

# Energy Transition through Solar Energy

# Solar City Seoul 2022

2018. 6. 22.

Hwang, Boyoun

Assistant Mayor of Climate & Environment



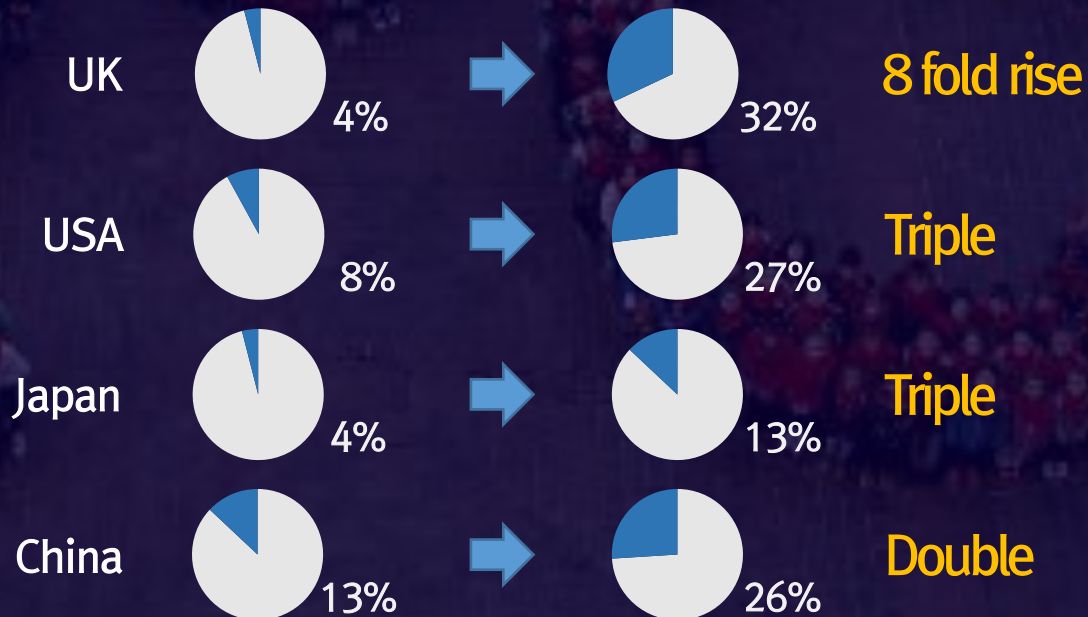
SEOUL METROPOLITAN  
GOVERNMENT

# 1 Era of Energy Transition

## Global efforts to lower GHG & increase renewable



**Global renewable targets (2010 → 2030)**



(Source : IRENA REmap, 2018)

# 1 Era of Energy Transition

## Korea Renewable Energy Plan 3020

### Vision

Toward participatory energy system to improve quality of life

– **Energy shift [RE 3020]** For everyone to join and benefit –

### Target

Type	2017	2022	2030
Renewable Power Share	7.6%	10.5%	20%
No. of National Virtual Power Plants	290K / 0.1GW	760K / 3.3GW	1.56M / 10GW

### Shifting Strategy

- ✓ (Sector) Waste, bio, etc.      ▷ Supply clean energy (i.e. solar, wind)
- ✓ (Participant) Foreigner, biz, etc.      ▷ Local residents, Koreans, etc.
- ✓ (Means) Individual development      ▷ Development of massive planned projects



# ① Era of Energy Transition

## Seoul's One Less Nuclear Power Plant

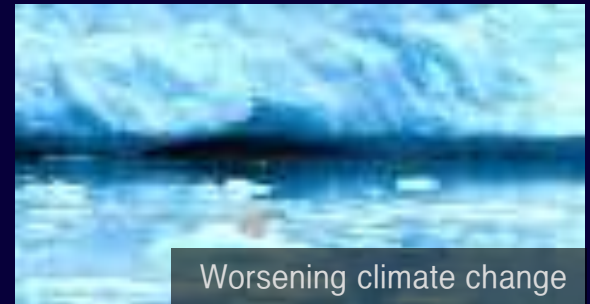
Pre-emptive actions to tackle energy crisis & climate change



Fukushima Accident (2011)



Rolling Blackout (2011)



