

The Core of The Energy Industry in Korea

Bitgaram Energy Valley





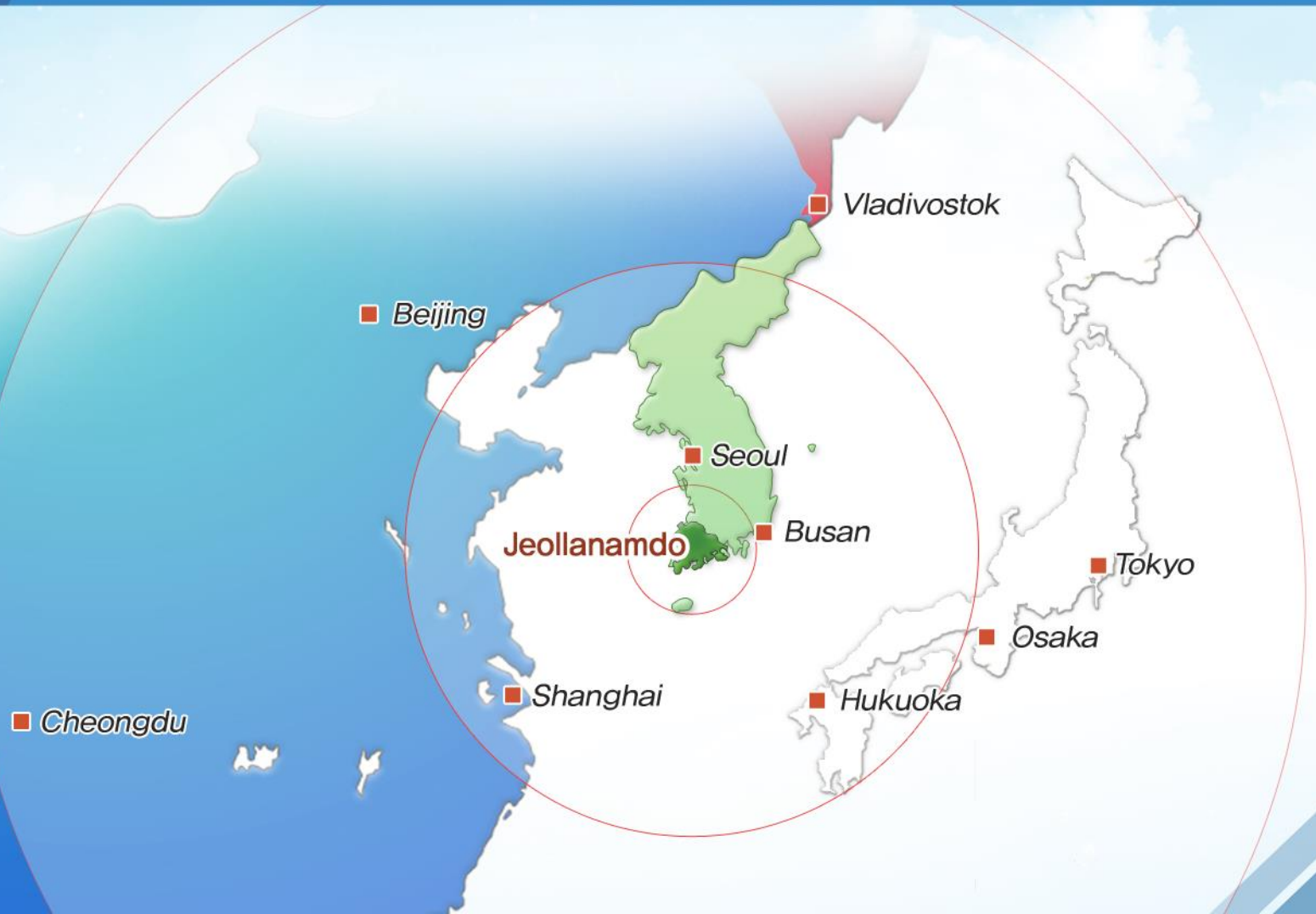
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- II. The Current State of Energy Industry and Development Plans
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I. Full of Life, Jeollanamdo

Introduction of Jeollanamdo



Introduction of Jeollanamdo



Population

1,930 thousand



Area

12,309km²



Administrative District

Cities : 5
Towns : 17

Introduction of Jeollanamdo

Gross Agricultural Output (2016)

