Innovative Business Model for replication :

Green Big Bang Model

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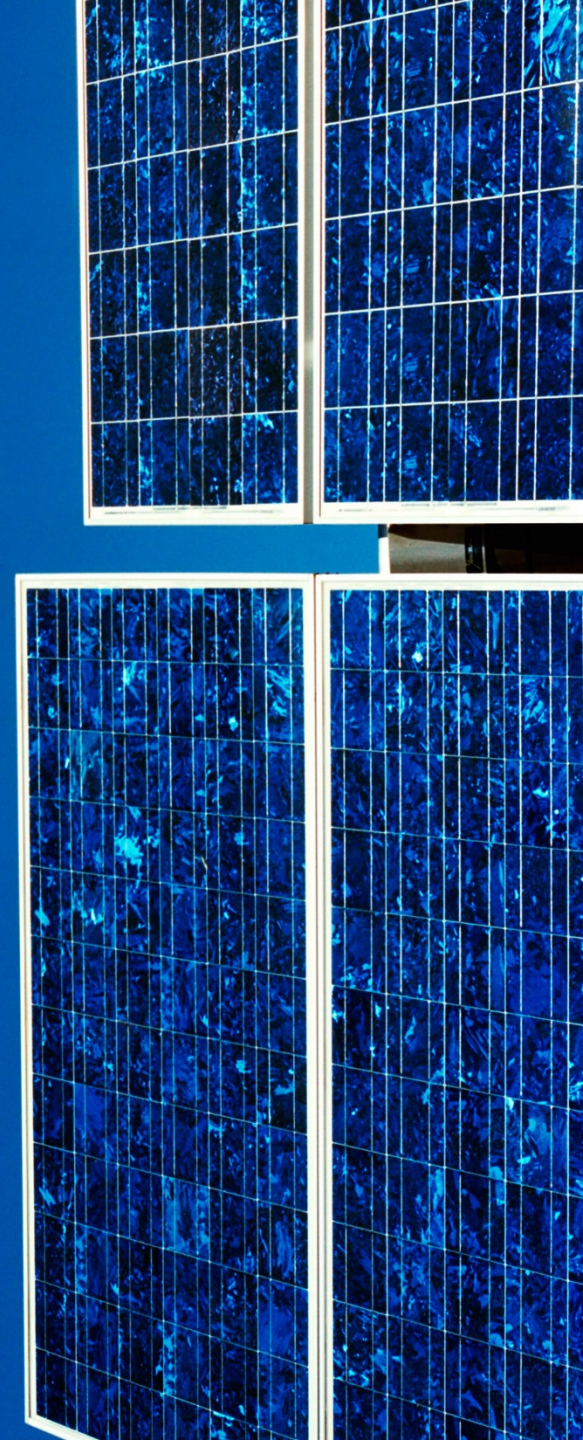
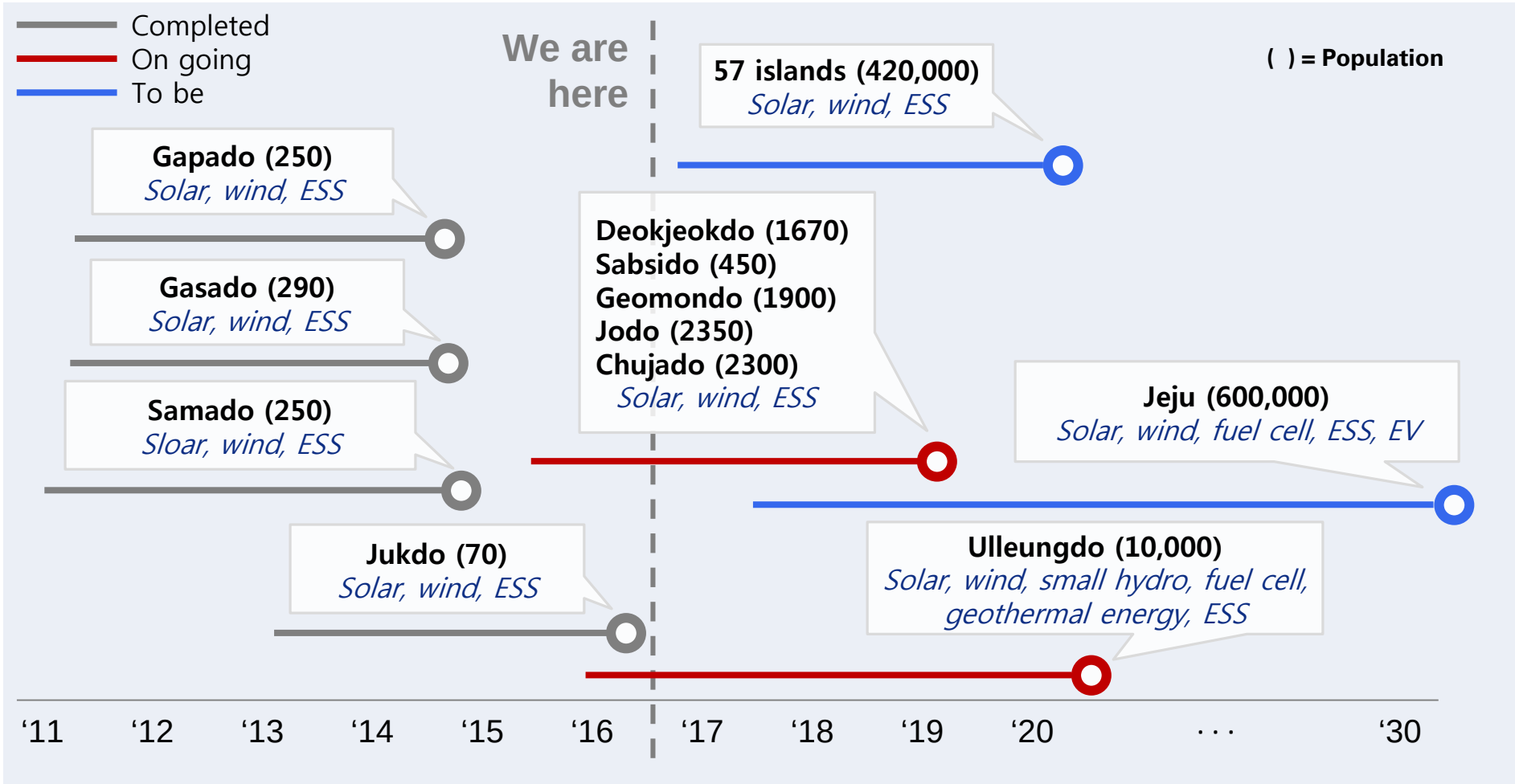
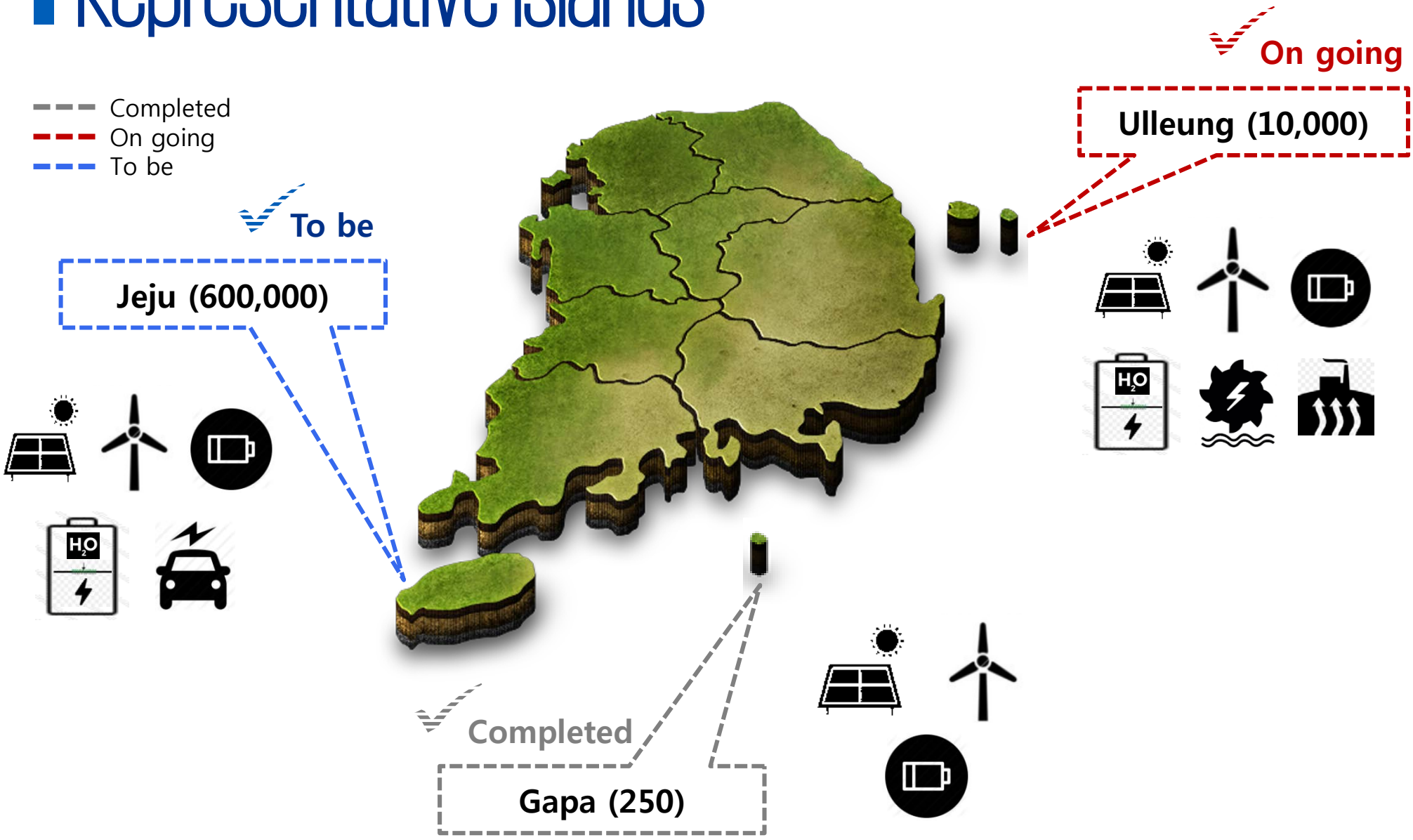


