Energy Conservation Policies in KOREA

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1. Energy Consumption and Facts

Overview of Energy Consumption in ROK(I)

- Primary Energy Consumption Grown at 6.4%/year in 1981~2007
  - From 46 Million TOE in 1981 to 24.3 Million TOE in 2006
  - Higher Energy Consumption Growth Rate Realized than GDP Growth rate in 1990~1997 due to Rapid Growth of Energy Intensive Industries
  - Lowered Energy Consumption Growth to 30%/year Compared to 4.3%/year GDP Growth in 1997~2007
- Decrease in Energy Consumption Per GDP Unit(TOE/1,000 US$)
  - From 0.35 in 1981 through 0.39 in 1997 to 0.34 in 2007
- Increase in Per Capita Energy Consumption
  - 5.4%/year Growth of Per Capita Energy Consumption from 1.18 TOE in 1981 to 4.86 toe in 2007

Energy Consumption in ROK(II)

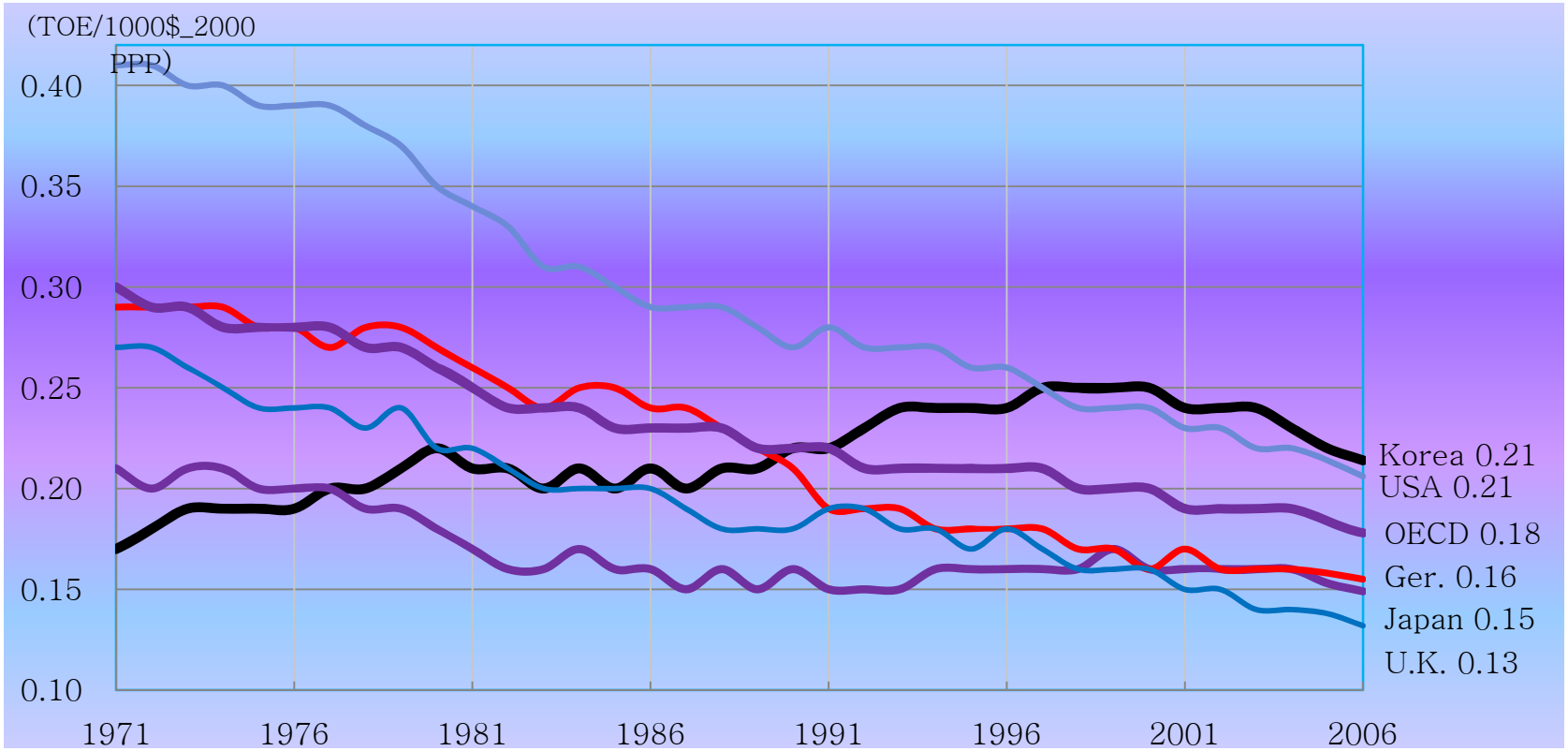
- Large Share of Oil and Coal in Energy Consumption('07)
  - Oil(44.6%) , Coal(25.3%), Nuclear Power(13.0%) and LNG(14.7%)
  - Rapid Growth in LNG(15.4%/year in 1990~2007) and Nuclear Power and Decrease in the Share of Oil
  - 5.4%/ year Growth in 1981~2007 of Coal Mainly due to Increase Use for Power Generation

