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# Green Energy Policy of Korea

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Sept. 2018

# 1 Korea's Renewable Energy - Electricity

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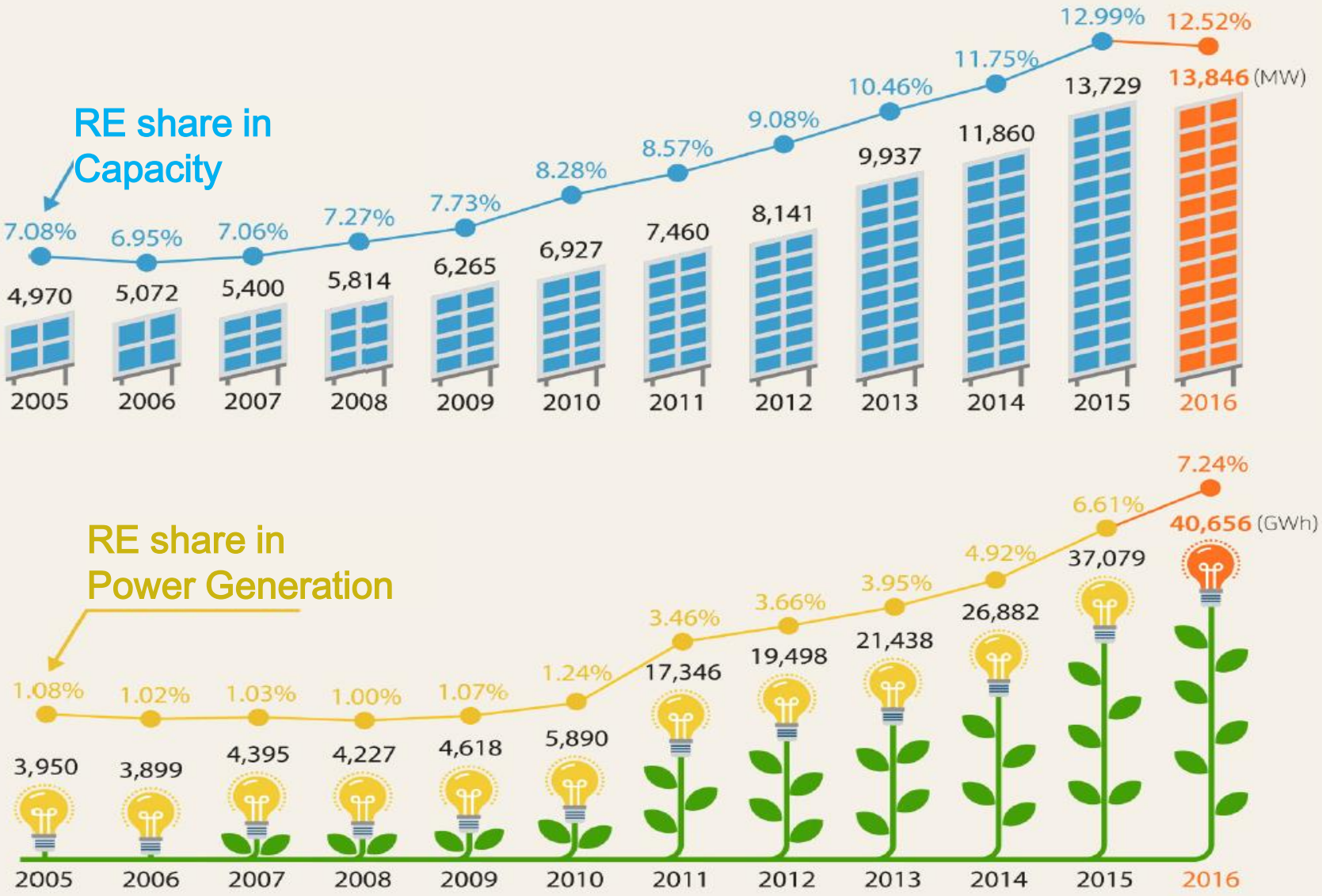
## ■ Renewable Energy Capacity & Power Generation