Worsening climate change

Changing mind and participation from citizens

Energy transition to renewable & demand management

Citizens make



Citizens reduce



Citizens participate



# 1 Era of Energy Transition

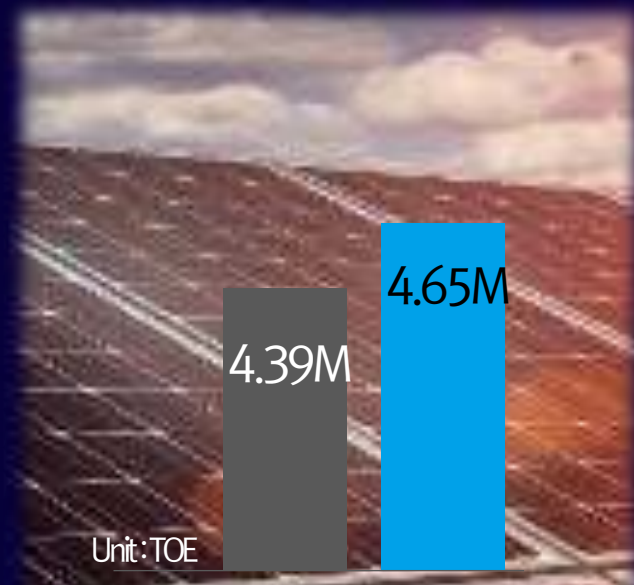
## Seoul's One Less Nuclear Power Plant

### 6year achievements (2012~2017)

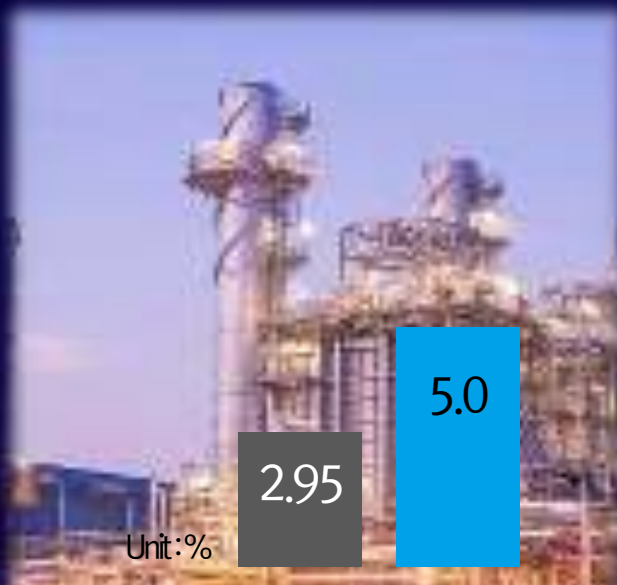
Energy  
Production & Reduction  
**4.65M TOE**

Energy  
Independence rate  
2.9% ▶ **5.0%**

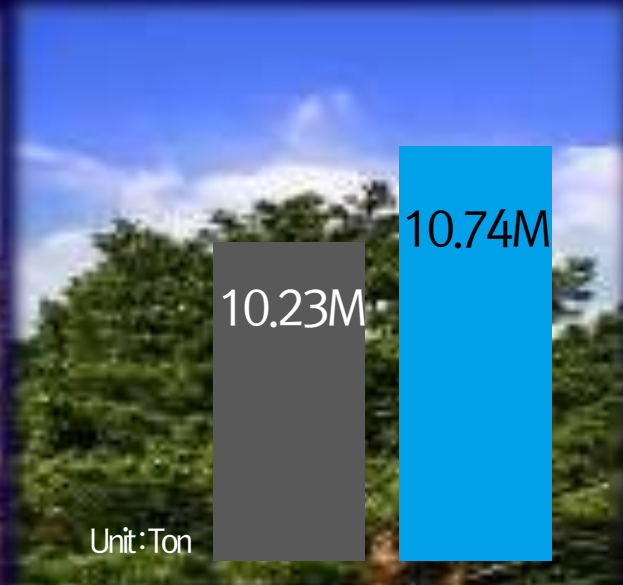
GHG Reduction  
**10.74M Ton**



Target Achieved



2011 2016



Target Achieved

# ① Era of Energy Transition

## Seoul's New Challenge, Solar City Seoul

**OLNPP**

- Start of Energy Paradigm Shift

[ Projects ]

LED Lighting  
Building Retrofit Project  
Renewable Energy

[ Paradigm shift ]

