The background features a light blue sky with soft, white clouds. Overlaid on this are several thick, semi-transparent, wavy lines in various shades of blue, ranging from light cyan to a deeper blue, creating a sense of motion and depth.

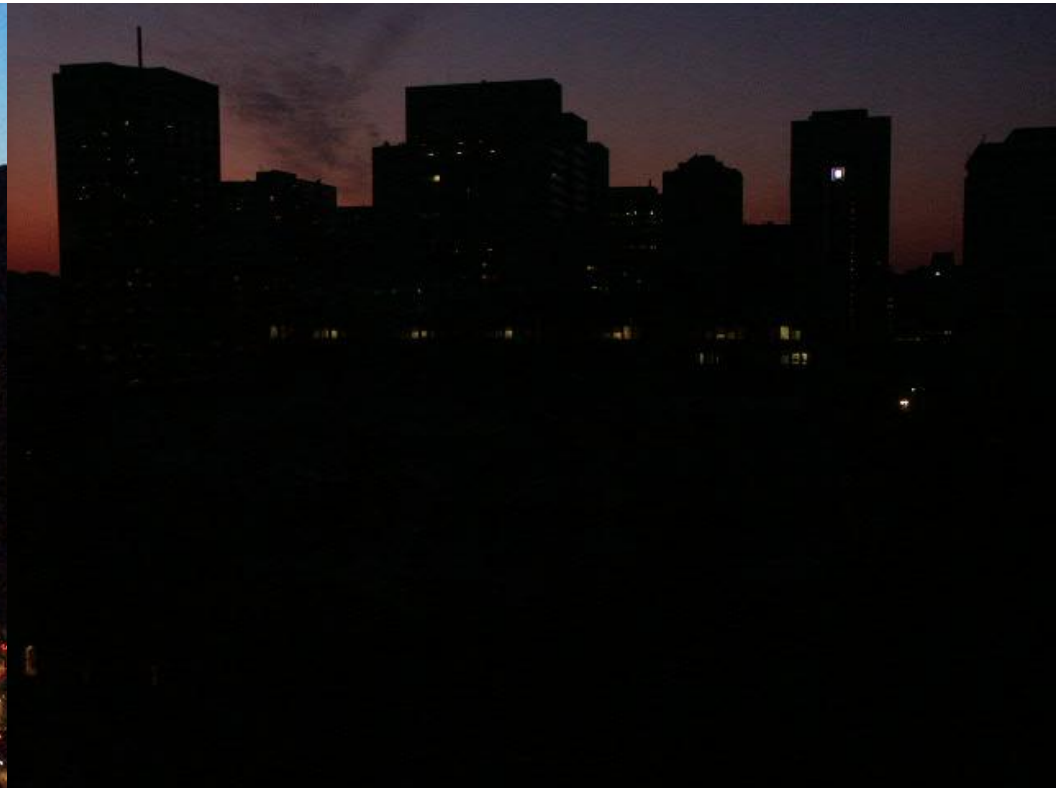
# **Smart Grid & Business Models**

# Blackout

**Power grid Failure → Blackout**

**Security relies on the Electronics & Electric Power – re-booting systems**

**UPS(Uninterrupted Power Supply), ESS(Energy Storage System) + Generator**



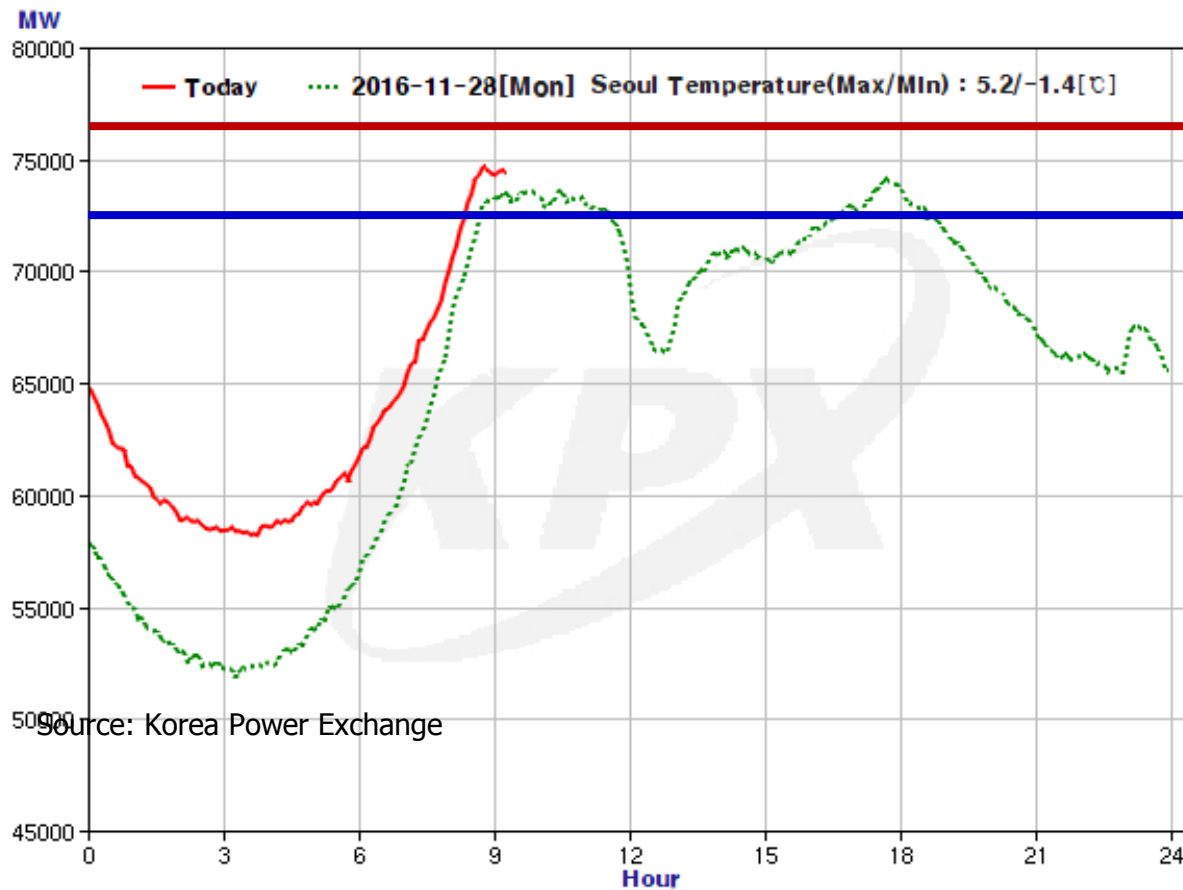
# Black out & why can't we turn it on?

## Super bowl 2013



# Peak-Shaving

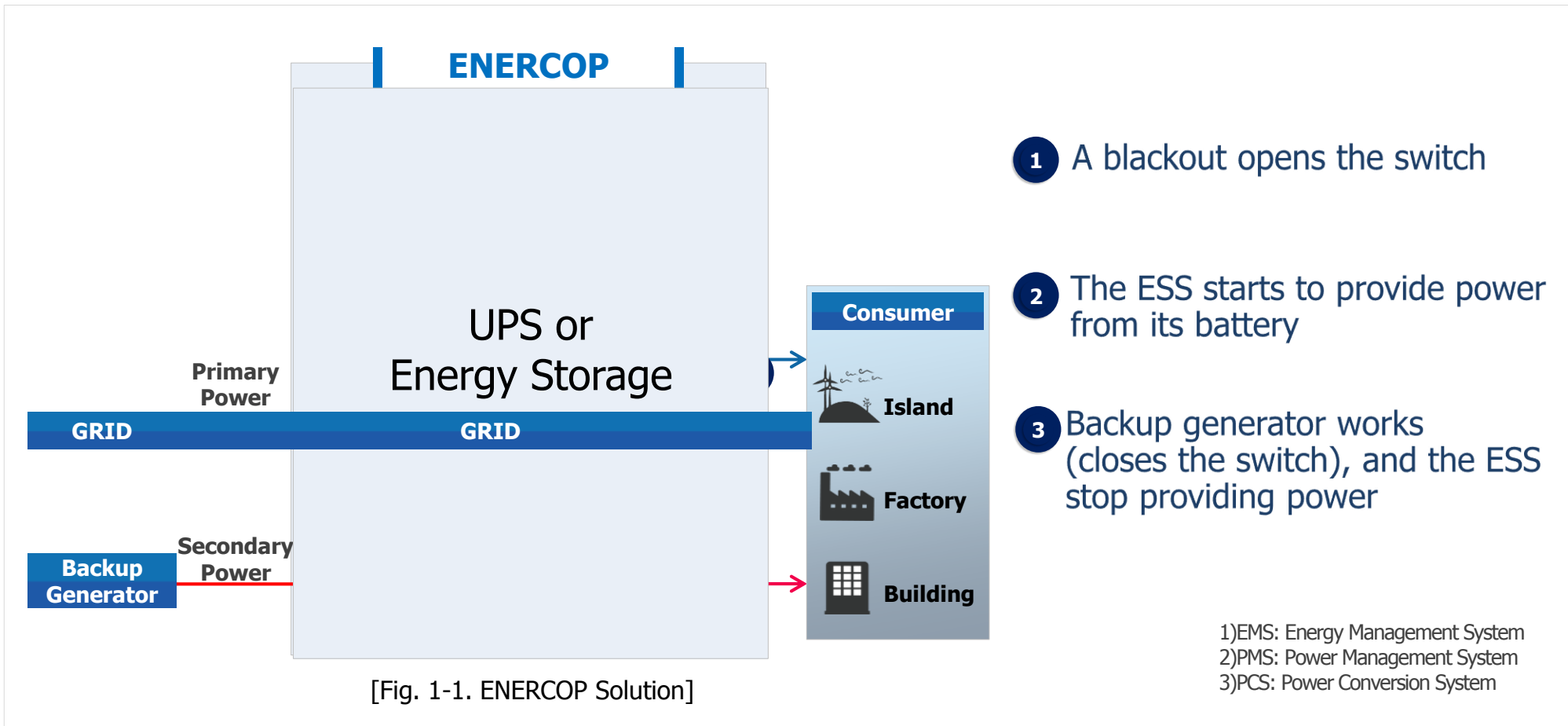
- Peak shaving concept: reducing less auxiliary (back up) power
- If demand exceeds – generator failure & black out