- Slowed Growth of Final Energy Consumption at 2.3%/year in 1997~2007
  - Mainly due to Lowered GDP Growth Rate, Increasing Share of Less Energy Intensive Industries, Improvement of Energy Efficiency
  - Slowed Energy Consumption in All Sectors since 1997
  - Fastest Growth of Energy Consumption in Transportation Sector at 8.9%/year in 1981~2007

Energy Facts of ROK

- Heavy Dependency of Energy on Foreign Sources
  - 97% of Energy Imported
  - Vulnerable to the Oil Price Fluctuation and Middle East Political Crisis
- Energy Sector as a Major Source of GHGs Emission
  - More than 85% of GHGs emitted from Fossil Fuel Combustion
  - High Pressure for Active Involvement of International GHG's Emission Reduction Efforts
- Energy Intensive Industries as the Major Sources of Economic Growth for the last 30 years
  - Steel, Refinery & Petro-Chemical, and Cement Industries

Energy Efficiency is below OECD Average



- Manufacturing and Energy-Intensive. Ind.(Petro,-Chem. Steel, Non-Metallic)

	Korea	Japan	Germany	USA
▪ Share of Manufac. in GDP(%)	27.8	21.3	22.5	12.9
▪ Share of Energy-Inten. in Manufac.(%)	31.6	15.9	22.3	27.4
▪ Share of Energy-Inten in GDP (%)	8.8	3.4	5.0	3.5

Energy Efficiencies in Comparison

Toe/output at the upper level of efficiency in the World

- crude steel : Korea(105), Japan(100), USA(120), EU(110)
- Soda(Chemical) : Korea(100), Japan(100), USA10), EU(119)
  - ➢ Cement: Korea(131), Japan(100), USA(177), EU(130)

Per Capita Consumption in Transportation, Household/Commercial Sector

Per Capita Energy Consumption in 2006					
	Primary Con. (TOE/person)	Final Energy Consumption(TOE/Person)			
		Total	Industry	Transport.	House./Comm
U.K.	3.82	2.62	0.69	0.93	1.01
Japan	4.13	2.75	1.09	0.72	0.94
Germany	4.23	3.08	0.99	0.77	1.31
Korea	4.48	3.00	1.48	0.68	0.84
OECD Ave.	4.70	3.25	1.06	1.11	1.08
USA	7.74	5.24	1.47	2.16	1.61

2. Energy Conservation Plans

Basis of 1st National Basic Energy Plan (2008~2030)

- "Low Carbon, Green Growth" as the National Agenda
  - Presented by President of ROK on August 15, 2008
  - Green Technology and Clean Energy Promoted

- Three Pillars of National Energy Plan
  - Enhancement of Energy Security
  - Improve Energy Efficiency
  - Implement Environment Friendly Energy Policy