Supply ▷ Demand management  
Consumption ▷ Production

[ Expand to national gov. ]

Increase renewables, end nuclear power, etc.  
Motivate national policies

New Challenge toward renewable -

**Solar Energy**

Fossil Fuels



**Renewable Energy**

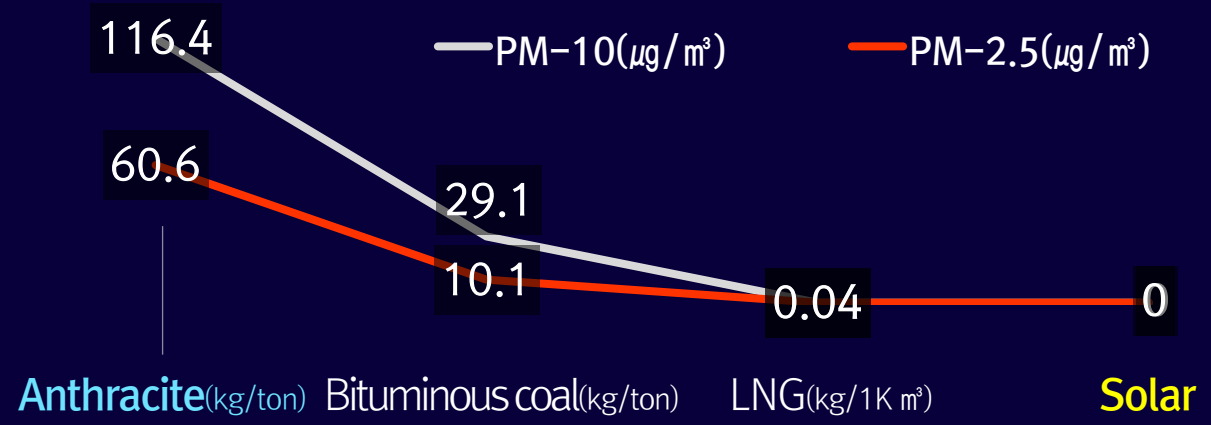
# 2

# Renewable Energy for Seoul

## Solar Energy – No Particulate Matter, No GHG

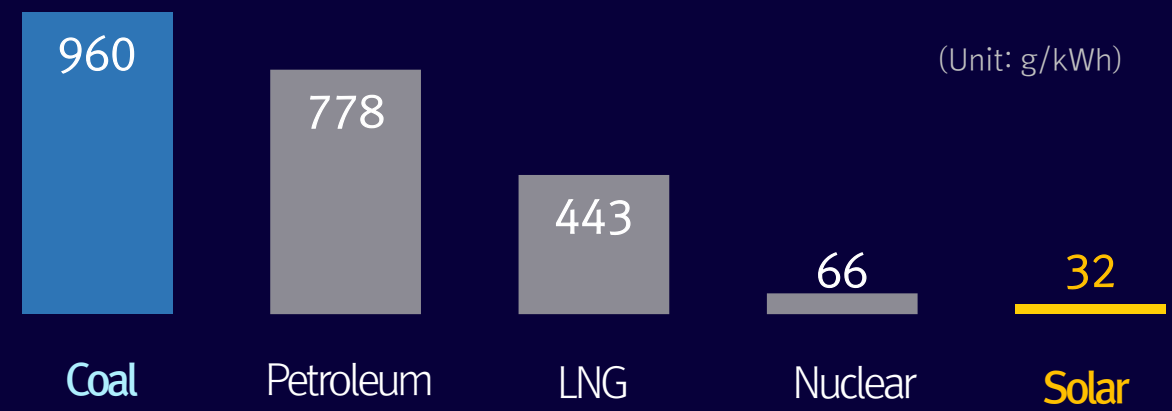
**PM emission factor for solar energy: 0**

(Source: NIER 2012)



**GHG emissions from solar: 3% of coal**

(Source: Sovacool, 2008)