US\$ 6.2 billion
(24% of the whole country)



*Source: National Statistical Office (NSO)

Gross Fisheries Output (2016)

US\$ 1.9 billion
(31.5% of the whole country)



*Source: National Statistical Office (NSO)

Tourists at Jeollanamdo (2016)

39.68 million people
(The 2nd of the whole)



*Source: Korea Culture & Tourism Institute

A Clear and Mild Climate

- 2,138 Sunshine hours every year
- Average temperature : 14°C
(*National average : 12.9°C)



The Main Industry of Jeollanamdo

The Amount of Production of The Main Industry in Jeollanamdo

*Source: National Statistical Office (2016)

Chemistry
(US\$ 80.4 billion)



Steel
(US\$ 22.3 billion)



Shipbuilding
(US\$ 6.3 billion)



The Main Industry of Jeollanamdo

Development of New Growth Power Industry in Jeollanamdo



Pushing ahead with enhanced industrial structure and business diversification to strengthen competitiveness!



II. The Current State of Energy Industry and Development Plans

The Change of Giant Market, Global Energy Industry

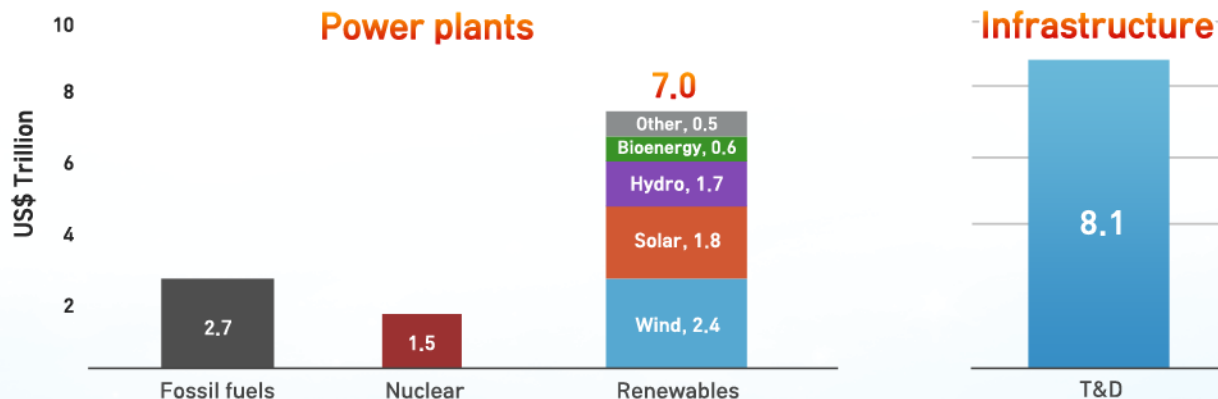
Cumulative Investment in The Power Sector by Region and Type in The New Policies Scenario, 2016–2040

	2016 – 2025						2026 – 2040						2016 – 2040
	Fossil fuels	Nuclear	Renewables	Total plant	T&D	Total	Fossil fuels	Nuclear	Renewables	Total plant	T&D	Total	Total
OECD	285	222	1,115	1,622	976	2,597	401	403	1,728	2,532	1,389	3,922	6,519
Non-OECD	863	307	1,429	2,599	2,014	4,612	1,135	485	2,805	4,426	3,681	8,106	12,719
World	1,148	529	2,544	4,220	2,989	7,210	1,536	888	4,534	6,958	5,070	12,028	19,238

US\$ Billion

*Source : IEA, World Energy Outlook(2016)

Global Cumulative Investment in The Power Sector by Type in The New Policies Scenario, 2016–2040



*Source : IEA, World Energy Outlook(2016)

The Current State of Energy Industry in Korea and The Plan for Development

Energy Landscape and Policies in Korea

“**Will develop the new energy industry into Korea’s next growth driver**”

– Keynote address by President of the Republic of Korea at the 21th UN Framework Convention on Climate Change (30 Nov 2015) –

Energy Policies of Korea (2016–2030)

Vision **The world’s 1st** Nation in Energy Solution System

Goal Creating US\$ 100 billion growth engine with 500,000 new jobs
Reducing greenhouse gas emission by 55 million metric tons

Roadmap for Energy Industry in Jeollanamdo (2016 – 2025)