illustrative

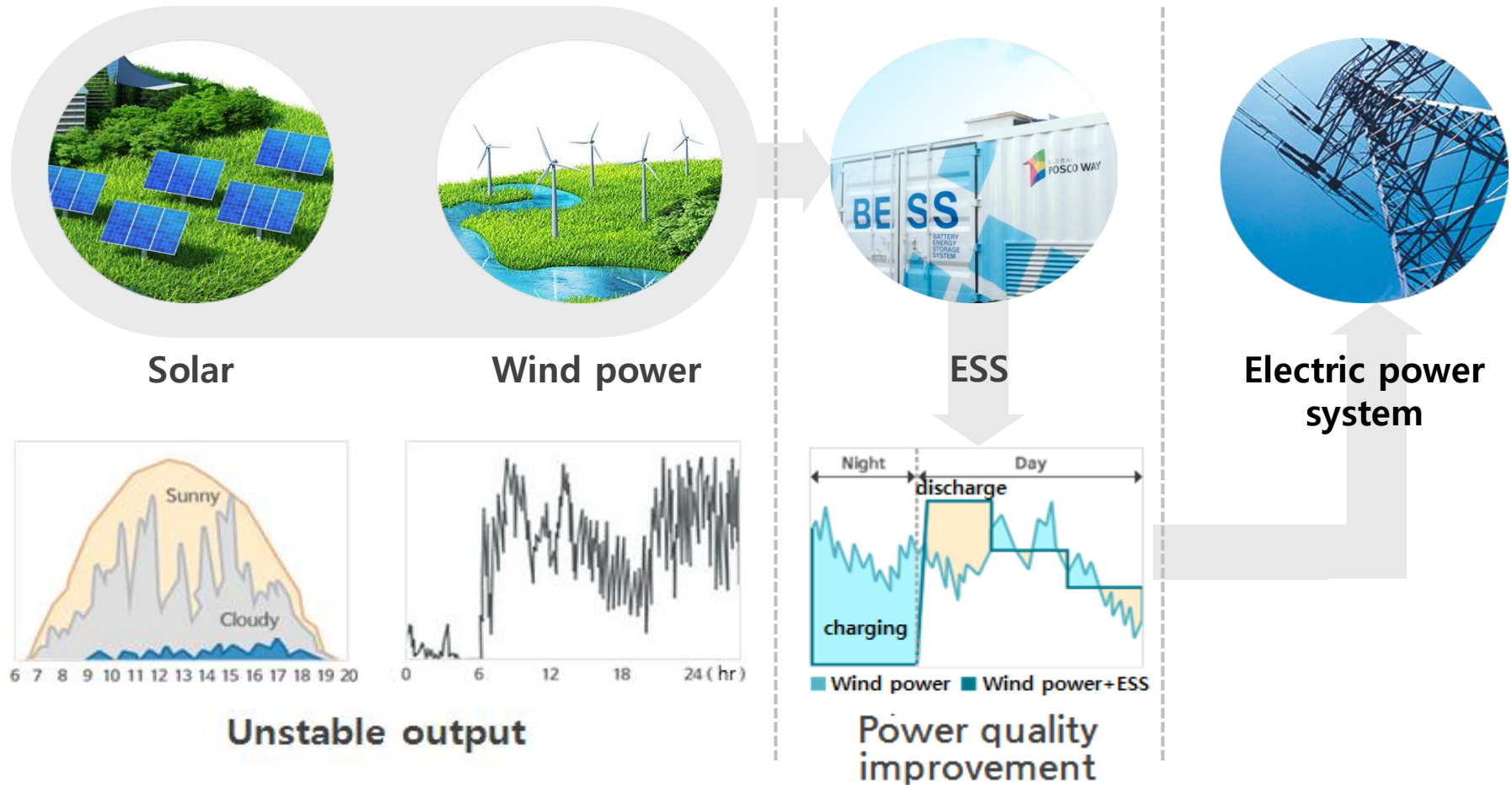
# Multi-function Energy Storage System (ESS)