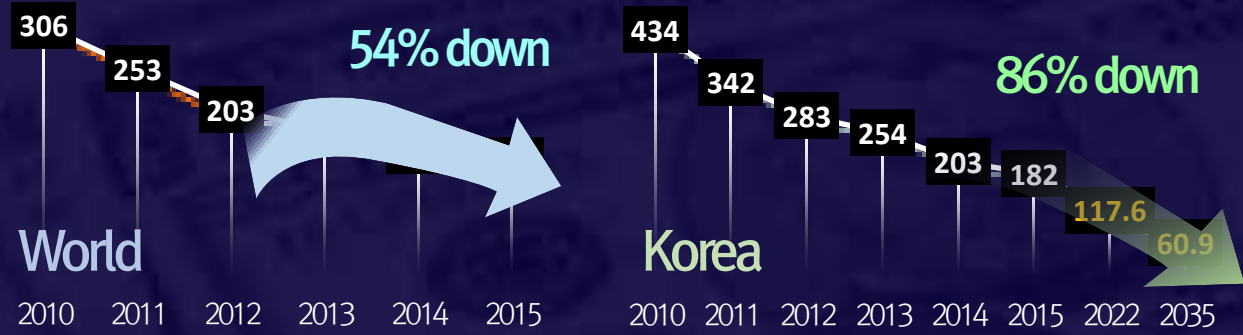


# 2 Renewable Energy for Seoul

## Solar Energy, Seoul's new growth engine

Declining global solar power generation cost

(Source: Korea Eximbank, 2016)



[ Int'l & domestic solar power generation cost Unit: (KRW/KWh) ]

Seoul, a platform of renewable energy

Maximize aspects of Seoul with concentrated technologies & industries  
Link with 4<sup>th</sup> industrial revolution, lay a foundation for renewable industry





## 2

## Renewable Energy for Seoul

## Solar Energy, most suitable renewable for Megacity



Limited renewable energy due to urban constraints

- Unfavorable to wind & hydro power
- Limited bio & waste expansion

Can install on various locations (i.e. roofs, walls, etc.)

- Can install anywhere in the city
- Install on urban infrastructure (i.e. roads)

Solar energy, installed by citizens, profits to be shared with citizens

- Expand self-consuming mini solar PVs
- Citizen participating Solar Fund

2

# Renewable Energy for Seoul

## Solar Energy, Safe and **NO** nuclear risks

### Rise in nuclear risks due to earthquakes

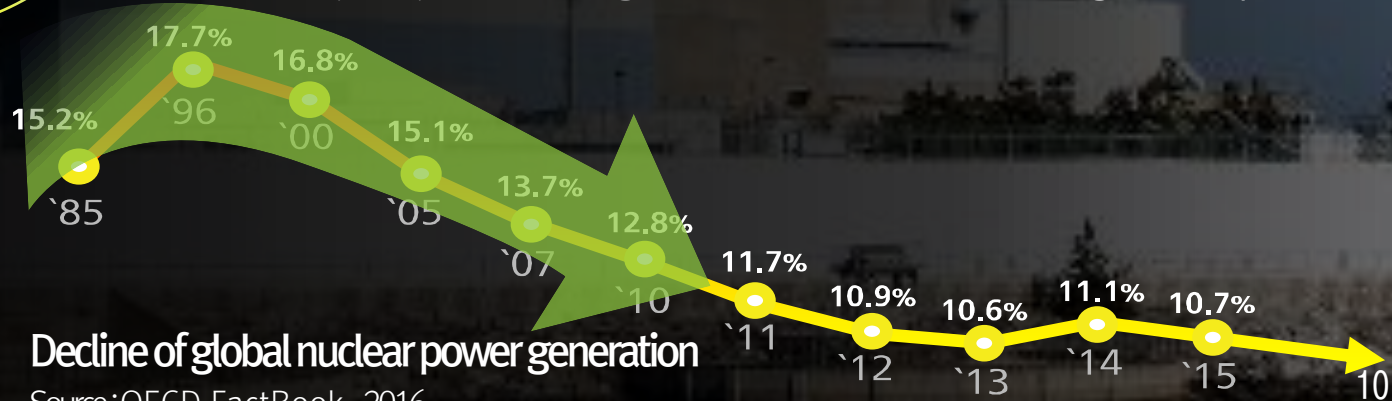


### Nuclear power plants concentrated area

(Within radius of 30km, 9 nuclear plants and 3.82million population)

### World is ending nuclear power

- 31 countries closed 164 nuclear power plants (37% of 447 operating nuclear power plants)
- Germany, Italy, Swiss, Belgium, etc. declared to end using nuclear power



Decline of global nuclear power generation

Source: OECD FactBook, 2016

# 3 Solar City Seoul 2022

## Vision

“Seoul wears Sun”