Public and private investments of US\$ 16.5 billion

Energy Industry Promotion	Bitgaram Energy Valley Completed	Renewable Energy Projects for Regularization
<ul style="list-style-type: none">• 50 Energy Independent Islands• EV Industry• Energy City	<ul style="list-style-type: none">• Industrial Land of 3.3 Million m²• Skilled Labor of 6,700 Individuals	<ul style="list-style-type: none">• Renewable Energy Self-sufficiency Rate 4%→30% by 2025

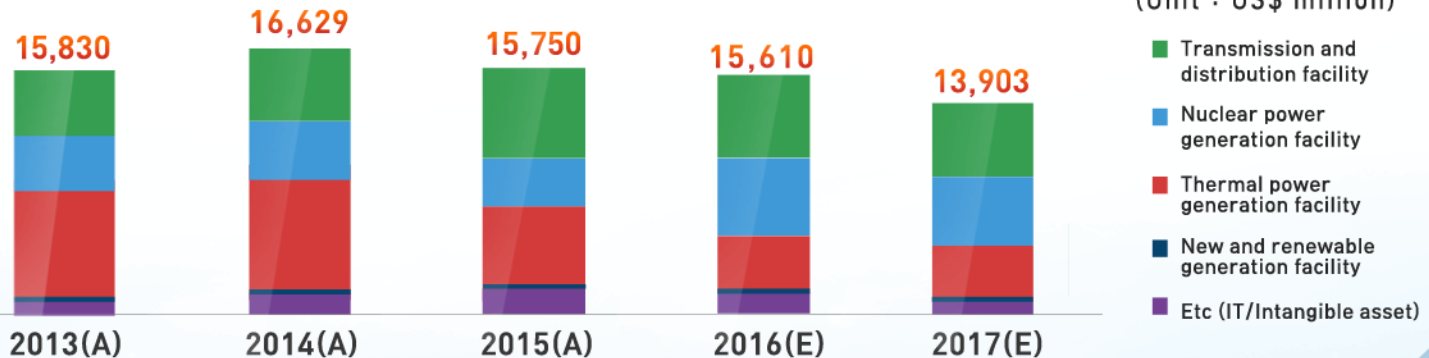
The Current State of Energy Industry in Korea and The Plan for Development

The Tendency of Supply and Demand in Domestic Electricity Industry

Division	'16		Outlook of '17	
	Amount	Rate of Percentage(%)	Amount	Rate of Percentage(%)
Production(US\$ million)	39,066	- 2.8	40,101	2.7
Export(US\$ million)	13,089	- 6.7	13,861	5.9
Import(US\$ million)	10,786	- 5.9	11,109	3.0
Trade balance(US\$ million)	2,303		2,752	

*Source : KOREA Electricity Industry Association

Facility Investment Plan of Energy Industry



*Source : KOREA Electricity Industry Association



III. Bitgaram Energy Valley

Introduction of Bitgaram Energy Valley

Bitgaram Energy Valley(BEV)