- Diesel power generators – like your cars: can't reach 100km at once
- Uninterruptible Power Supply (UPS) is like your notebook PC battery



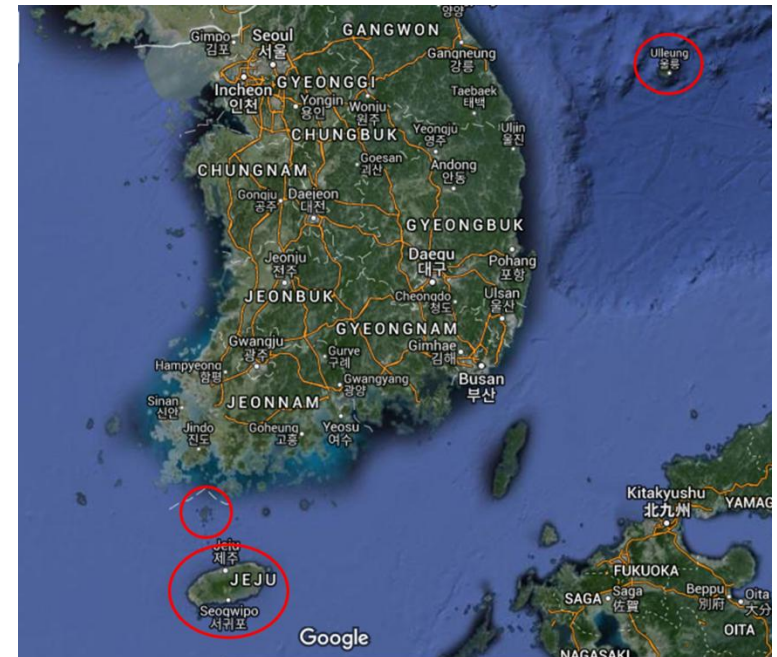
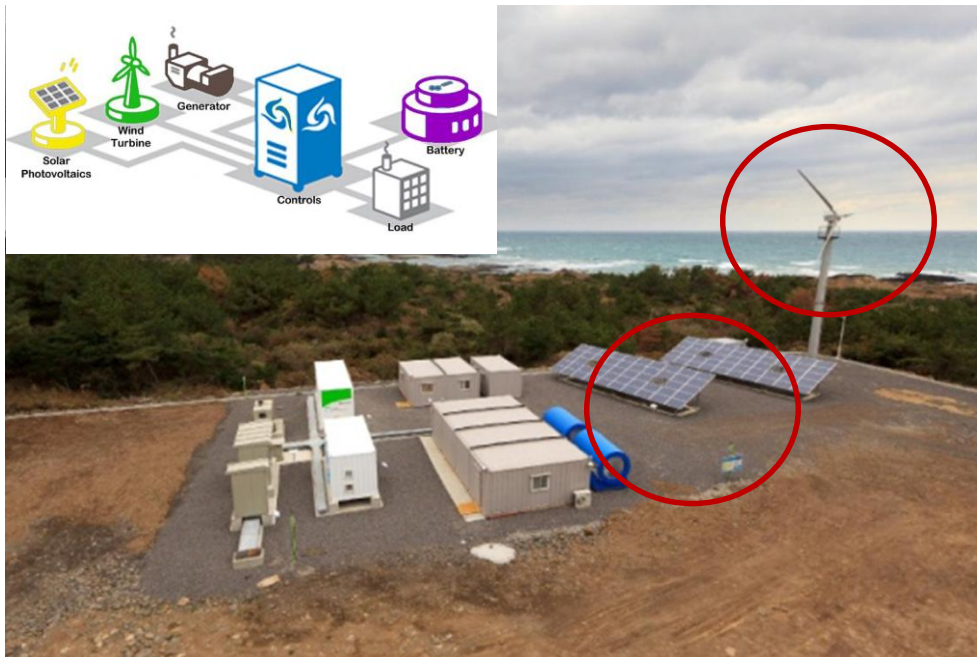
# ESS & Electricity Quality

- Renewable energy source : SUN, WIND...
- Stabilizing output → Power Quality Improvement