# 2 Korea's Renewable Energy - Industry: PV

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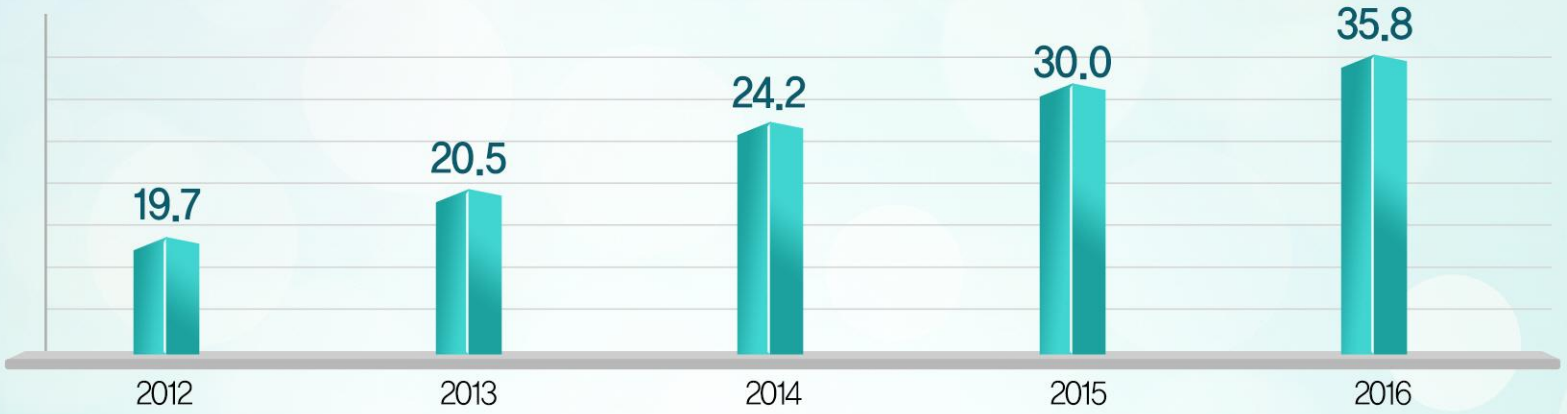
## ■ Status of PV industry in Korea

### ⊙ PV export(hundred Million Dollars)




### ⊙ Capcity of Korean PV enterprises

| | |
|---|---|
| Cell | ① Hanwha Q Cells(5,200MW/year, World 1st rank)<br>PERC(Passivated Emitter and Rear Cell)<br>Efficiency 19.5%, 1st commercialized for Polycrystalline Cell<br>② LG Electronics(1,100MW/year)<br>22% efficiency for N-Type Monocrystalline Bifacial Cell<br>③ Hyundai Heavy Industries(600MW/year)<br>④ Shinsung E&G(600MW/year)<br>21.7% efficiency of Monocrystalline PERC cell |
| Polysilicon | ① OCI(52,000ton/year, World 3rd rank) ② Hanwha Chemical(15,000ton/year) ③ Hankook Silicon(15,000ton/year) |
| Module | ⊙ Global production capacity 10GW<br>⊙ Domestic production capacity 6.4GW |

# 3 Korea's Renewable Energy - Industry: Wind

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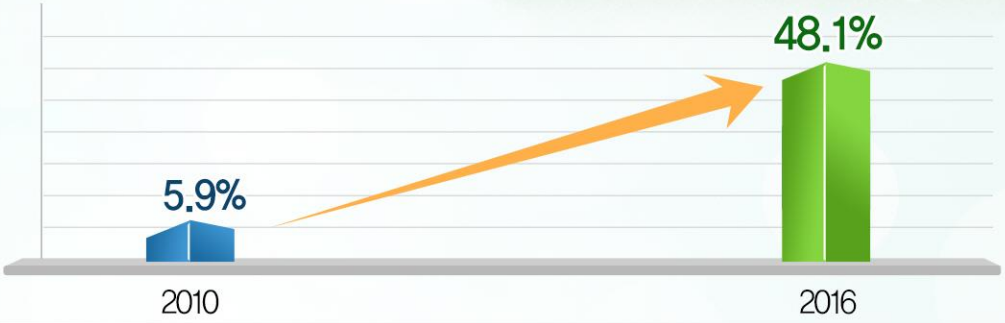
## ■ Status of Wind industry in Korea