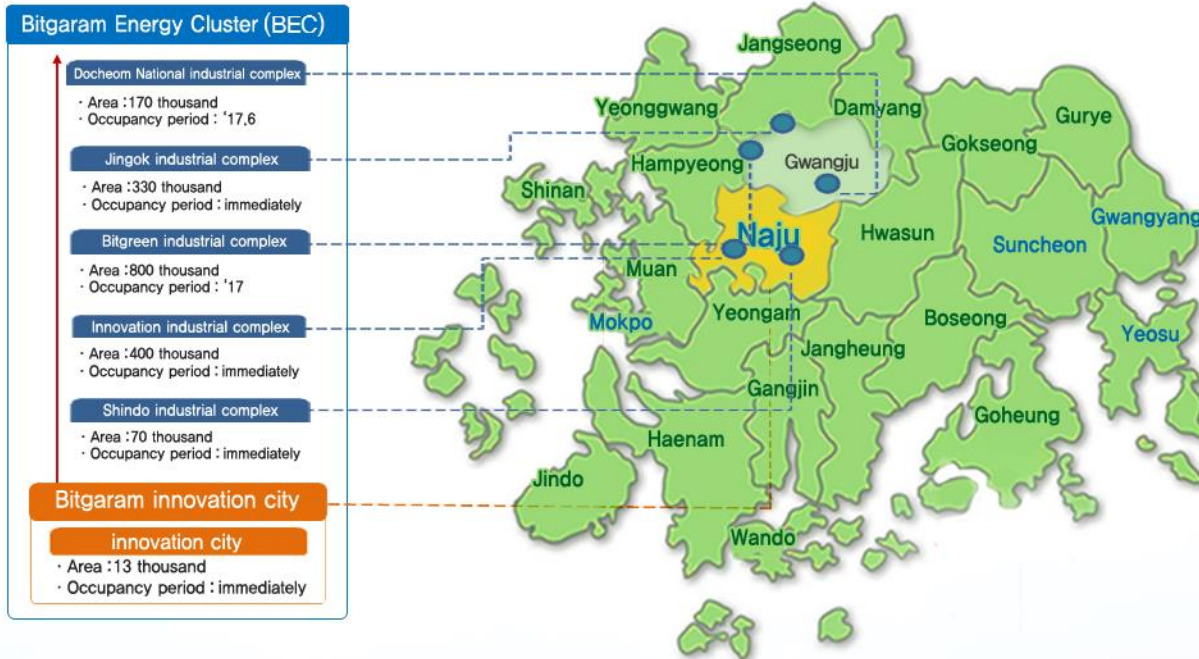
Constructs **Smart Energy Hub** creating future values by making industrial ecosystem concentrated on power, new energy industry, new and renewable energy, ICT convergence industry around the **Bitgaram Innovation City**



Introduction of Bitgaram Energy Valley

Bitgaram Energy Valley(BEV)

Constructs **Smart Energy Hub** creating future values by making industrial ecosystem concentrated on power, new energy industry, new and renewable energy, ICT convergence industry around the **Bitgaram Innovation City**



Introduction of Bitgaram Energy Valley

The Vision and Strategy of Bitgaram Energy Valley

Glocal Energy Hub Creating Future Value

Attraction of the energy business leading technology & mutual growth

- Building environment to attract business
- Intensive transfer of related companies
- Building energy industrial ecosystem
- Improvement of regulation related to investment

Expansion of R&D cooperation & training for high skilled manpower

- Building R&D infrastructure
- Development of convergence R&D task
- Strengthening foundation of training talented individuals
- Training highskilled manpower in energy

Promotion a growth engines industry with specialized company

- Building Test-bed
- Provision of track record

Reinforcement communications of communities & promotion coliving developments

- Social contributions for shared values
- Reinforcement of the communication with communities
- Building coliving developmental system by the activation of local economy

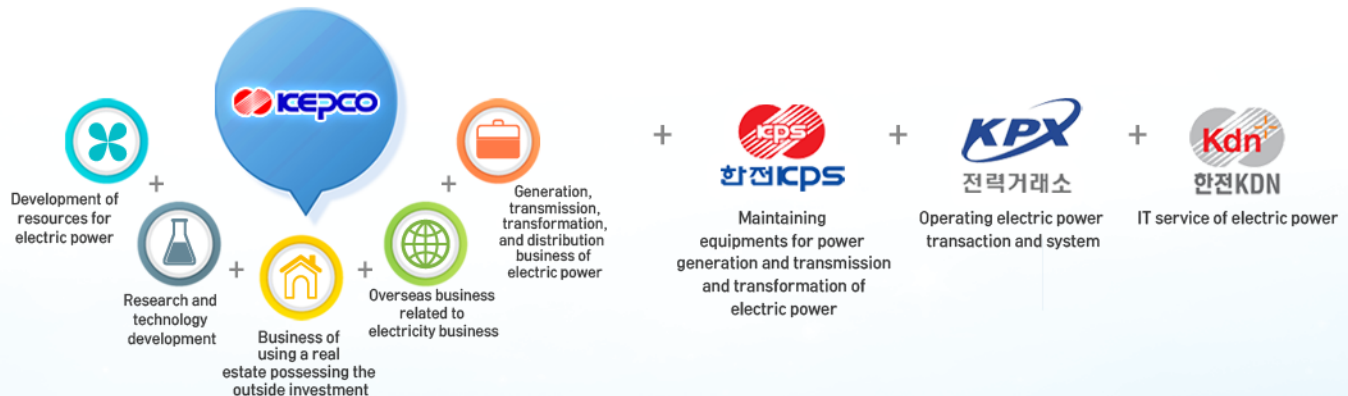
KEPCO, A Leading Bitgaram Energy Valley Company

Introduction of KEPCO

Forbes No.1 of Global Electric Business by Forbes - 2016.