⇨ *Transformation to the Low Energy Consuming Society*

Principles and Goals of Efficiency Policy

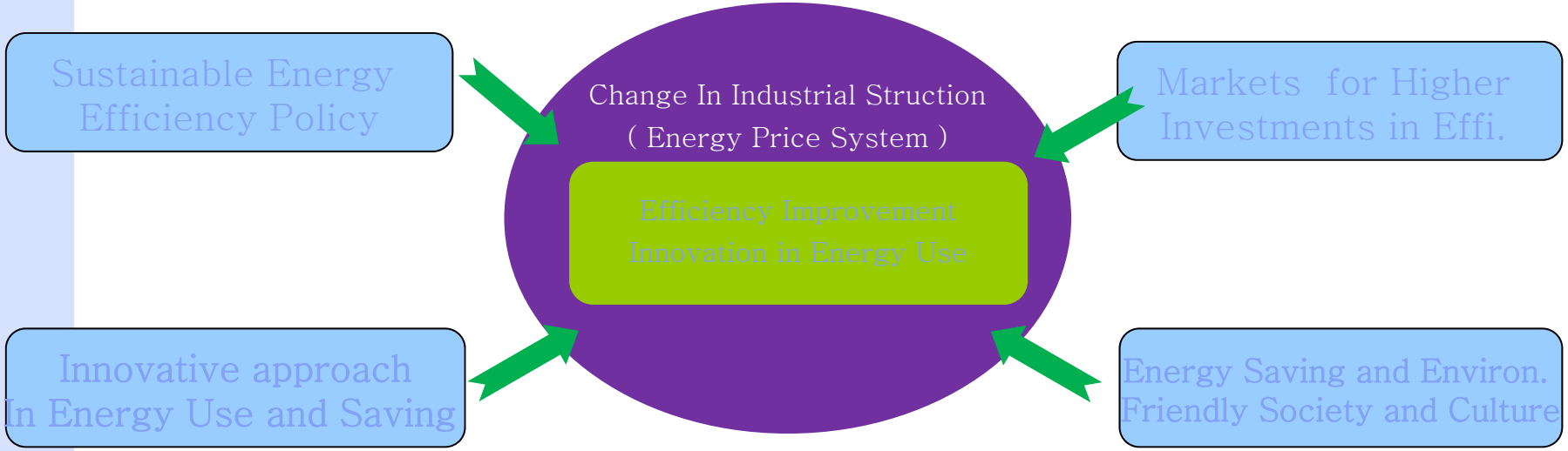
◆ For the sustainable development in High Oil Price and Climate Change

Transition to Low Energy Consuming Societal Economic Structure

◆ To improve Efficiency by 47% by

Top Class Country in Energy Efficiency (2.6%/yr)

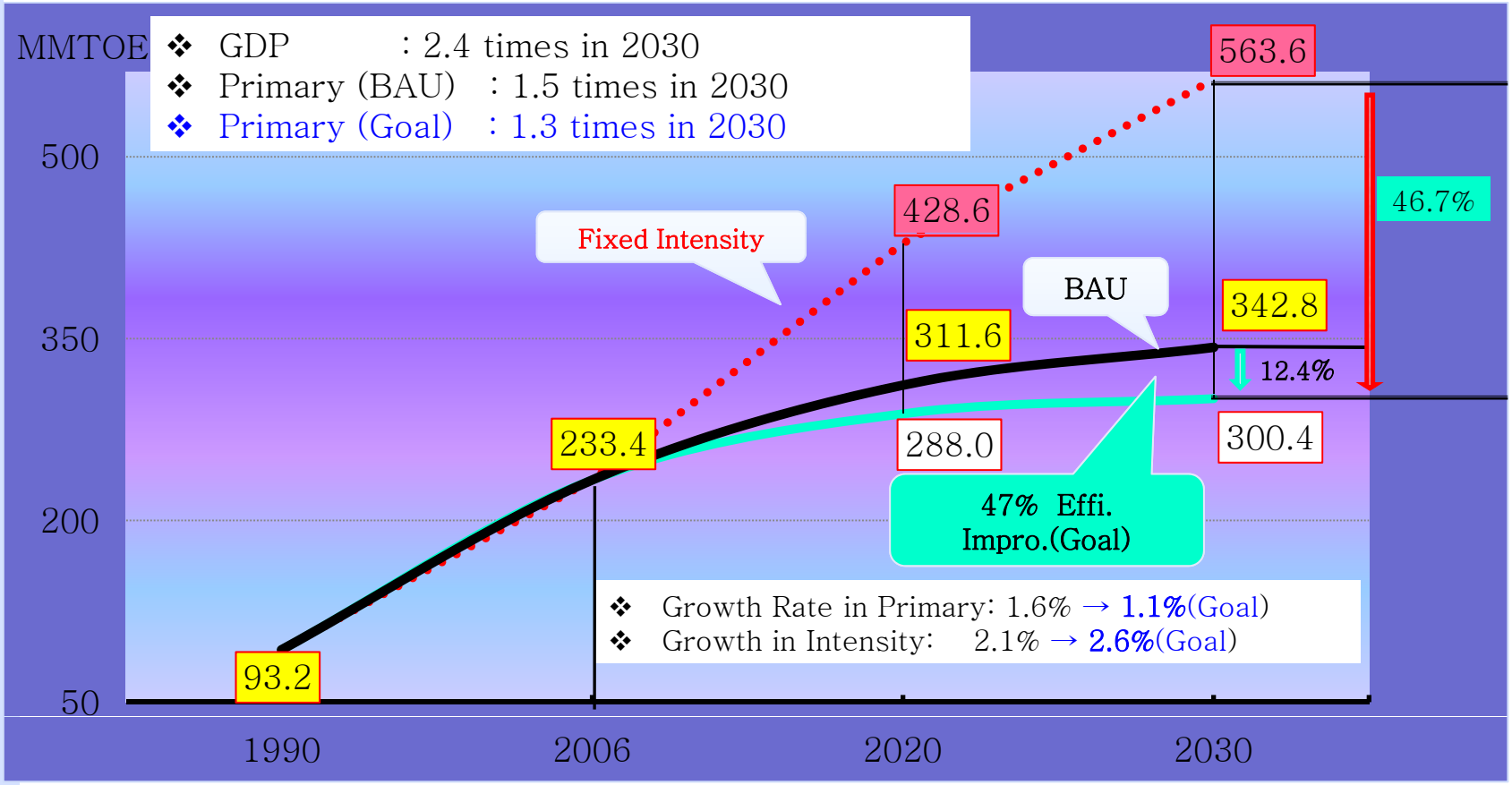
Low Energy Consuming Society
(47% improvement by 2030년)