Energy self-sufficient island of Korea

More than half of the islands in Korea being converted into energy self-sufficient island by 2030 with private sector investment (4 + 6 + 58 since 2011)



Representative islands



From the experience of completed 4 islands,

we needed a better model

with greater universality
and potential for dissemination

Prerequisites for Dissemination

1. ***How to improve inter-operability of technology?***
2. ***How to acquire economic feasibility of technology?***
3. ***How to evoke support and participation from the residents?***

Green Big Bang

Achieving replication and dissemination of a economically viable model with technological convergence

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1. Ulleung island



Wind

Solar

Taeha renewable energy tour town



Geothermal energy


Small hydro power plant

Namyang diesel

Jeodong diesel


LED street lamp


EV car sharing


Electric fishing boat

Microgrid center

ESS

Jeodong eco-friendly energy town

Fuel cell


LNG storage facility

AS - IS
Power supply based on fossil fuel

- Pollutants from two diesel power plants, fishing boats and vehicles

Phase I
Renewable energy 30% by 2017

- a diesel shutdown by solar, wind, small hydro power plant with ICT(ESS+EMS)

Phase II
Zero diesel generation by 2021

- all diesel shutdown by geothermal, LNG power plant with premium island identity

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1-1. Ulleung Island

Private Investors to make South Korea's second largest island energy self-sufficient and carbon neutral

Ulleung Island 'Green Island Project'

- **Description** : To substitute *renewable energies with the ESS and EMS for Diesel power* by 2020
- **Renewable sources** : Solar, Wind, Small hydropower, Geothermal, Fuel-cell
- **Project cost** : USD 303 Million

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Clean energy + technology = resilient energy infrastructure

Scaling up the model

Learning from the successful Gasa Island initiative, South Korea is replicating the microgrid model and scaling it up on other islands.