- Year of establishment : 1898
- The number of employees : 20,603
- A subsidiary company
 - 13 companies including Korea, Hydro&Nuclear Power and Korea South-East Power
- Overseas branch
 - 7 branches including Beijing and New York

- Sales : US\$ 60.2 billion
- Operating profit : US\$ 12.2 billion
- Total amount of market price
 - US\$ 28.3 billion(KOSPI No.4)
 - *1st Samsung(US\$ 254 billion), 2rd SK hynix (US\$ 32.5 billion), 3rd Hyundai(US\$ 32.3 billion)



Main Technical Development Field of Bitgaram Energy Valley

New Technology

- ESS(Energy Storage System) : Energy Storage System
- EV(Electric Vehicle) : Electric Vehicle, Charging infrastructure
- Micro-Grid : Product of electronic power in small areas ↔ consumption system
- New and renewable energy : Wind Power(on land or at sea), solar energy(advancement of technology)
- HVDC(High Voltage Direct Current) : High Voltage Direct Current

Advancement of Technology

- Transformer of power transmission and distribution : Ecofriendly, high efficiency, transformer of self diagnosis system
- Switch blocking device : Ecofriendly, High speed, highcapacity switch, blocking device
- Superconducting wire with highcapacity and low loss, cable, insulator

ICT Technology

- Intelligent ICT electricity system : A construction of electrical grid and optimization of operating systems
- ICT infrastructure and safety : Self Communications network and management technology of communications network
- Diagnosis of utility based ICT and additional service : A diagnosis of power utility and operating skills

DR/EE Technology

- DR(Demand Response) : Energy Management system, automatic demand response system, the largest management system for electric power
- EE(Energy Efficiency) : High efficiency inverter, premium motor, highefficiency refrigerator

KEPCO's Promotion for Energy Growth Engines Industry

Bitgaram Energy Valley Investment Plan (2016 – 2020)

Total **31 businesses, investment US\$ 10 billion** (2017 : US\$ 28 billion)

(Unit : US\$ million)

Division	Business Contents	Business Expenses by Year('16~'20)					
		'16	'17	'18	'19	'20	Total
New energy industry	13 businesses including ESS for F/R, EV charge, new generation, etc	3,833.8	2,190.9	333.2	274.8	268.9	6,901.6
Transmission and transformation of electric power	5 businesses including HVDC superconduction, etc	294.4	290.9	129.9	195.9	153.5	1,064.6
Electric power distribution	7 businesses including DC electric power distribution, facility management for IoT utility	332.2	155.1	183.9	195.6	227.5	1,094.3
I C T	3 businesses including big data utility and smart office, etc	11.1	23.0	35.1	32.3	32.2	133.7
R&D	3 businesses energy including prosumer technology, etc	102.4	162.2	229.1	239.1	217.9	950.7
Total		4,573.9	2,822.1	911.2	937.7	900.0	10,144.9

KEPCO's Promotion for Energy Growth Engines Industry

Expansion of Verification Business to Secure Track Record

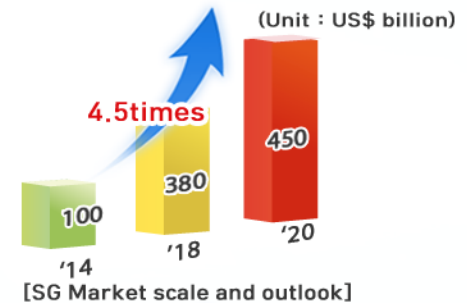
MG(Micro-Grid) Field

- Technical development and verification of island area micro grid(Gasa Island etc)
- Construction of smart energy campus



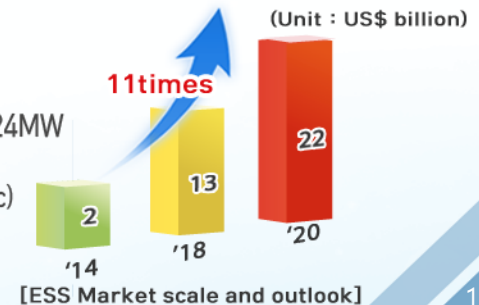
SG(Smart-Grid) Field

- Pilot project of smart home service based on SG
- Construction and connection of SG office stations for an energy public institution (KEPCO, KPX, KDN etc)



