

↓  
1.5 °C @ 2050



## Technology supported VPP

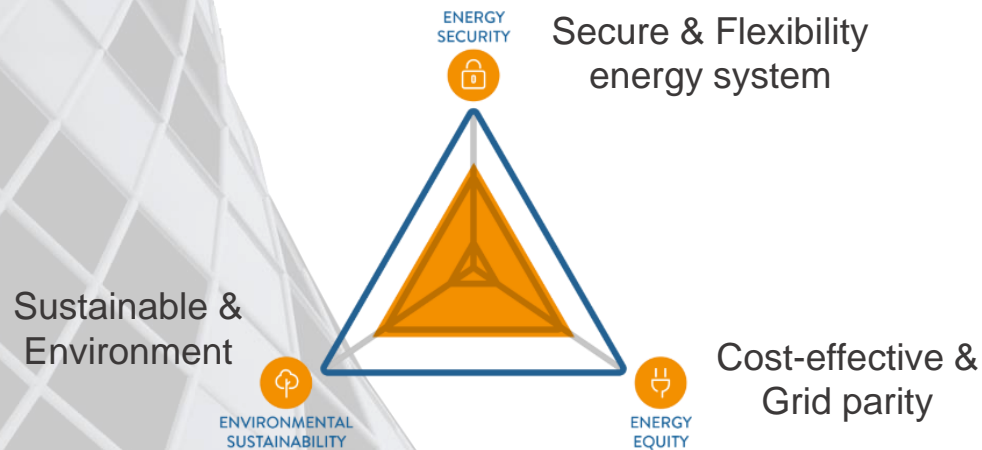


Clean technology  
(VRE, EV, BESS)

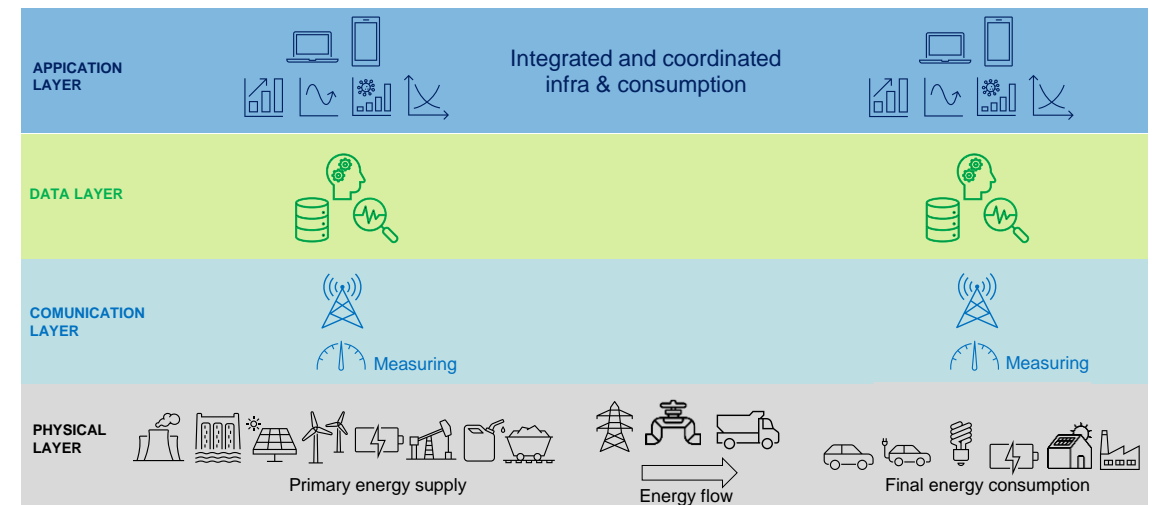


Digital technology AI & IOT  
(VPP)

## Core common of VPP technology



## VPP beginning - Data is KEY





# THANK YOU

## ... Q & A



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