One such initiative will make Ulleungdo, South Korea's second-largest island, energy independent and carbon neutral. The project, which will be launched in August, aims to provide energy from renewable resources: solar, wind, and small hydropower combined with the ESS and EMS by 2017, transitioning to geothermal energy and fuel cells by 2020. Led by the New Energy Industries Committee — which includes members from both public and private sectors — the project will raise funding through innovative project financing and a special purpose vehicle established by private investors.

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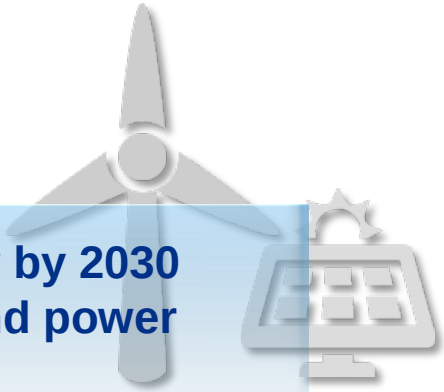
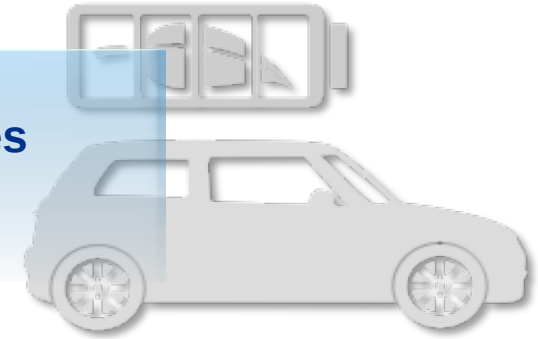
2. Jeju island

Carbon Free Island Vision to achieve zero carbon by 2030



Renewable energy

Jeju plans to hit 100% renewable energy by 2030 (Offshore wind power 2GW, onshore wind power 350MW, solar power 100MW)



Electric Vehicle

Replace 100% of cars with electric vehicles (approx. 371,000)

Smart-grid

Establishing Smart-grid cities in the entire area of Jeju

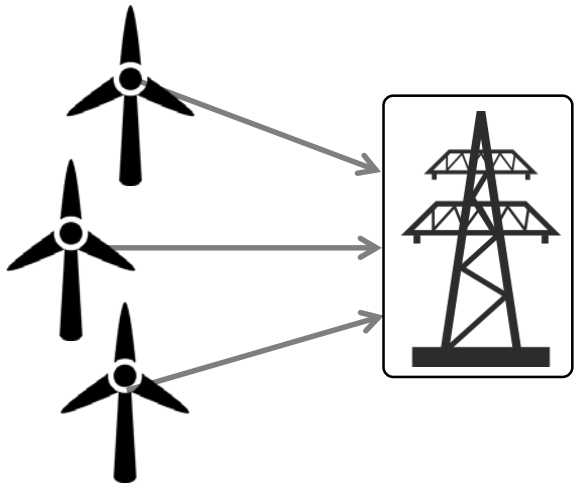
But still have challenges of

1	Renewable Energy	*"Low Dispatchability"*
2	Battery	*"Low Utilization rate"*
3	Electric Vehicle	*"High Price"*
4	Grid	*"High Peak Load"*

Big Bang Innovation I (Supply Side)

Green Big Bang Company provides an integrated ESS operation service to various power producers, and intermediates electricity transaction service