ESS(Energy Storage System) Field

- Continuous expansion of Ess business for frequency matching (nation) 184MW, (local) 24MW
- Introduction of ESS to Island areas on Diesel development (Pyeong · Sonjook Island etc)

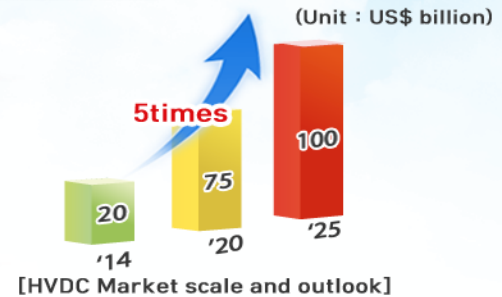


KEPCO's Promotion for Energy Growth Engines Industry

Expansion of Verification Business to Secure Track Record

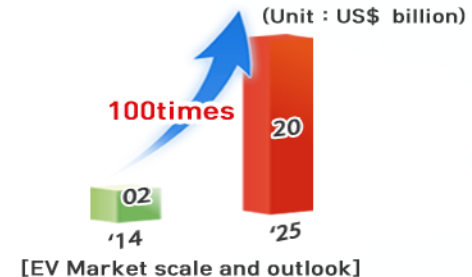
HVDC/LVDC

- Promotion of direct current distribution network development (Shinan Hataedo Island 46 households, load 80kw)
- *Localization with coresearch on HVDC technology development



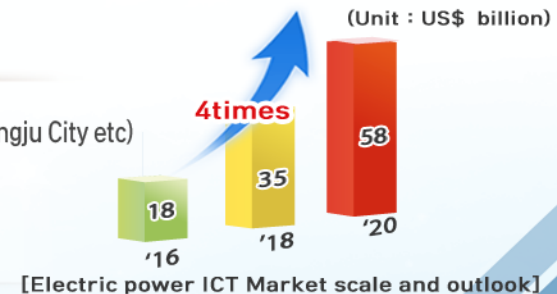
EV(Electric Vehicle)

- Starnetwork construction of electric vehicle charge
 - 345 in 122 branches of the nation, 73 in 15 branches of locals
- Testbed construction for V2G (lifting peak in case of emergency) verification (GIST, Seoul National Univ)



IoT(Internet of Things) / Big Data

- Selfdiagnosis by smart sensor to monitor power equipments (Daegu · Gwangju City etc)
- Business Cooperation on social security network service for the elderly living alone or dementia with AMI network usage



Introduction of Bitgaram Energy Valley Industrial Complex

The Status of Industrial Complex Around Innovational City



Name	Area	Sale Price
Naju Innovation	1,785 thou. m ²	US\$ 190/m ²
Naju Sindo	227 thou. m ²	US\$ 245/m ²
Yeonggwang Daema	1,652 thou. m ²	US\$ 119/m ²
Mokpo Daeyang	1,551 thou. m ²	US\$ 267/m ²
Eastern Hampyeong	738 thou. m ²	US\$ 112/m ²
Damyang	583 thou. m ²	US\$ 150 /m ²
Gangjin Environment	657 thou. m ²	US\$ 94/m ²
Hampyeong Bitgreen	4,060 thou. m ²	Unsettled

Introduction of Bitgaram Energy Valley Industrial Complex

Naju Innovation Industrial Complex

Advanced base of industrial development, covers co innovation cities of Gwangju and Jeollanamdo



- **Location** : Wanggok–myeon (Deoksan–ri, Jangsan–ri, Yangsan–ri) and Dongsudong, Naju, Jeollanamdo
- **Area** : 1,785 thousand m² ■ **Sales price** : US\$ 190/m²
- **Categories of businesses** : Electricity materials, electronic components, machine and equipments etc

Introduction of Bitgaram Energy Valley Industrial Complex

Yeonggwang Daema Industrial Complex

Yeonggwang industrial complex of electric vehicle is taking a leap to specialized area of environment friendly electric vehicles This complex reduces greenhouse gas and makes a cluster producing environment friendly vehicles