Principles and Goals of Efficiency Policy

Goal : 47% Improvement by 2030
⇒ Top Class Country in Energy Efficiency

❖ 15.3% Reduction in Final Demand in 2030(37.6MMTOE)⇒ 12.4% Reduction in Primary Demand in 2030(42.3백만TOE)



Principles and Goals of Efficiency Policy

<Efficiency Goals by Sectors(Unit:MMTOE)>

		2006	2030			
			BAU	Goal	BAU	Goal
Final Energy	Industry	97.2	134.0	116.0	18.1(48%)	13.5%
	Trans.	36.5	45.9	40.3	5.6(15%)	12.3%
	Household /Commercial	39.8	59.1	47.1	12.0(32%)	20.3%
	Public/Etc.	3.8	6.0	4.1	1.9(5%)	31.5%
	Total	173.6	245.1	207.5	37.6(100%)	15.3%
Primary Energy		233.4	342.8	300.4	42.3	12.4%

- Industry : annual energy consumption growth: 1.3% ➔ 0.7%
- Transportation : annual energy consumption 1.0% ➔ 0.4%
- Household/Commercial: annual energy consumption 2.1% ➔ 1.1%
- Public & Etc.: annual energy consumption 1.9% ➔ -0.3%

4th Basic Plan for Rational Energy in 2008

- Vision
  - Building Low Carbon, Efficient Society and Economy
  - Development of Green Advantage through Technology Innovation and Demand Side Management
- National Target
  - 11.3% Energy Efficiency Improvement by 2012
    - 0.335 (2007) → 0.297(2012) → 0.185(2030)
  - Lowering Energy Consumption Growth to 2.3%/year by 2012
    - 3.1% (2002~2007) → 2.3%(2007~2012)
- 4 Strategies
  - Promote R&D in Energy Efficiency Improvement
  - Innovative Demand-Side Management
  - Market Creation and Market Transformation
  - Construction of Low Carbon and Energy Efficient Infra Structure

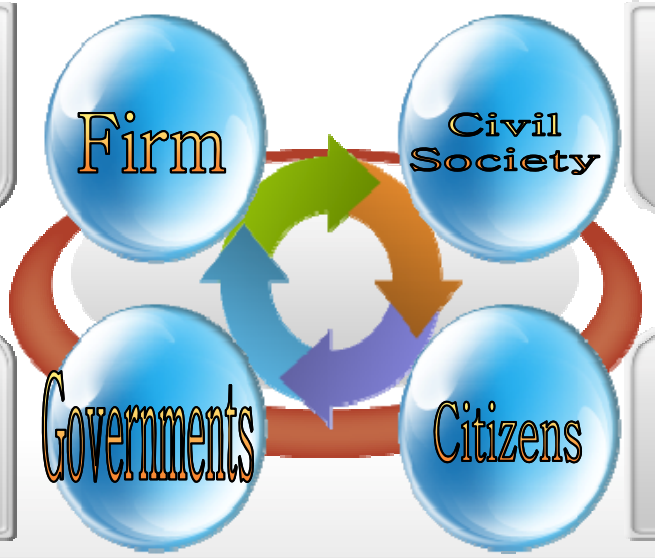
Implementations

Coping with High Oil Prices and Climate Change
Innovation Approaches in all Sectors

Transition to Low Energy Consumption Economy

- Tech. Development in Energy Efficiency
- Deployment of Effi. Equipment

- Awareness
- Nationwide Movement for Saving



- Effective Carrots and Sticks
- Low Consumption Economy & Society

- Use of Efficient Equip.
- Lifestyle Change

3. Key Policies for Energy Conservation

R&D in Energy Efficiency Improvement in 4th Plan

- Development of Building Energy Management System
  - Application of Information Technology to Monitoring Energy and Environment and to Efficient Operation of Equipment
  - Efficient Insulation Technology to the Wall and Window of Buildings
- Deployment of Green Car
  - Reduce Weight of Car by Developing Ultra Light Materials
  - Development of Engine and Transmission for Small Green Car
  - Development of Battery Technology for PHEV
- Development of Source and Core Technology for Efficient LED
- Introducing Green Home Appliances and 7 Top Runners Program
  - Develop Efficient Components of 6 Major Home Appliances Including TV, Refrigerator and Computer
  - Develop New Technology for Energy Efficiency Improvement for 7 Major Energy Using Equipments such as Boiler, Motors and Dryers.