As is

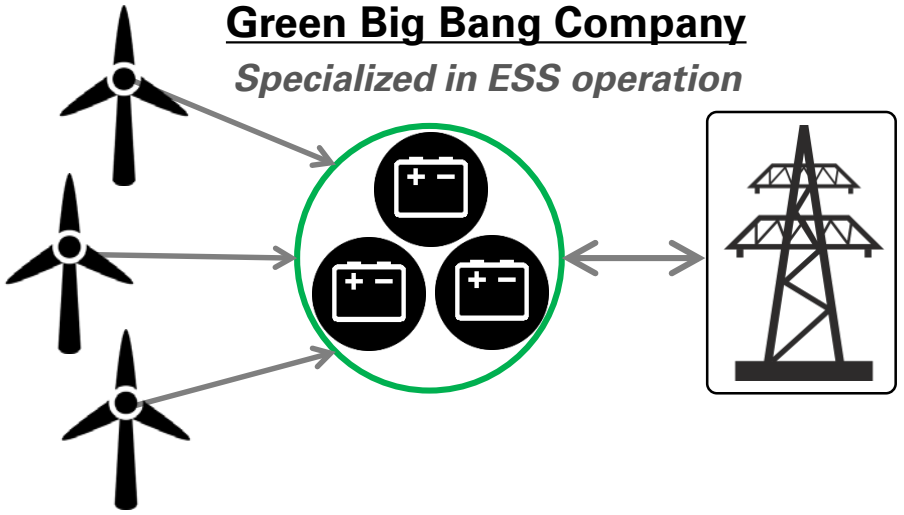


Power Producer – Limits in expanding renewable energy due to variability
Grid Operator – High cost of maintaining backup power

To be

Green Big Bang Company

Specialized in ESS operation



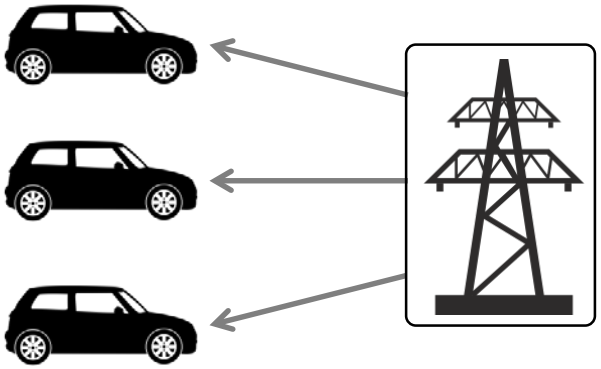
Power Producer – Cost savings in ESS installation
GB Company – Economies of scale
Grid Operator – Stability of electricity supply

Annual savings of US$ 140 million from avoided cost of back-up plant and grid construction in 2030

Big Bang Innovation II (Demand Side)

Green Big Bang Company uses the batteries leased to EV owners to provide electricity transaction service such as peak-shifting

As is

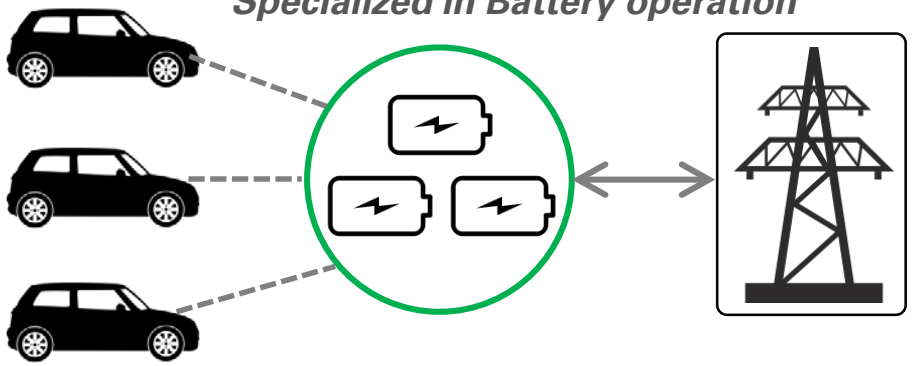


EV Owner – High price of EV, Low utilization of Battery

To be

Green Big Bang Company

Specialized in Battery operation



EV Owner – EV purchasing cost reduction through battery lease, Profit from electricity transaction