Yeonggwang Daema Industrial Complex



- **Location** : Namsan-ri and Songjuk-ri, Daema-myeon, Yeonggwang, Jeollanamdo
- **Area** : 1,652 thousand m² ■ **Sales price** : US\$ 119/m²
- **Categories** : Electricity materials, machines, electronic component etc

Introduction of Bitgaram Energy Valley Industrial Complex

Mokpo Daeyang Industrial Complex

Mokpo Daeyang industrial complex suburban industrial complex to intensively foster new growth electric power promoted



- **Location** : Daeyeang-dong, Mokpo, Jeollanamdo
- **Area** : 1,551 thousand m² ■ **Sales price** : US\$ 267/m²
- **Categories of businesses** : Electronic materials, ceramic, solar energy, vehicle manufacturing

Bitgaram Energy Valley – Investment Attraction Achievement

Achievement

Attraction of **200 Businesses**

Sector	New Energy Industry	Electric Equipment	Etc.	Total
No.	155	42	3	200

Business Type	Foreign	Large	Midsize	Small	Total
No.	6	7	3	184	200

Investment attraction worth of
US\$ 815 million with 5,658 new jobs



ABB

ALPS



esri



HYOSUNG

LS 산전



LG CNS

117 businesses realized the investments.

(60% of the total contracts)

Purchase of Industrial Site: 29 businesses

Start of Construction: 26 businesses

Occupancy: 62 businesses



VI. Business Support and Investment Incentives

KEPCO's Program for Business Support – R&D Support

R&D Support of KEPCO by Institutions Related Energy and Research Institute

Energy Valley R&D Center

Naju ('16~'20)

- Business expense : US\$ 100 million
- Fostering new energy industry, research, general center of verification

Energy Valley Research Development Institute

Naju Innovation City ('15~'17)

- Business expense : US\$ 23.5 million
- Support center of small business R&D, educational facility, test for material and equipment

KEPCO KPS R&D Complex

Naju ('13~'17)

- Business expense : US\$ 59.8 million
- Developmental facility and oceanic plant R&D, research and educational facility

Korea testing institute for electric and electronic machine

Gokseong ('16~'19)

- Business expense : US\$ 38 million (33,000m²)
- A performance test of industrial hightension direct current device



KEPCO's Program for Business Support – R&D Support

"Energy Valley Research Center" R&D Cooperation

- **R&D co development** by Industry–University–Institute Collaboration
 - Investment around **US\$ 10 million** (national R&D US\$ 23 million)
 - ('16) 92 proposal → **Selected 18** proposal main research task
- **R&D task contest** specialized energy valley and development
 - Period : Twice/yr(every January, July)
 - Category : Energy New Industry, convergence technology, electricity new technology

Start-Up and System of Research Institute Business



Business Support Programs by KEPCO / Financing

New Energy Industry Promotion Fund

- **US\$ 2 billion**
- Investment Areas
 - Electric Technical Developments: substation ICT, IoT, energy efficiency, CCS, etc
 - New Industry Promotion: EVs, ESS, MG/SG, energy control system, etc.
 - Large Power Projects: solar/wind power stations, power grid export, etc.

Business Loan for SMEs

- **US\$ 200 million**
- **The Bank of Korea Base Rate**
 - + 0.95% + Interest Rate Reduction up to 1.3%
- **US\$ 75 million loans for 63 businesses completed**

SME Promotion Fund

- **US\$ 80 million**
- Funding Types
 - New Energy Industry Fund (US\$ 50 million)
 - Energy Valley Fund (US\$ 25 million)
 - Bitgaram Fund (US\$ 13 million)

KEPCO's Program for Business Support

- Training Talented Individuals

Business Support Programs by KEPCO / Training

■ Employment Support Program [600people/2yrs]



■ Finance Support by KEPCO and the Government

	Training Course - 2 months	Internship Course - 3 months
Selection Cost	· US\$ 500 a month (US\$ 1,000 bonus after course completion)	· US\$ 1,320 a month
Course Expenditure	All-expense-funded	

New Energy Industry Training Program

Specialized Training Course

- For junior and senior university students
- 16 weeks
- New energy technologies

OJT Course

- For vocational school students
- 40 hours
- On-the-job training in new energy industry