- 1,031MW installed by 2016
  - – Onshore wind : 77 sites, 519 turbines, 996.22MW
  - – Offshore wind : 3 sites, 12 turbines, 35MW

- Domestic turbine market share




- Capcity of Korean Wind enterprises

| | | |
|---|---|---|
| Turbine | Doosan Heavy Industries | 3MW on/offshore turbine, 5.5MW offshore turbine<br>– world 5th rank Offshore turbine supplier in 2016(30MW, 1.5%) |
| | Hyosung | 5.5MW offshore wind turbine certified in Germany (July, 2015) |
| | Unison | 750KW, 2MW, 2.3MW wind turbine |
| | Hanjin | 1.5MW, 2MW wind turbine |
| Tower | CS Wind | Wind tower global market share 6.5%<br>Manufacturing at Canada, China, Viet Nam and UK |
| Forging | Tae-woong | 400 customers including world turbine top 10 enterprises |

# 4 Korea's Renewable Energy – Industry(Outcome)

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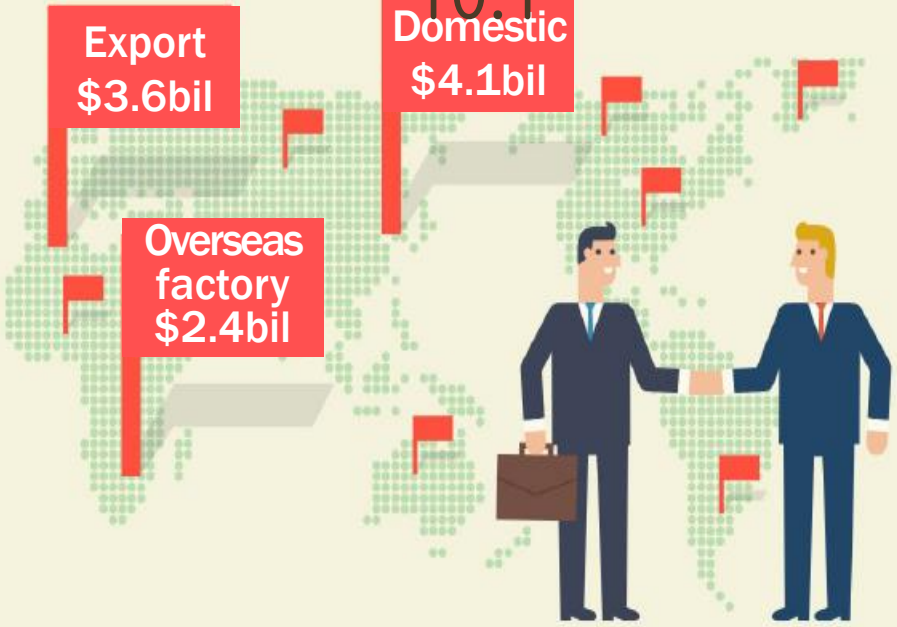
■ Renewable Energy Industry (2016)

| # of Manufacturer | # of Employment | Sales(USD billion) |
|---|---|---|
| 405 | 14,412 | 10.1 |



# Energy Transition – Renewable Energy 3020

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## Vision: Energy transition 「RE3020」

- Everyone's participation & improving the quality of life -

### Target

| | | 2017 | 2022 | 2030 |
|---|---|---|---|---|
| RE share in power generation | | 7.6% | 10.5% | 20% |
| Citizen power plant | Urban (# Households) | 0.29mil. | 0.76mil. | 1.56mil. |
| | Agri. | 0.1GW | 3.3GW | 10GW |