### Solar City Seoul 2022



- 1 Solar energy to 1M houses
- 2 Available public sites 100% Installation
- 3 New growth engine Solar industry
- 4 System improvement More citizen participation

**1GW**  


Solar power capacity

1 Nuclear power plant: 1GW

**100만**  


Solar powered houses

1 house out of 3 houses in Seoul

**3%**  


Solar energy generation rate

Solar power production to rise by 10-fold compared to 2016 level

# 3 Solar City Seoul 2022

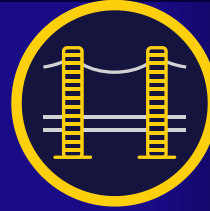
## 6 Major Actions

# 1



1M houses (i.e. apts, buildings) with solar panels

# 4



Create solar energy landmarks

# 2



Supply solar energy to all available public sites

# 5



Create solar energy special towns

# 3



Expand citizen participating solar energy

# 6



Foster solar energy industry



# 1. Supply solar panels to 1 M houses

## 1) Solar PVs on balconies: 0.63M houses

Newly built: Installing mini PVs is required from planning stage

Existing: Install mini PVs in apartments en masse



## 2) Mini generators for houses: 0.15M houses

Subsidize PV installation on roofs

Connect with urban regeneration areas, create special solar town



## 3) Building integrated PVs: 0.22M houses

Newly built: Installing PVs is required for certain buildings

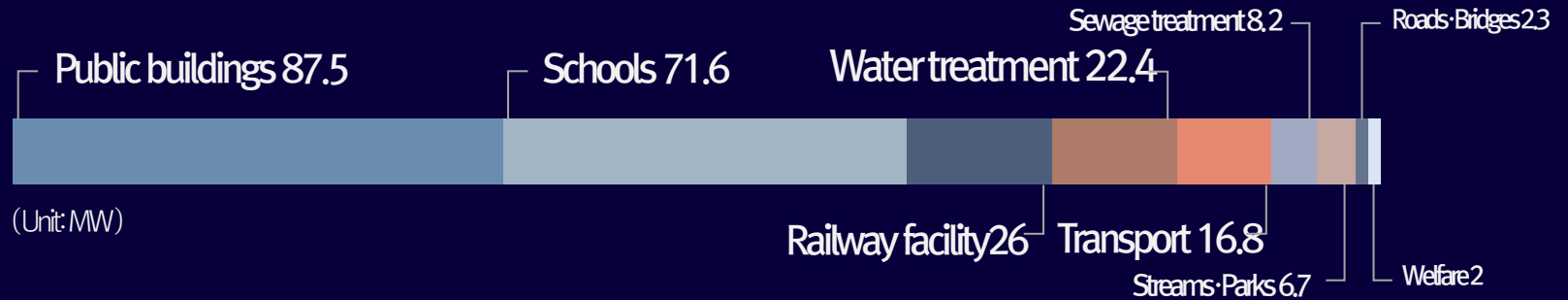
Existing: Subsidize installation costs





## 2. Supply solar to all available public sites

### 1) Install 243MW solar PVs in public buildings, facilities & sites



### 2) Seoul Energy Corp to implement 158MW solar energy project

Energy corp + Construction corp + Finance corp + Develop a **corp** for citizens to join/**Invest in biz, share**