GB Company – Economies of scale

Grid Operator – Stability of electricity supply

Power Producer – Cost savings in Renewable Energy ESS

Secure up to 37% of daily electricity demand with 370,000 EVs

Annual cost savings of US$ 340 million from replacement of ESS in 2030

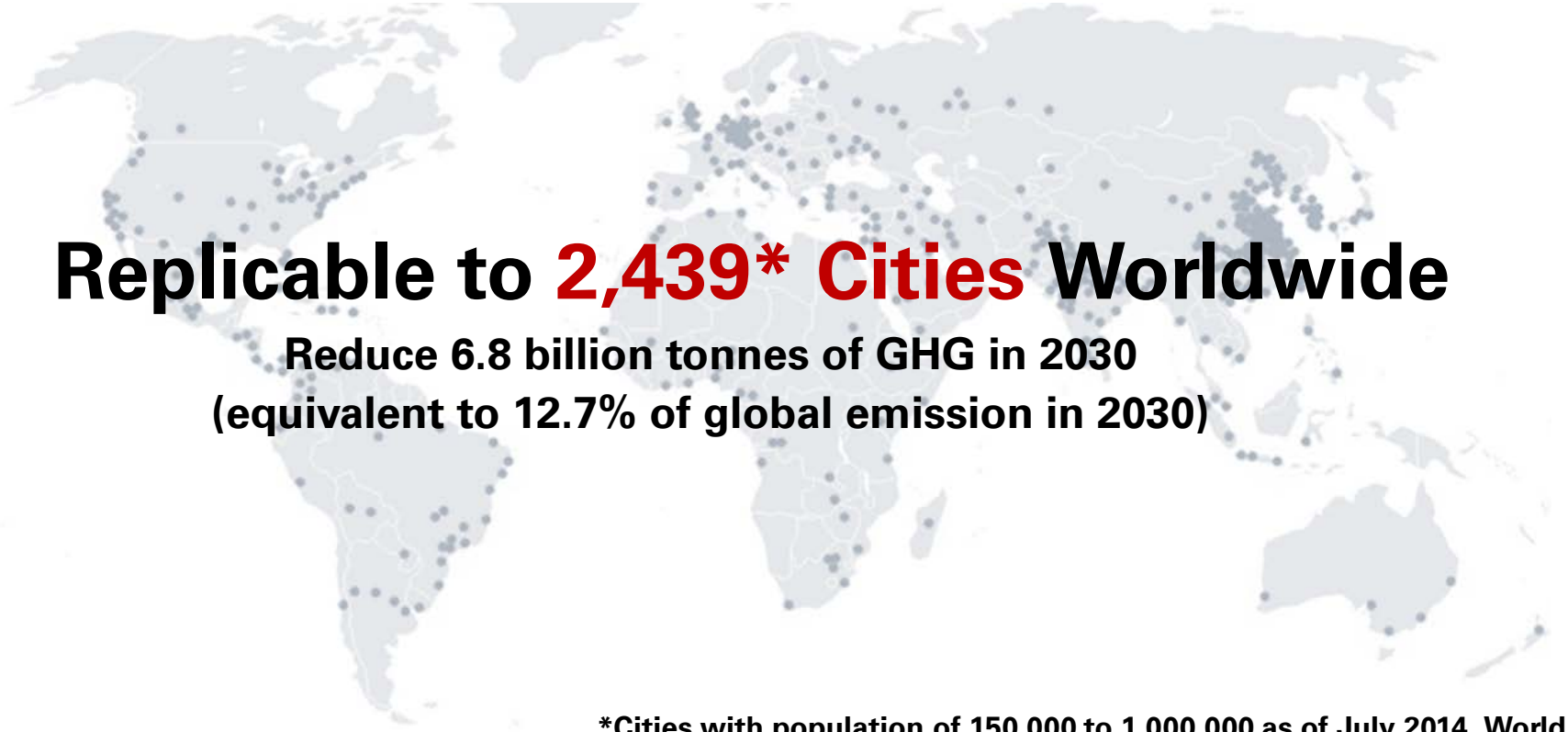
From Jeju to Globe

Jeju

Reduce >90% of 2030 emissions from power sector

Foster relevant companies, create >0.4 million jobs

Increase in the local residents' income as "Prosumers"