Innovative Demand-Side Management

- Introduction of Negotiated Agreement in Industrial Sector in 2010
  - Setting Energy Efficiency Improvement Target through Negotiation Between Factory and Government and Providing Incentives after Auditing the Performance
  - Mandatory Implementation of Energy Management System to the Heavy Energy Consuming Factory (over 25,000 toe/year)
  - Extend Voluntary Agreement to Mid- and Small- Factories (> 1TMTOE) in 2010
- Extending Energy Audit and Management of Energy Use
  - Mandatory Audit for Energy Intensive Use Plants : > 2 TMTOE, Every 5 years
  - Extend Auditing Service for the Mid- and Small- Size Firms
    - Service Fee Covered by Government upto 90%(2009)
    - Eligibility Extended to 2TMTOE~10TMTOE in 2010
- Energy Efficiency Resource Standard to Energy Suppliers
  - Mandatory Efficiency Improvement Target to Energy Suppliers

Innovative Demand-Side Management

- Promotion of Cooperative Efforts
  - Energy Saving Through Partnership Program
    - Currently in Steel, Petro-Chemical, Paper Industries
    - Ship Building and Pharmaceutical Industries in 2010 and 2012, respectively
  - Cooperation among Large Company and Mid- and Small Company in Transferring Energy Saving Technology and Know-hows
- Promotion of ESCO Firms and Energy Saving Projects in Industrial Sector
  - Financial Incentives to ESCO Firms and Projects by Providing Working Capital Loan for Mid-Small ESCO firms at Low Interest Rate
  - Performance Guarantee and Developing Human Resources/Expertise
- Incentives for Investment on Energy Conservation Projects
  - Increase in Funding Resource for Energy Conservation Projects
  - Increase in Tax Credit for Investment to 20% from 10%

Innovative Demand-Side Management

- Mandatory Fuel Efficiency Certificate to Mid- and Large Trucks in 2012
- Gradual Increase in Fuel Efficiency Standard
  - 30% improvement of Fuel Efficiency Standard to 17km/l by 2015
- Promotion of Hybrid Cars through Tax Incentives (vs. Subsidy)
  - 10% of Cars by 2020
- Education and Public Awareness for Eco-Driving
- Promotion of Public Transportation
  - Additional Construction of BRT System in Major Road
  - Building Transit Complex
  - Increase Use of Railroads
- Campaign for Bicycle Use

Innovative Demand-Side Management

- Promotion of Integrated Energy Supplying System in Households, Buildings and Industrial Complex
  - Introduction of CHP and Heat Pump
  - Utilization of Unused and Wasted Energy, Bio fuels
  - District Heating and Cooling System, Small or Medium Scale Energy System
- Labeling and Energy Saving Features in Design of Buildings
  - Monetary Incentives for Efficient Buildings
  - Mandatory Design to Limit Annual Energy Use per Square Unit for Large Buildings(> 10,000m^2)
- Voluntary Agreement with Old Buildings
- Strengthen Energy Use Cap on Public Sectors
  - Promote the use of LED, CHP, Efficient Motors, Highly Insulated Windows

Market Creation and Market Transformation

- Market Creation for New Technology and New Products
  - Increase the Number of Certified Products and Provide Subsidy to the Consumers
  - LED Lightings, Industrial Furnace, Industrial Boilers
  - Preferential Treatment in Government Procurements
- Market Transformation
  - Cooperate Average Efficiency System for Home Appliances
  - Mandatory Top-Runner Program
  - Increase the Number of Labeling Products (Gas Boilers, Windows)
  - CO2 Labeling in Energy Efficiency Labeling System
- Minimum Energy Performance Standard
  - Banning Production and Use of Inefficient Products and Technology
  - Banning Incandescent Light Bulb by 2013