Parking lots



Building roofs



Market roofs





# 3. Enhance Citizen Participation

## 1) Participatory project – communicate with & invested by citizens

**Governance**



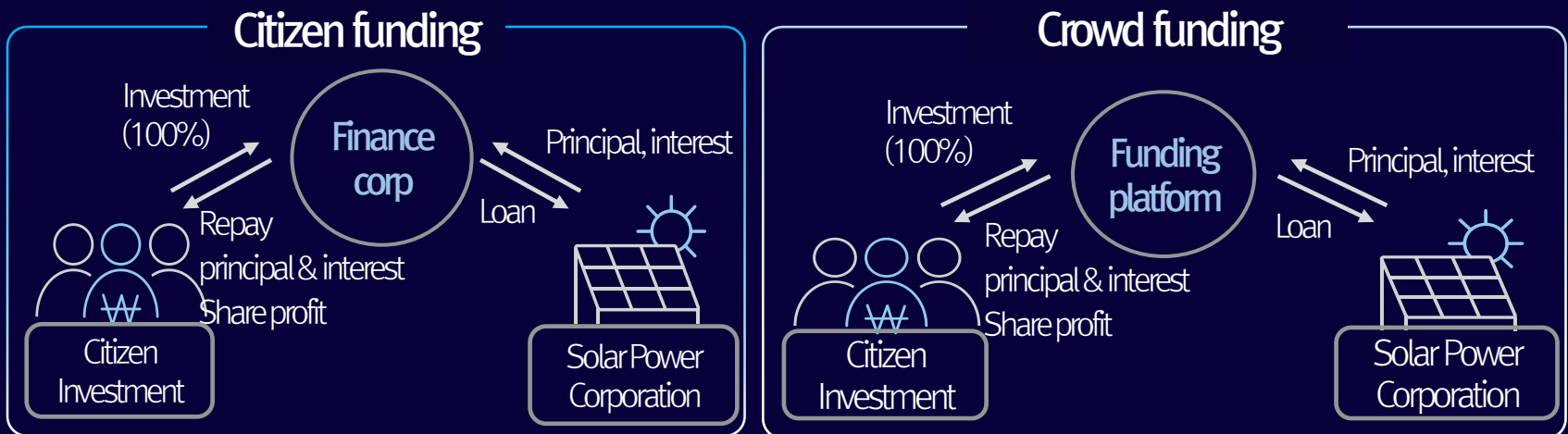
Citizens **make, monitor & evaluate** policies

**Various Stakeholders**



**Lead** solar energy by **installing** in private buildings

## 2) Citizens invest in solar energy and earn profits



## 4. Create solar power landmarks in Seoul

### Squares

- Install solar designed devices in Seoul
  - Raise public awareness
- Solar street furniture (i.e. streetlights, benches)
  - Fun + Design + Experience

### Parks

### Riverside







## 5. Special solar zones in development areas

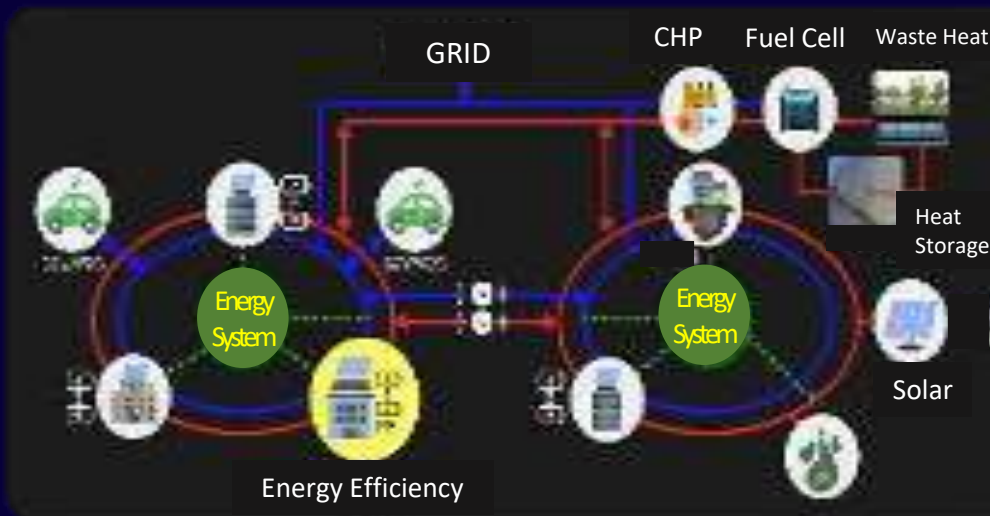
### 1) Energy independent Smart Energy City

Integrated control of buildings using ICT tech → Efficient energy management  
 Solar energy, fuel cells, ESS → Decentralized power supply system

### 2) Expand Energy Zero House

Whole housing complex to become **Energy Positive Complex** through energy efficiency and renewable energy