Replicable to 2,439* Cities Worldwide

Reduce 6.8 billion tonnes of GHG in 2030
(equivalent to 12.7% of global emission in 2030)

***Cities with population of 150,000 to 1,000,000 as of July 2014, World Atlas**

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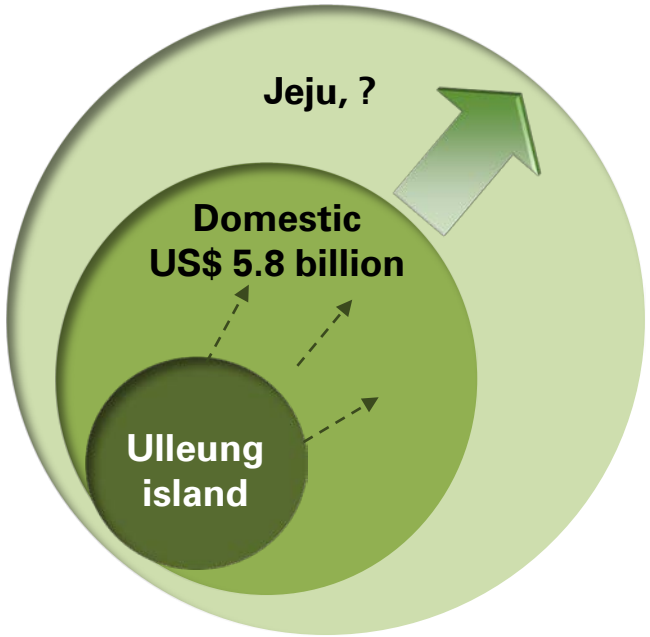
Economic Impact