# Stand-alone microgrid

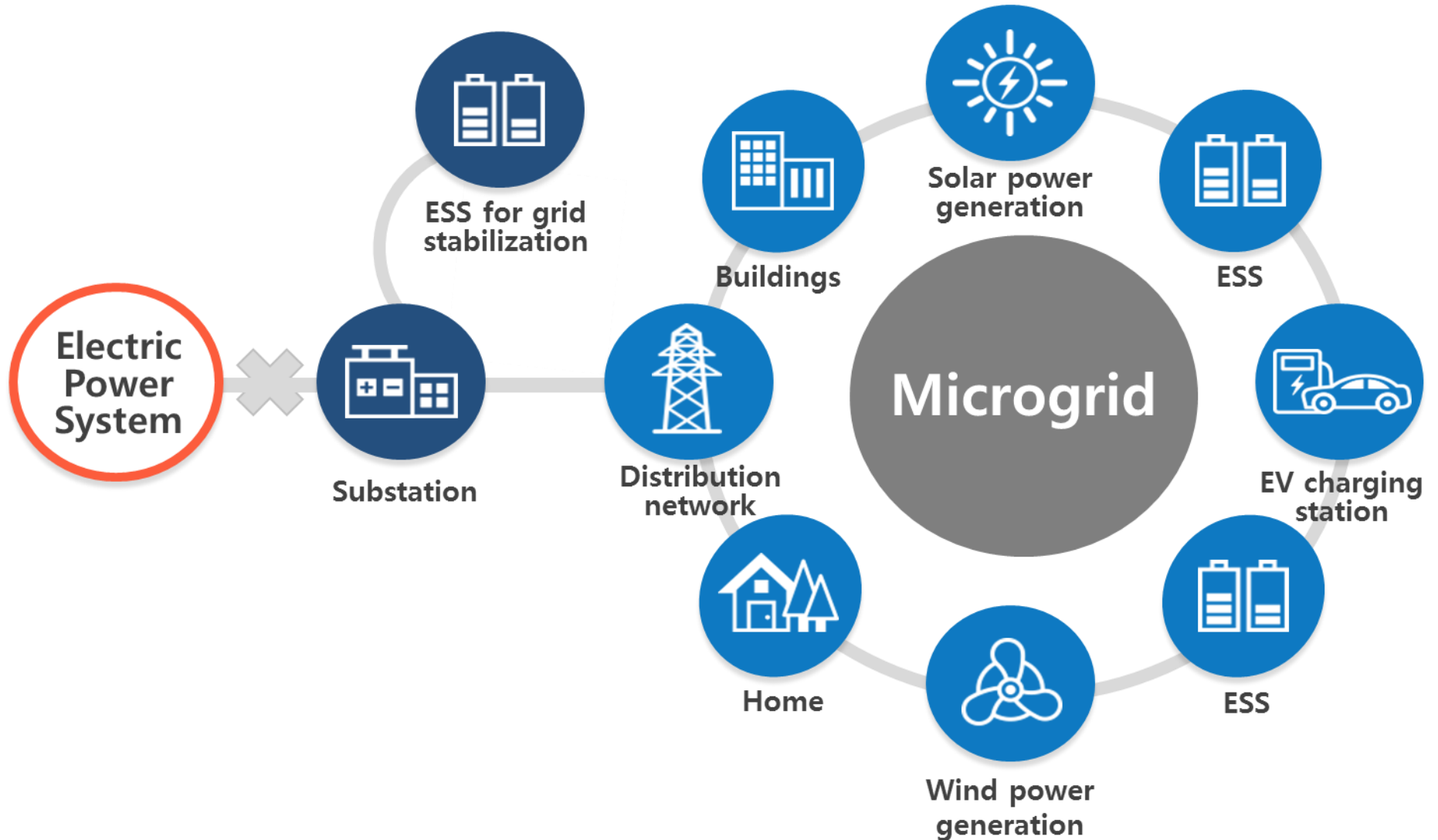
- Renewable energy source + ESS + Controllers → stand-alone microgrid
- ESS: improving power quality
- Mostly remoted area, islands (replacing diesel power generators)



Picture Source: INNOVATELI

# Microgrid

## ○ Renewable Energy & controlling electricity





# Purchasing Electricity on the street?

- Do you need electricity on the street?
- Have you thought about purchasing electricity on the street?



# EV charging system

- Electricity, Networked-metering system, location-based systems...
- First controlled electricity selling machine?