Construction of Low Carbon and Energy Efficient Infra-Structure

- Restructuring Energy Price System
  - Simplifying Progressive Pricing System
  - Eliminate Cross Subsidy and Cost Based Pricing
  - Introduction of Menu Pricing System Leading to Behavioral Change
- Education and Public Awareness
  - Eco-Driving, Home Energy Doctor Program
  - Active Involvement of NGOs in Energy Saving Campaign
  - Development of Audience Oriented Campaign Program
  - Education Program for Elementary School
- Incentives for Energy Saving
  - Carbon Point : Incentives for Savings in Electricity, Water and Gas
  - Carbon Cashbag: Incentives for Purchase of Efficient Equipments

Restructuring Energy Price System

Consistent Energy Tax Basis and Simplifying Tax System

- Fair Competition among Energy Types addressing Security, Environment, Equity issues
- Acquiring Consistency and Effectiveness of Energy-Environment Policies

Optimal Level of Tax

- Rationalization of Transportation Fuel Tax: Social Costs, Int'l Standards
- Fair Competitive Taxing of Heating Fuels
- Addressing GHGs Reduction in Energy Price

Improving Price Control in Network Energy Industry

- Incentive Pricing System in Network Energy Industry
- Fair Rate of Reture to the Capital Invested
- Establishment of Independent Commission for Price

4. International Cooperation in Energy Conservation

International Cooperation In Energy Conservation

- ROK Promoting Energy Cooperation among 6 Countries in NEA
  - Cooperative Development of Energy Resources to Enhance Energy Security
  - Information and Experience Sharing among Participating Countries
  - Promote Business Partnership in Energy Projects
- Asia Pacific Partnership for Climate Change
  - Technology Based Approach in Combating Climate Change
  - Project Based Cooperative Efforts among Member Countries
  - Joint Projects among Public Sectors and Private Sectors
- CDM Projects in NEA
  - Active Involvements of Business Sectors in NEA
  - ROK launched Carbon Fund to Promote Investment in CDM Projects

International Cooperation In Energy Conservation

- Political Barriers in Energy Cooperation in NEA
  - Weak Incentives for Multilateral Cooperation among Some Countries in NEA
  - Competing Interest in Securing Energy Supplying Sources
  - Ideological Difference Existing in Region
- Providing Sufficient Incentives to the Private Sector
  - Compensation for Intellectual Property Rights of the Owner of Advanced Technology
  - Limited Financial Resources for the Joint Projects
  - Potential Competitors in International Markets
- Limited Players in CDM Projects in NEA
  - Monopolistic and Oligopolistic Structure in CDM Markets
  - Uncertainty in Post-2012 Climate Change Regime

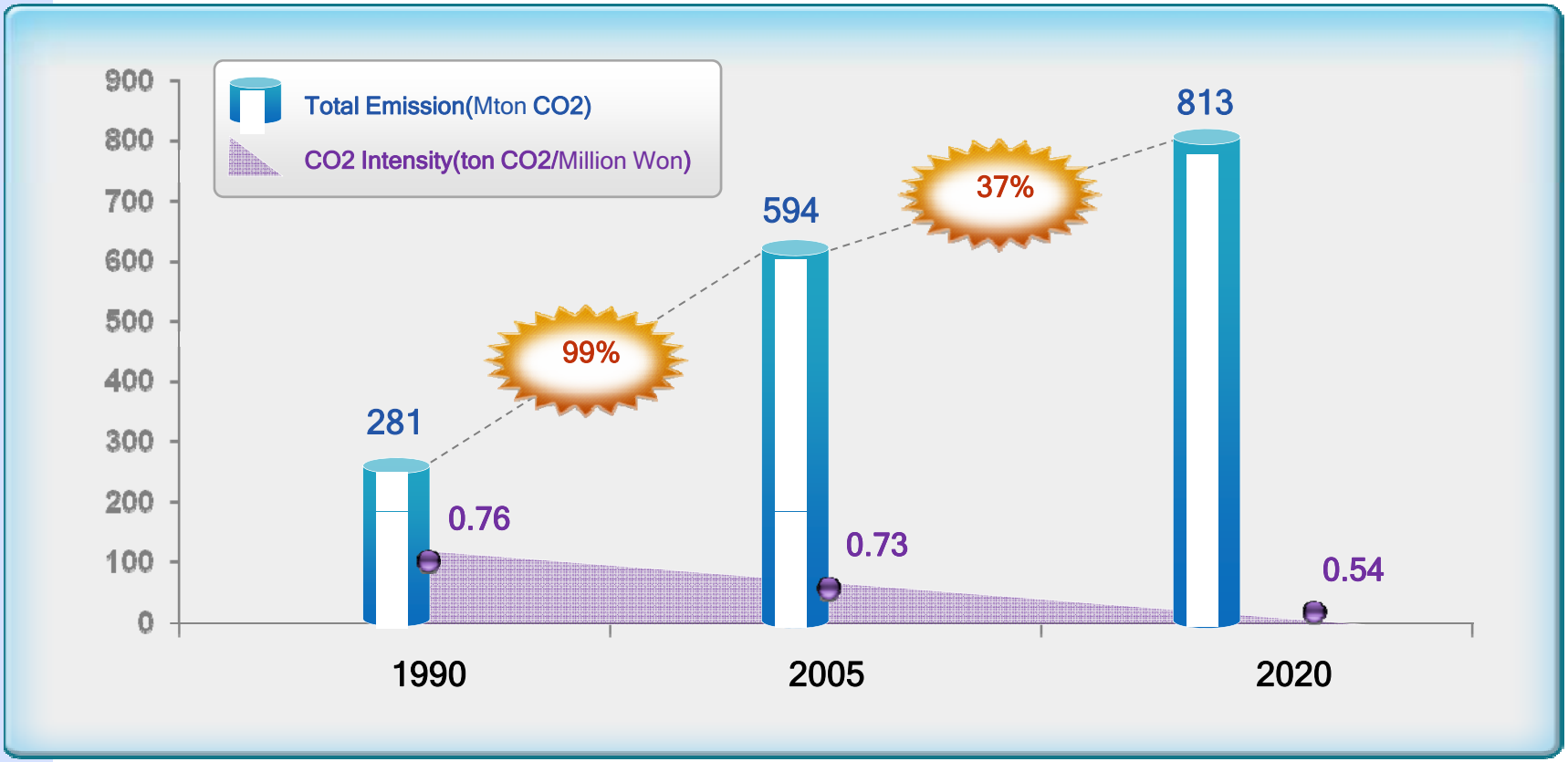
International Cooperation In Energy Conservation(III)