Total Economic impact

US$ 5.8 billion



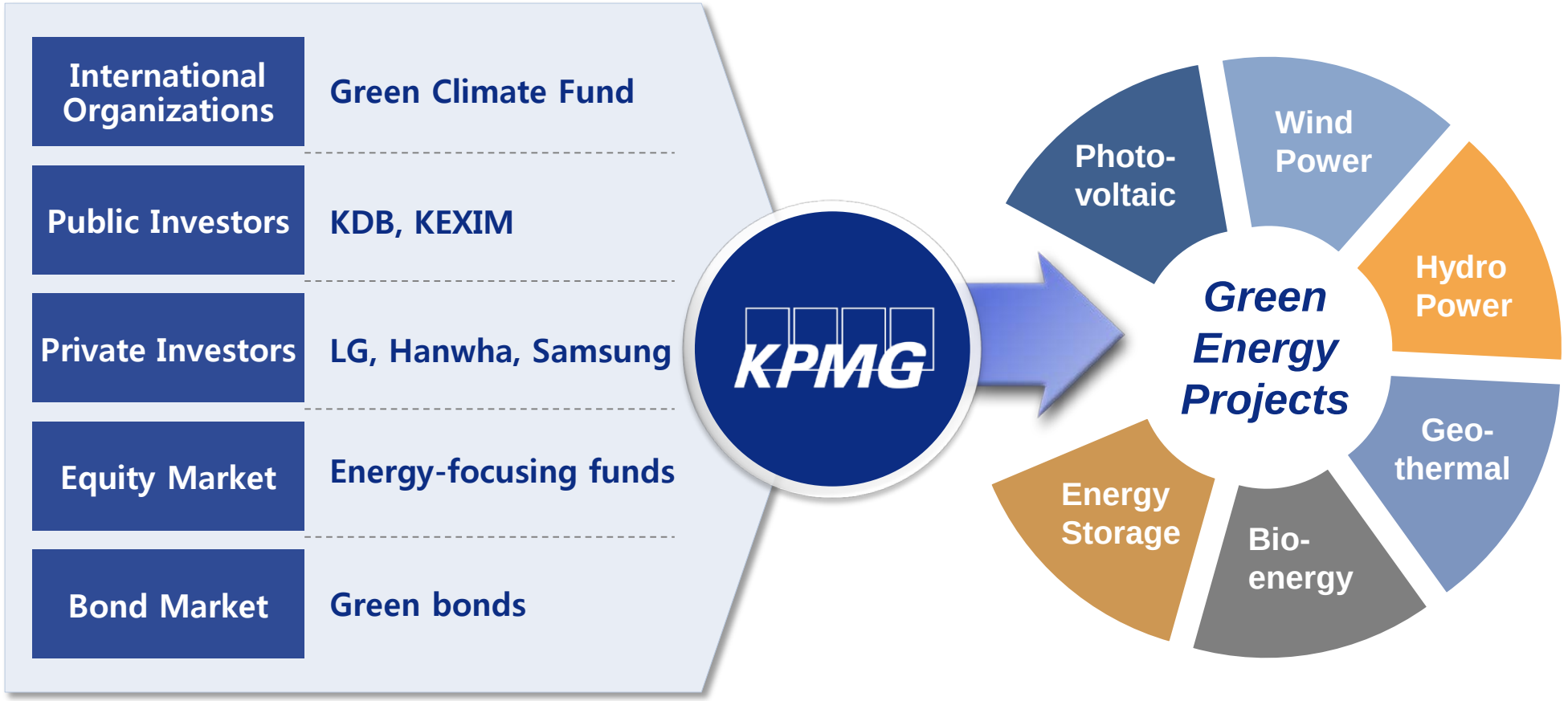
Scale of influence

Scope of influence

Benefit	Economic impact
• Avoiding cost of power outages • Decreasing investment on power infrastructure • Increasing renewable energy utilization ratio	**On power system operation** **(US$ 1.7 billion)**
• Job creation • Reduction of energy Consumption • Production Triggering • Creating added value • Reduction of CO2 emission	**On Clean energy investment** **(US$1.4 billion)**

Financing green energy projects

KPMG, with its global network and expertise in green business, can arrange financing for green energy projects worldwide



Green energy project funding cases

KPMG Funding Cases

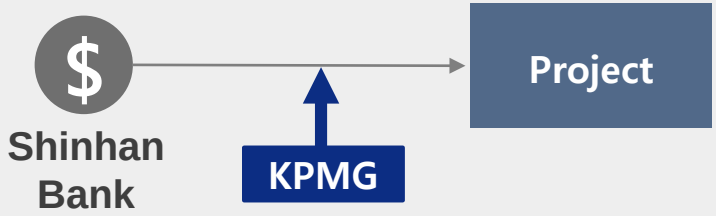
International Organization

- ***PV-ESS*** Project in Peru ($1.8M)
- Funded by ***Green Climate Fund***

Public Entity

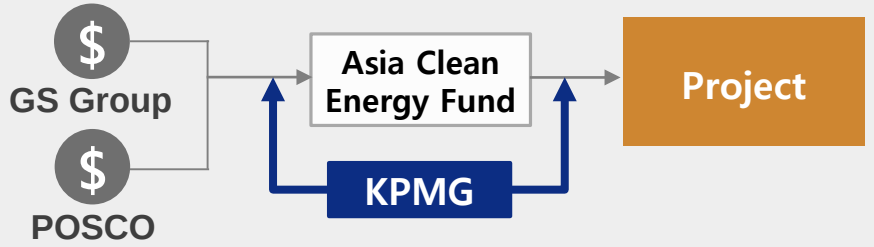
- ***Energy Efficiency*** Project in Vietnam ($399M)
- Funded by ***Korea International Cooperation Agency*** and others

Financial Institution



- ***Energy Independent Island*** Project in Korea (Ulleung Project, $303M)
- Funded by ***Shinhan Bank***

Private Corporations



- ***Hydro Power*** Project in the Philippines ($250M)
- Funded by ***GS Group*** and ***POSCO***

Thank you

KPMG

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