PRIME Course

- For students from Dongshin Univ. and Honam Univ.
- Recruiting students from 2017
- Establishment of new colleges for energy ICT convergence

Plan for Special R&D Region Designation of Bitgaram Energy Valley

Special R&D Region Outline

- **Target region** : Bitgaram Innovation City, Naju Industrial Complex, Dongshin Univ
Designated area : 3.2km²
- **Specialized field** : Energy & ICT convergence industry(superconductor)
- **Benefits for occupied companies**
 - Tax reduction
 - National Tax** Corporate tax, income tax 100 for 3yrs, hereafter 50% for 2yrs
 - Local Tax** Acquisition tax free, property tax 100% for 7yrs, hereafter 50% for 3yrs
 - **Funding** : More than US\$ 10 million for promoting technical commercialization



Bitgaram Innovation City

FTA Platform Application

The Current State of Republic of Korea's FTA

- FTA with 52 countries around the world
 - : **The 3rd in the world**
 - 73.4% of GDP total amount all over the world (US\$ 40.3 trillion)
 - * The world's 1st : Chile, The worlds' 2nd : Peru
- FTA with the U.S, the EU and China
 - : **The world's 2nd, Asia's 1st**
 - * The world's 1st : Chile (source: Ministry of Trade)

Major Customs Tariff of Korea&China FTA Energy Field

Name of Item	Current Tax Rate(%)	Types of Concession*
Generator	10	15
Aerogenerator	8	15
Inverter	10	15
Uninterruptable Power Supply	10	15

* Types of concession: Tariff elimination by tariff reduction at a constant rate for 15 yrs



Investment Incentives

Tax Reductions

Foreign Investment Zone

- Requirements : 30% or more foreigner investment ratio, US\$ 30 million or more investment in manufacturing, US\$ 2 million or more investment in R&D facility
- Tax reductions
 - Corporate · Income Taxes : full exemption for the first 5 years and 50% for the next 2 years
 - Acquisition · Property Taxes : full exemption for the first 15 years
 - Tariff, Individual Consumption Tax, VAT : full exemption for the first 5 years

New Growth Industry

- Requirements : 30% or more foreigner investment ratio, US\$ 2 million or more investment
- Tax reduction
 - Corporate · Income Taxes : full exemption for the first 5 years and 50% for the next 2 years
 - Acquisition · Property Taxes : full exemption for the first 15 years
 - Tariff, Individual Consumption Tax, VAT : full exemption for the first 5 years

Special Economic Zone for SMEs

- Requirement : Setting up a business in the designated zones*
*Naju Innovation Industrial Complex, Naju General Industrial Complex, Jangheung Bio Food Industrial Complex, Gangjin Environment Industrial Complex
- Tax reduction: Corporate or Income Tax: 50% reduction for the first 4 years



Investment Incentives

Subsidies

Subsidy for New Growth Industry

- **Requirements** : 30% or more foreigner investment ratio
US\$ 2 million or more investment
- 5-10% of the total FDI inflow, for infrastructure or construction spending

Provincial Subsidies

- **Requirement of subsidy** : 30% or more foreigner investment ratio
No minimum investment requirement
- **Subsidy Types**
 - Land Subsidy : up to US\$ 400,000 within 30% of the total land value
 - Facility Subsidy : up to US\$ 500,000 within 5% of the total investment of more than US\$ 2 million
 - Employment Subsidy : up to US\$ 600 monthly for each new hire from the 11th employee within a 12-month period
 - To qualify : A company should have more than 10 full-time employees.
 - Training Subsidy : up to US\$ 600 monthly for each new hire from the 11th employee within a 12-month period
 - To qualify : A company should have more than 10 full-time employees.

Special Subsidy

- **Requirement** : US\$ 50 million investment or full-time employment more than 100 individuals



V. The Investment Proposal

Business Model Proposal

The Growth of Business Values and The Generation of Revenue



Advanced Technology and Global Business Network



- Working with KEPCO on a joint project
- The development of technology and the training program for professional manpower
- Synergy creation by an integration of related businesses
- An advanced industrial complex



JeollaNamdo

- Expansion to Chinese market by using FTA
- Customs benefits
- Tax reductions and subsidy incentives
- Pleasant settlement conditions



- Jeollanamdo Provincial Government
- www.jeonnam.go.kr

Jeollanamdo Provincial Government

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