\* 5Pin to 5Pin/7Pin : BMW, Renault Samsung, GM, NiSSAN, Hyundai-Kia Motors  
 \* 5Pin : BMW, GM, Nissan, SSAN, Hyundai-Kia Motors

## < ChargEV Service Application >

App. (Android & ios)



charging spot



charger booking



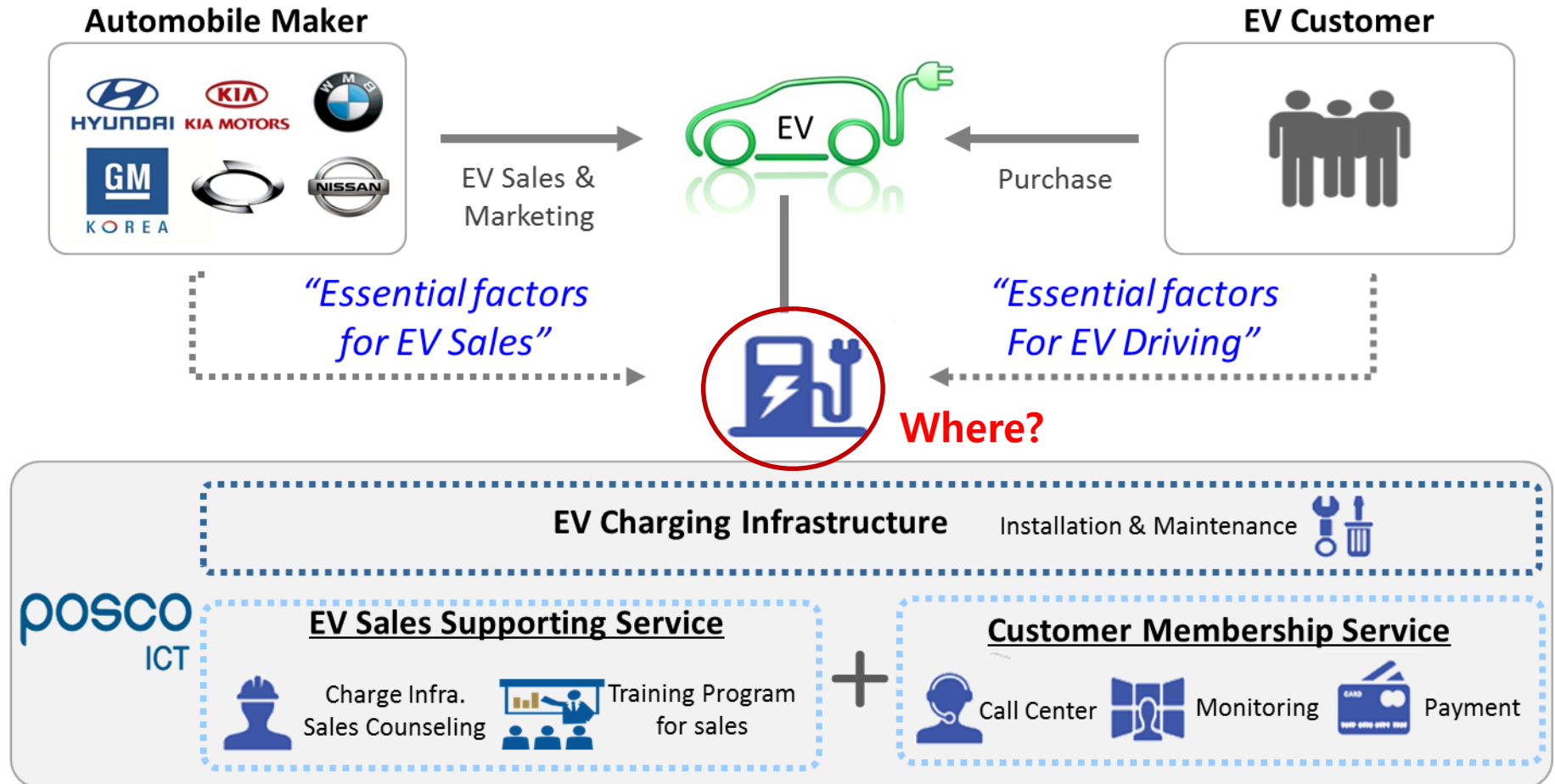
Charging Infra. Monitoring Screen



Hyundai Motors' Membership Card

# EV charging system Business Model

- EV makers & Customers, Government & Land owners
- EV stations vs Gas stations



# 2<sup>nd</sup> Industrial Revolution

- Dramatic changes – Prepare for the future
- We will experience similar changes soon