Smart Energy City



Energy Zero Housing Complex





# 6. Foster Solar Energy Industry

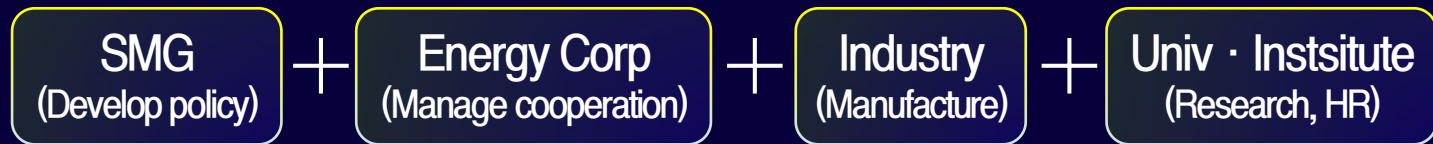
## 1) Establish & operate solar energy support center

One-stop service for life cycle



## 2) Industry-academic cooperation & start-up support

Industry-academic cooperation



- Support** · Support **R&D** in solar energy sector (2billion KRW, 2018)
- Start-ups** · Raise & operate solar **Seoul Fund** (40B KRW, 2019)

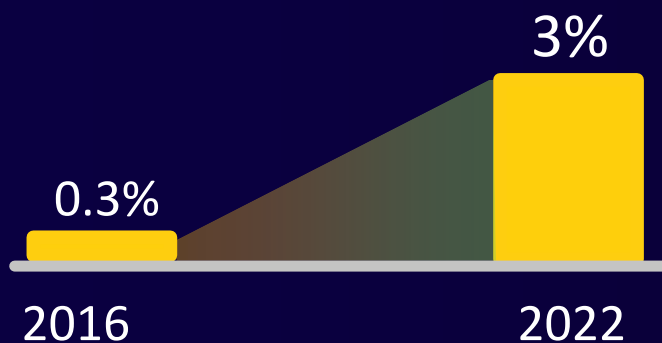
# 4 Seoul in 2022

## Sun Shining Seoul 2022



Install solar power equivalent to capacity of 1 nuclear power plant

- Reductions during peak electricity demand
- Sustainable renewable energy city



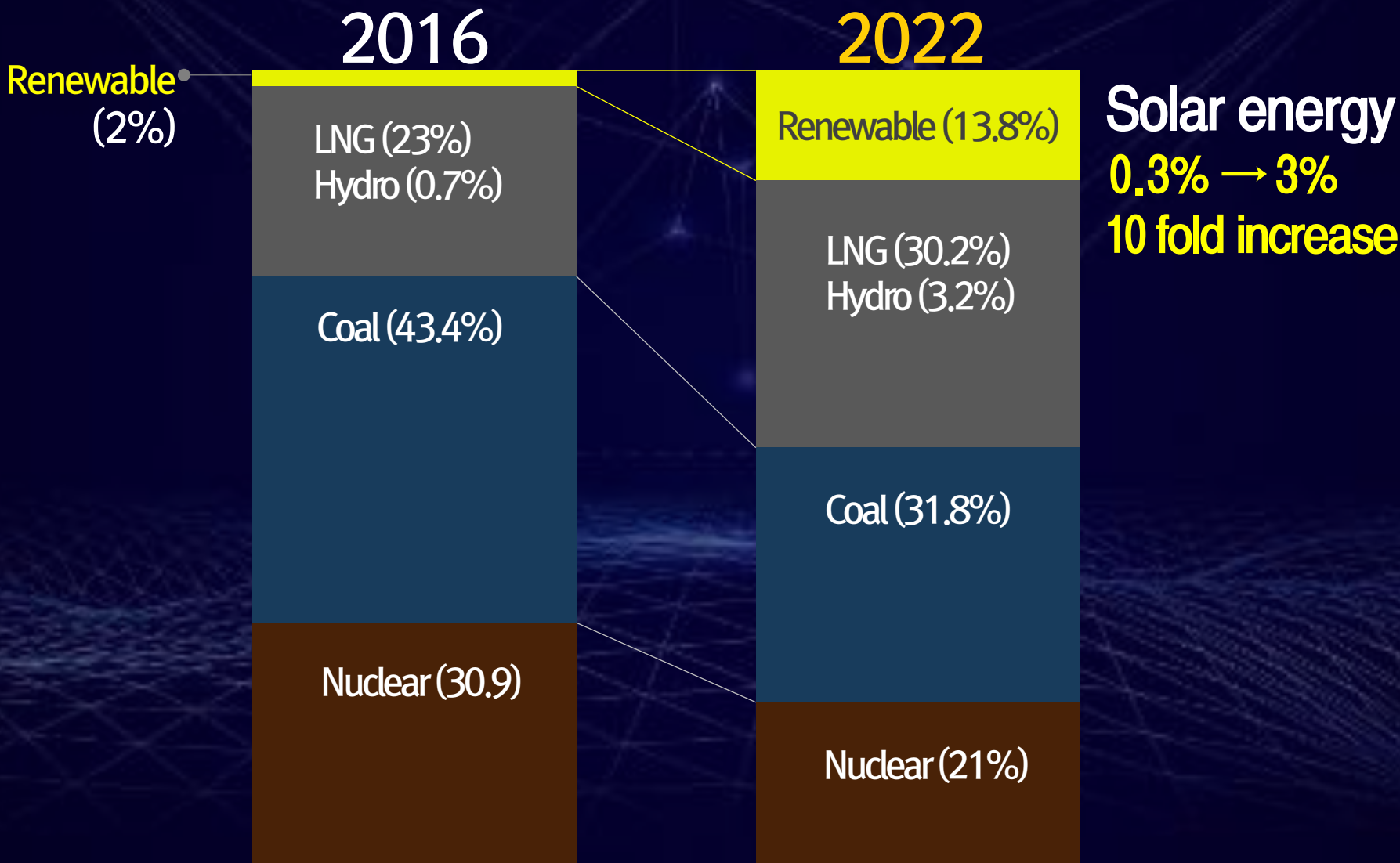
10-fold increase in solar energy

- Generate power for 310 K houses per year
- Smart Energy City using ICT