- Some Fields for Cooperation
  - Information and Experience Sharing in Statistics, Investment Policy, Projects and Planning and Modeling in Energy Sectors
  - Energy Service Sector such as ESCO, Energy Audit
  - Common Standard for Automobiles, Electric Equipment, Renewable Energy
- Private Sectors as the Key Players
  - Cooperation among Business Sectors Based Upon Economic Incentives
  - Promote Joint Technology Development Project and Joint Marketing in the Domestic Market as well as the International Market
- Public Sector as a Facilitator in Energy Cooperation
  - Removing Institutional Barriers and Securing Investments by Private Sector
  - Mobilizing Financial Resources for the Private Sector Investment
  - Creating Domestic Market for Jointly Developed Technology through Regulation and Subsidy

5. Mid-Term National GHGs Mitigation Goals in 2020

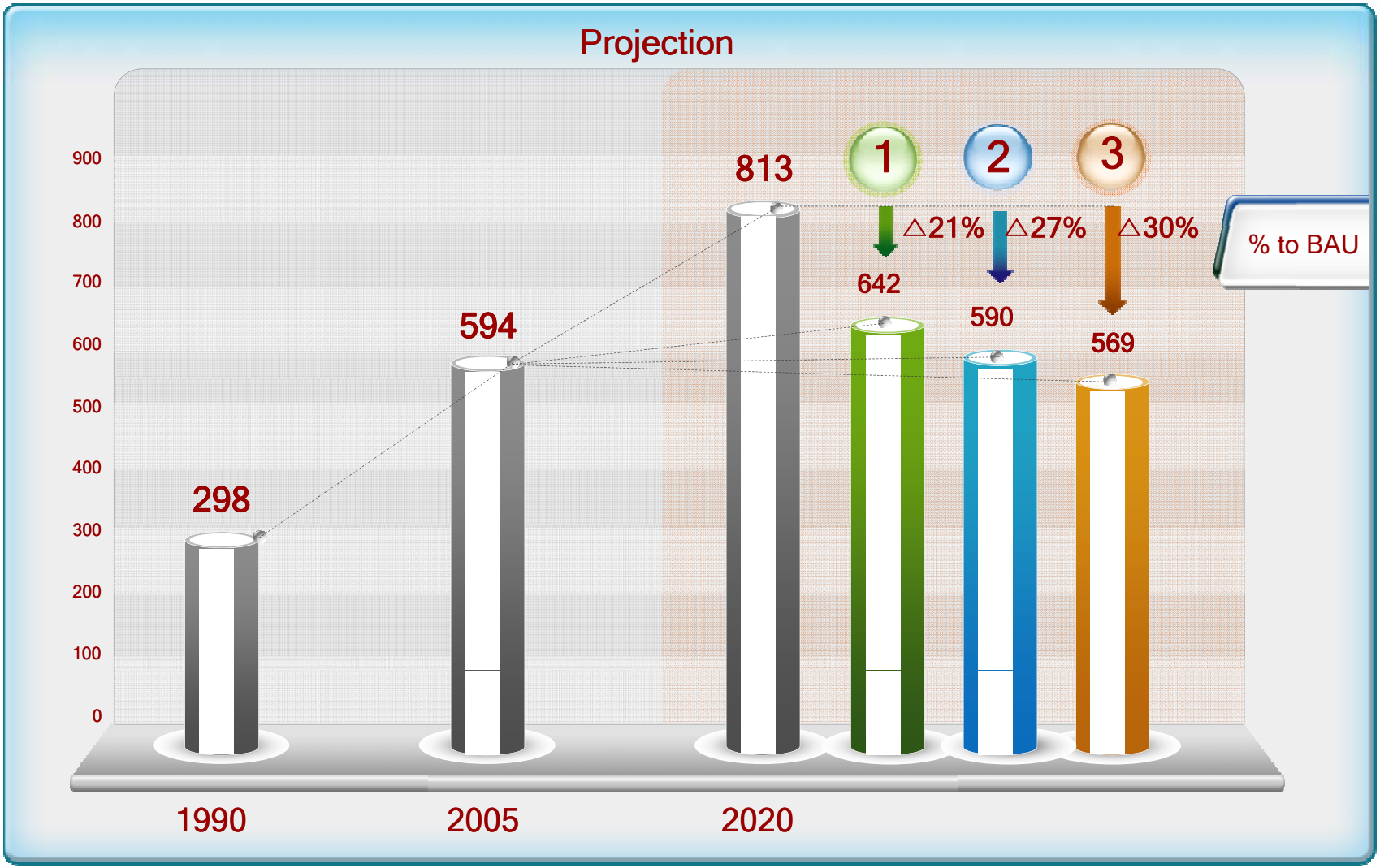
GHGs Emission Projection

- ✓ Continual Decrease in Annual Emission Growth Rate
- ✓ Decrease in CO_2 Intensity(ton CO_2/Million Korean Won)



3 Scenarios of Mid-Term Reduction Goals

Unit : MMT CO2-e



Mid-Term Reduction Goals and Measures

Scenario	Goals w.r.t. BAU	Criteria in Policy	Exemplary Mitigation options
1	△21% 171 MMT CO2-e	Cost Effective Policy and Technology Option	▪ Promotion of Green Homes, Green Buildings ▪ Rapid Penetration of Efficient Electric Equipments and Lightings(LED) ▪ Shifts to Low Carbon - High Efficient Transportation System ▪ Innovation in Manufacturing Processes into Green Process ▪ Promotions of Renewables and Nuclear Power ▪ Introduction of Smart-Grid