Easter morning **1900** : Spot the automobile



Easter morning **1912** : Spot the horse



\* source : Business Insider, Hyundai IONIQ TV Advertisement

# PPA? Grid Parity?

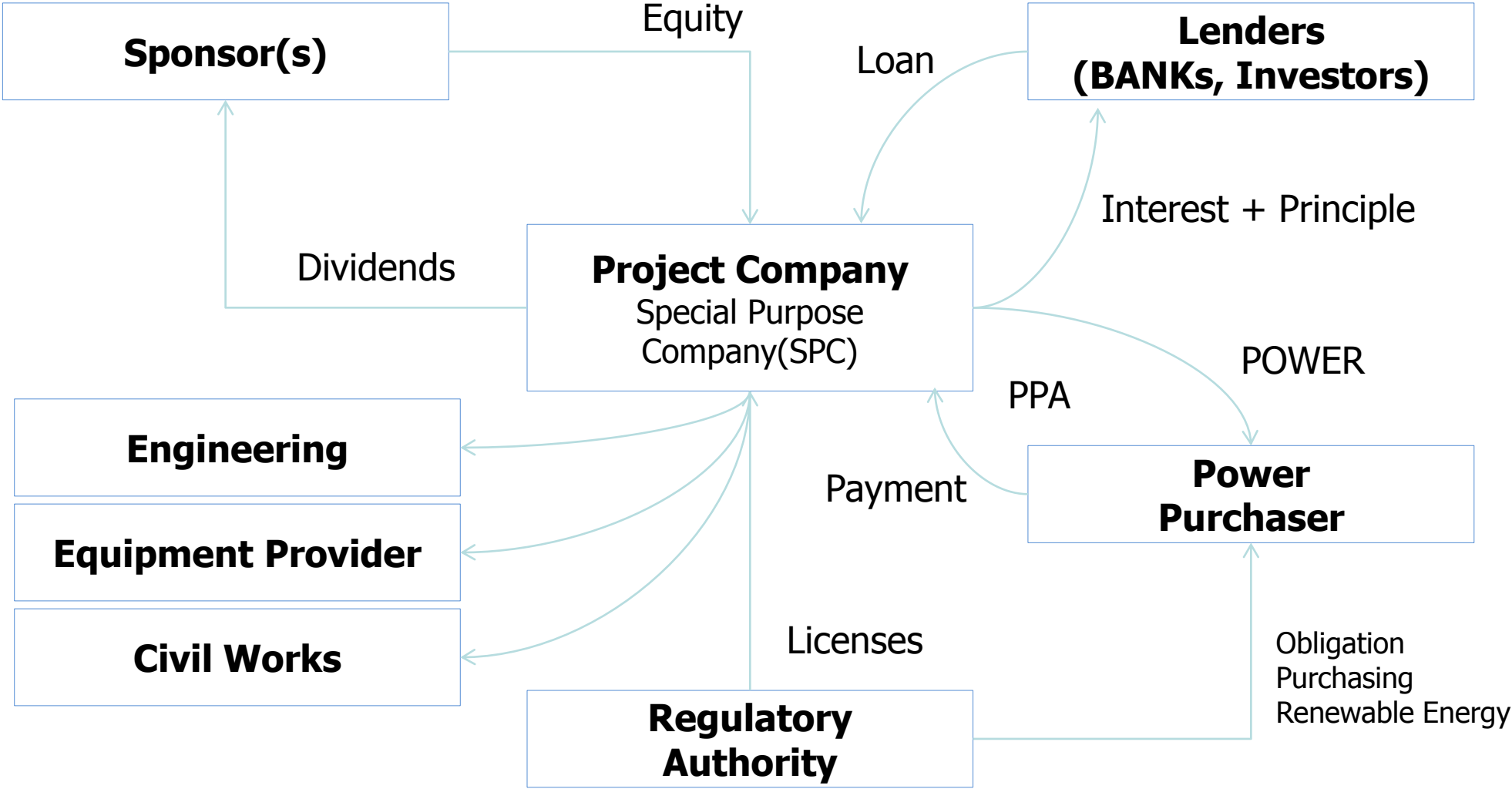
- **Power Purchasing Agreement (PPA)**
- **Grid Parity (PV Electricity Generating Costs > Fossil Fuel)**