# 4

## Seoul in 2022

### Energy Transition in Seoul



# 4

## Seoul in 2022

### Reduced GHG & Particulate Matter

Supply 1GW of solar energy  
Can reduce GHG by 544K ton/year



Same as planting 820M pine trees

Supply 1GW of solar energy  
Can reduce PM-2.5 by 135 ton/year



Reduce emissions from 220K diesel cars

(1 diesel car: 0.602kg/year)



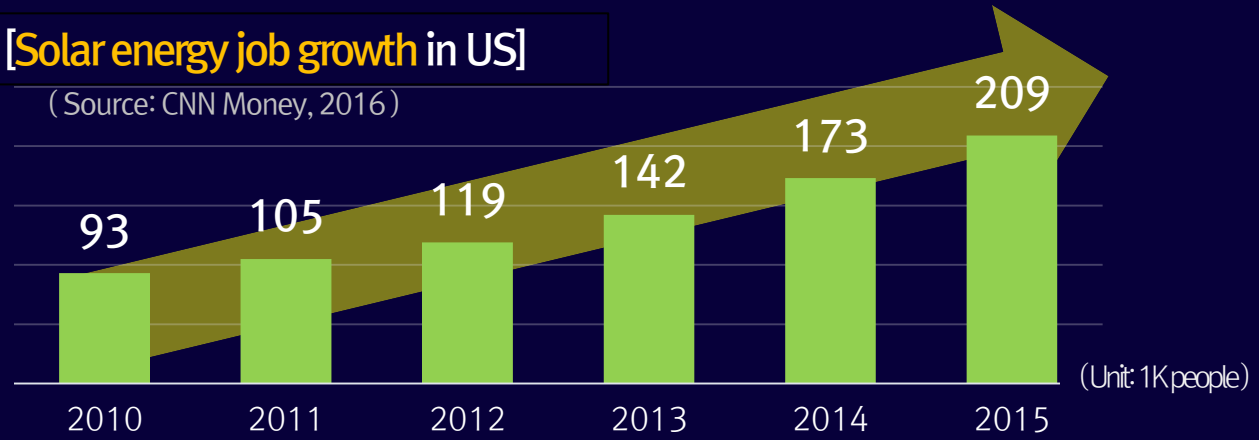
## Build renewable energy industry

Create jobs

- Solar City Seoul will create 30.7K jobs
- [ 35.5 people/MW (World Bank, 2011)]

[Solar energy job growth in US]

( Source: CNN Money, 2016 )



Renewable energy industry

- ICT-solar integrated industry to be the key in 4<sup>th</sup> industrial revolution
- Economic growth from solar energy industry boom

**Solar City Seoul will bring benefit to everyone, including citizens, businesses, society and the government.**

**Please follow Seoul's steps toward sustainable future.**

**Thank you.**