### Strategy

**Sources**

Focus on PV & Wind

**Method**

Citizen participation & Sustainable development

**Enhancing Economic feasibilities**

Promoting Large-scale project by deregulation

- Expanding PV in urban area
- Expanding Agricultural PV
- Expanding RE co-ops & social enterprises
- Large-scale project

# Energy Transition – Renewable Energy 3020

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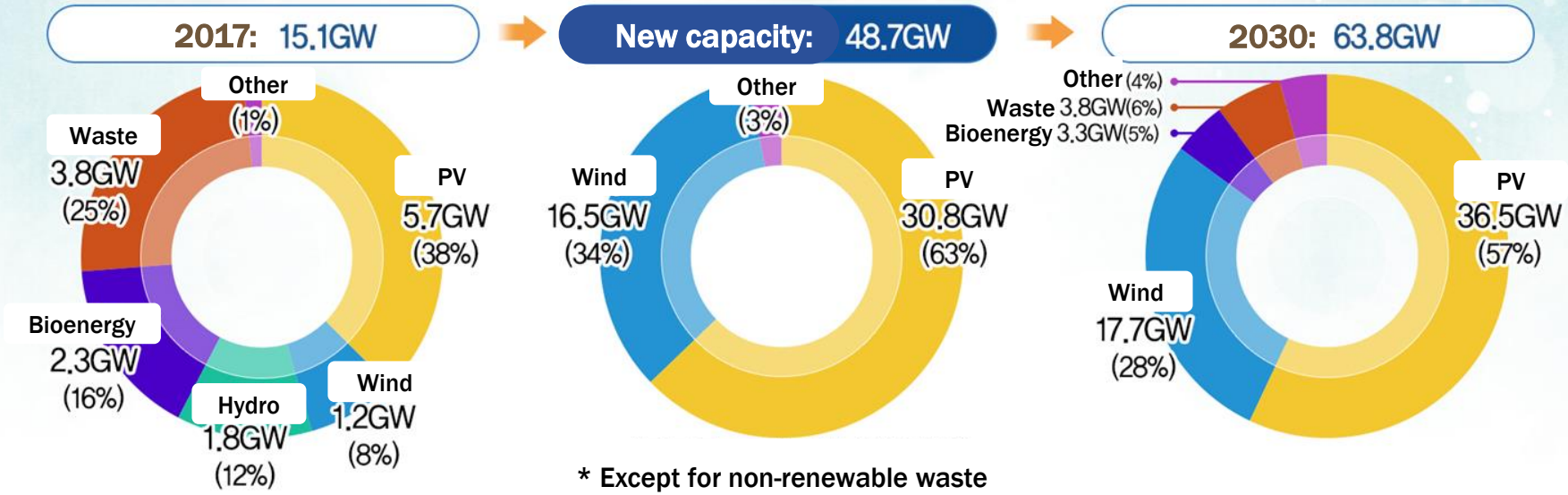
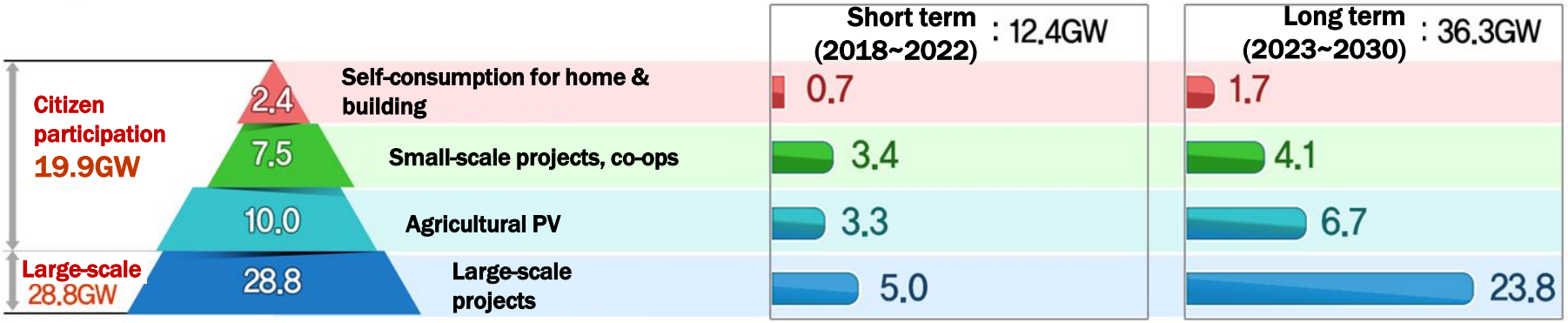
**RE Target** 20% of power generation by 2030: More than 95% of new capacity is PV & Wind