# Let's build a power plant

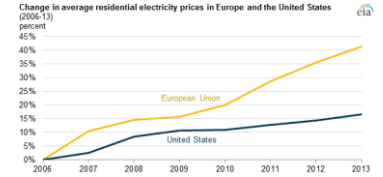


# Let's build a power plant



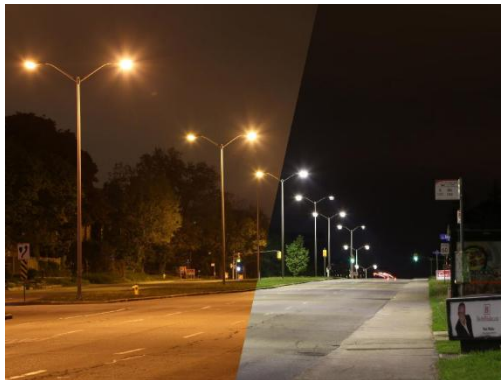
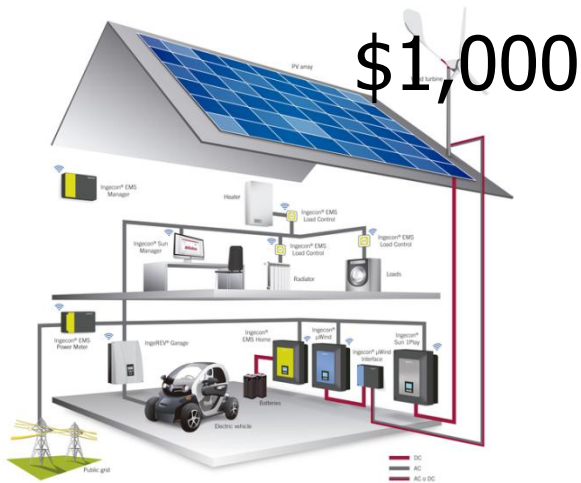
# ESCO Model

- Are Electricity Prices Going Up? Or Down?
  - Return on Investment (ROI) 3-5 years



\$100

Utility Bill



\$30

\$70

Utility Bill

Assets & Profits

\$70

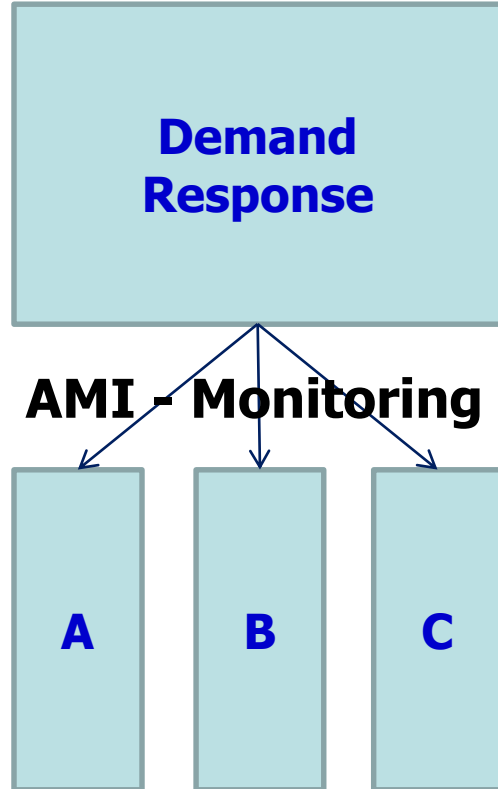
Utility Bill



# Demand Response Business Model

## ○ Preventive Measure

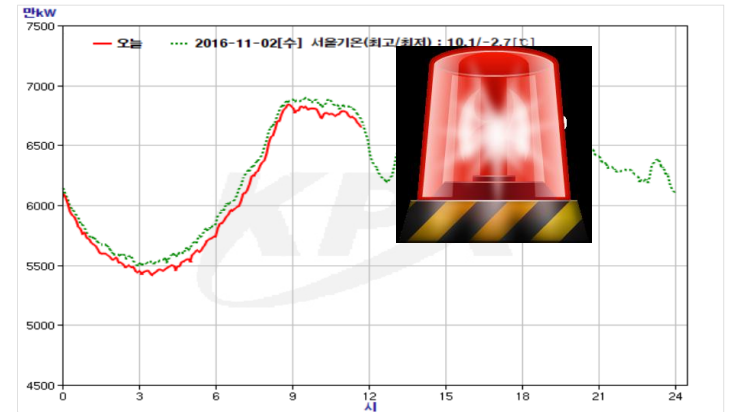
- Additional Power Plant? Or Expensive Emergency Power?
- Contracted DR customers – Shutting off or Save Electricity & Get paid!



## Peak Alert!

● 실시간 전력수급 그래프

2016. 11. 03(목) 11:40



※ 실시간 전력수급현황은 5분 주기 순시자료입니다.

**Reducing Usage & Get paid**

# ESS Business Model

- Buy when it is cheap and sell it when it is expensive? (midnight rate)
- Value-added services: just like UPS “No More Blackouts” Hospital? Hotels?



# Finally

- **Smart Grid and Business Models**
- **Understanding technology and its trend is important, but...**
- **Technology can be applied or project can be made when...**
  
- **EPC + F (Engineering, Procurement, Construction) + Financing**
- **Electronic Vehicle**
- **PPA**
- **ESCO**
- **Demand Response**
- **ESS**