2	△27% 2.23MMT CO2-e	Mitigation Cost Up to $50/TonCO2-e	▪ Destruction of F-Gases ▪ Promotion of Hybrid Cars ▪ Increase in use of Bio Fuels ▪ Application of CCS in Power Plants
3	△30% 2.44MMT CO2-e	Upper Bound of Reductions Range by EU	▪ Introduction of Electric and Fuel Cell Vehicles ▪ State of the Art Efficiency Technology and Equipments in Households

* Sinks are not included.

Impacts on GDP and Consumption

	Scenario 1	Scenario 2	Scenario 3
GDP	-0.29%	-0.37%	-0.49%
Consumption per Household	130,000 Won	166,000 Won	217,000 Won

Reduction Measures and Roles in Sectors

Implementation Strategies

Realization of Sustainable Economic Growth and Social Structure by Minimizing GHG Emission and Environmental Pollution with GHG Mitigation Goals

Green Buildings

- Green Buildings
  - Insulation Standards, Solar or Geothermal Heating/Cooling System
- High Efficiency Green Products
  - LED, Top-Runner Products, Green IT
- SMART Metering
- State of Art Efficiency Equipments

Green Transportation

- Low Emission/High Fuel Efficiency Automobiles
- Modal Shift to Public Transportation/ Railroads/ Bycycle
- Hybrid Vehicles
- Bio Fuel
- Electric Vehicles, Fuel Cell Vehicles`

Low Carbon Industry/Generation

- Efficiency Improvement in Production Process
- Larger Share of Low Carbon Emission Fuels in Power Generation (Renewable, Natural Gas)
- SMART GRID
- Mitigation of F-GASES
- CCS

Green Consumption /Lifestyle

- Green Purchase (Green Labeling)
- Green Lifestyle (Eco-Driving)
- Green Start
  - Green Life Campaign

Thank You for Your Attention!

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