* Except for non-renewable waste

**Method** Achieving target by Citizen participation & Large-scale projects



# Energy Transition – Way to Achieve

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■ To achieve 20% target by 2030

1. Increasing RPS mandatory rate
2. Promoting large scale RE projects : Offshore wind farm, etc
3. Local community participation : Agricultural solar villages, etc
4. Investment for grid stability : T&D improvement, securing backup power
5. Efficient demand side management using smart grid infrastructure
6. R&D investment $1.4bil including RE($1.0bil) (2016–2020)

# Renewable Portfolio Standard(RPS)

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## Overview

- Enforces 21 power producers to supply certain amount of the total Power generation by NRE (Implemented in 2012)
  ※ Obligators: power producers with capacity of 500MW or above

## Goal and Current Status

- Goal : ('12) 2.0% →...→ ('16) 3.5% → ('17) 4.0% → ('18) 5.0% →...→ ('20) 7.0% →...→ ('23~) 10.0%
- Current Status : RPS achieved 10.1 times of total FIT installed capacity(proceeded for 10 years) in 7.3 years

| RPS('12~ ) | FIT('01~'11) | Rate of change |
|---|---|---|
| **10,546MW** | **1,042MW** | **1,312.7%↑** |

## Best Practice

- Converting rooftop of the factory and parking lot into Solar PV Power Plant (Busan)
  - The largest Solar PV Plant for the single factory utilized existing facilities in the world (20MW, Renault Samsung Motors)
  - Generated electricity(26GWh/yr.) provides 7,300 households
    ** Ave. usage rate 15%, 1 household uses 300kWh/month*

# RPS – REC & Multipliers



## Evaluation Criterion

- **Economic feasibility, Environmental effect, Potential, Industrial promotion effect, Policy priority**

*(Govnt. Revises every 3 years)*

| Energy Source | Multiplier | Eligible Energy Sources | |
|---|---|---|---|
| | | Installation Type | Detail |
| Solar PV | 1.2 | On Land | Less than 100kW |
| | 1.0 | | More than 100kW |
| | 0.7 | | Exceed 3,000kW |
| | 0.7 | On Forest Land | |
| | 1.5 | On Building & Existing Facilities | Under 3,000kW |
| | 1.0 | | Exceed 3,000kW |
| | 1.5 | Floating on the Water Surface | |
| | 1.0 | Self-generating Facilities | |
| | 5.0 | ESS(with Solar PV Facility) | 2018, 2019 |
| | 4.0 | | 2020 |
| Other REs | 0.25 | Bio-SRF, IGCC, Byproduct Gas, Waste | |
| | 0.5 | LFG, Wood Pellet, Wood Chip | |
| | 1.0 | Hydro, Onshore Wind, Other Bioenergy, Tidal(with Embankment) | |
| | 1.5 | Unused Forest Biomass(Co-firing), Hydro Thermal | |
| | 2.0 | Unused Forest Biomass, Fuel Cell, Tidal(without Embankment), Current Power, Geothermal | |
| | 1.0 ~ 2.5 | Geothermal, Tidal(without Embankment) | Variable Type |
| | 2.0~3.5 | Offshore Wind(Connection Distance ~5km: 2.0, 5~10km: 2.5, 10~15km: 3.0, 15km~: 3.5) | |
| | 4.5 | ESS(with Wind Facility) | 2018, 2019 |
| | 4.0 | | 2020 |

# Renewable Portfolio Standard(RPS)

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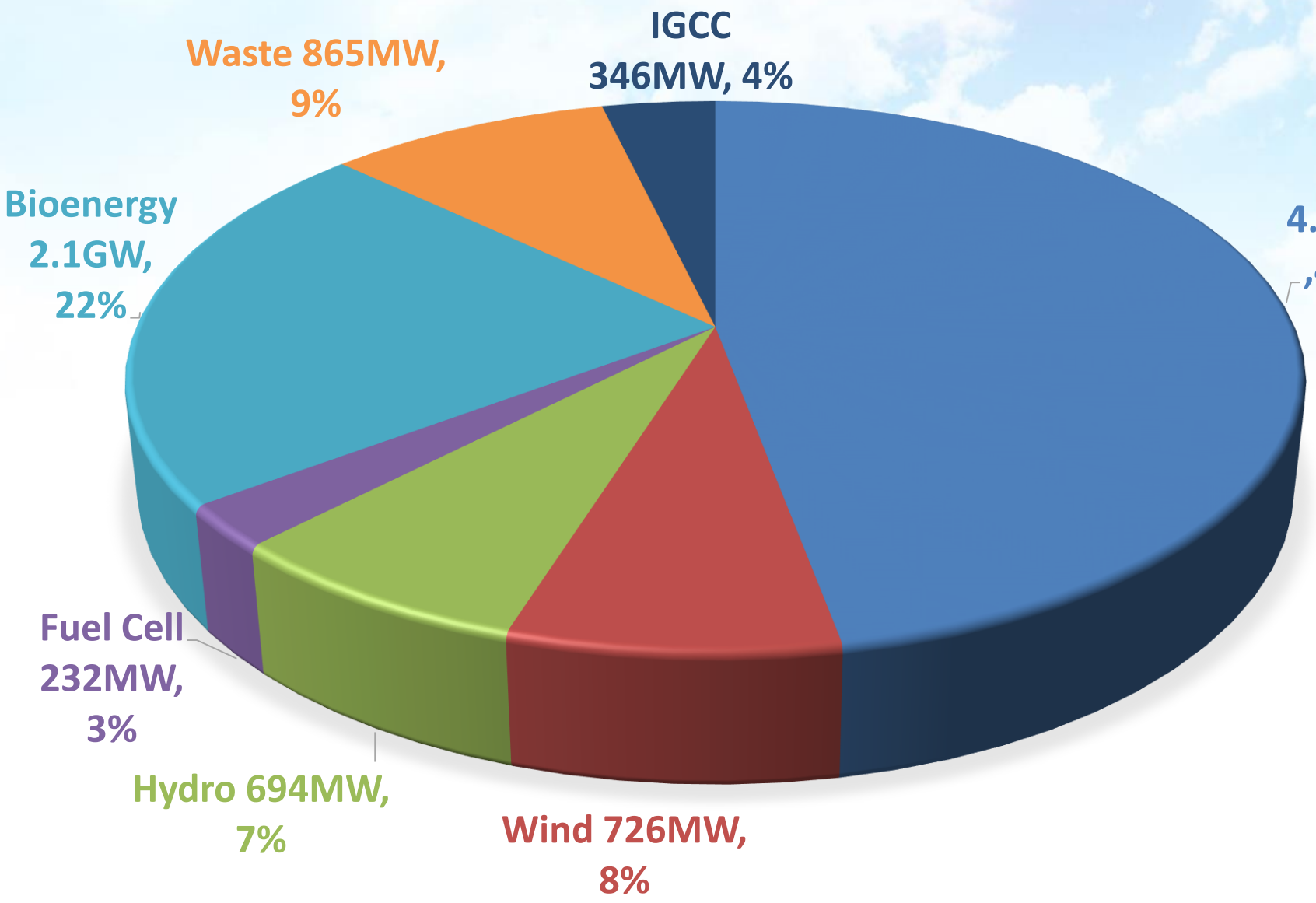
## TOTAL RPS CAPACITY : 9.4GW (2017)



# IREC 2019 in Seoul, Korea – 23rd ~ 26th Oct 2019

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# Thank you