Sunshine of the Life

Strategies of Hanwha against Global Climate Change

2014. 4. 9

Hanwha Chemical

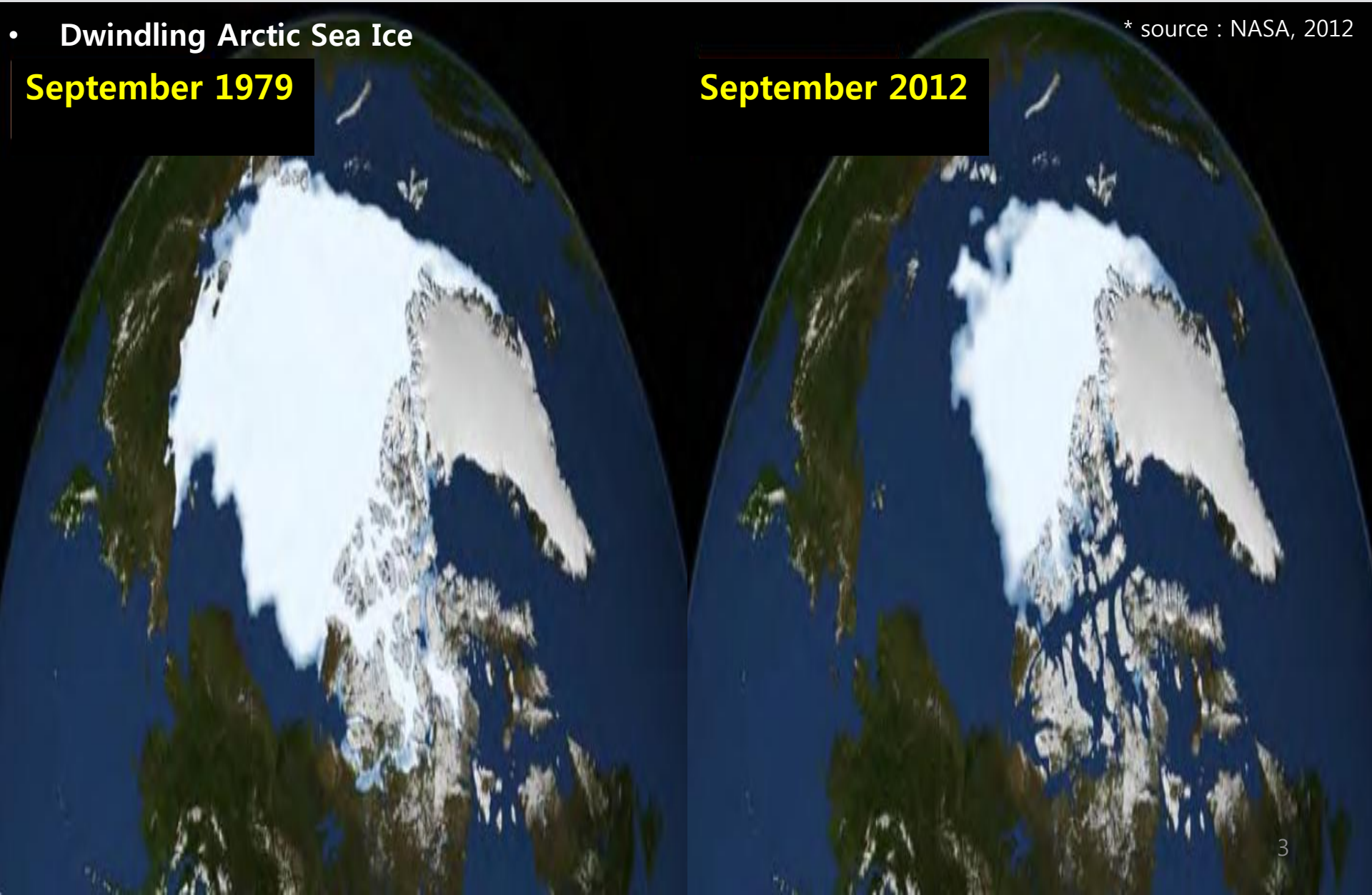
Hanwha Chemical

Contents

1-1. Issues of Global Climate Change

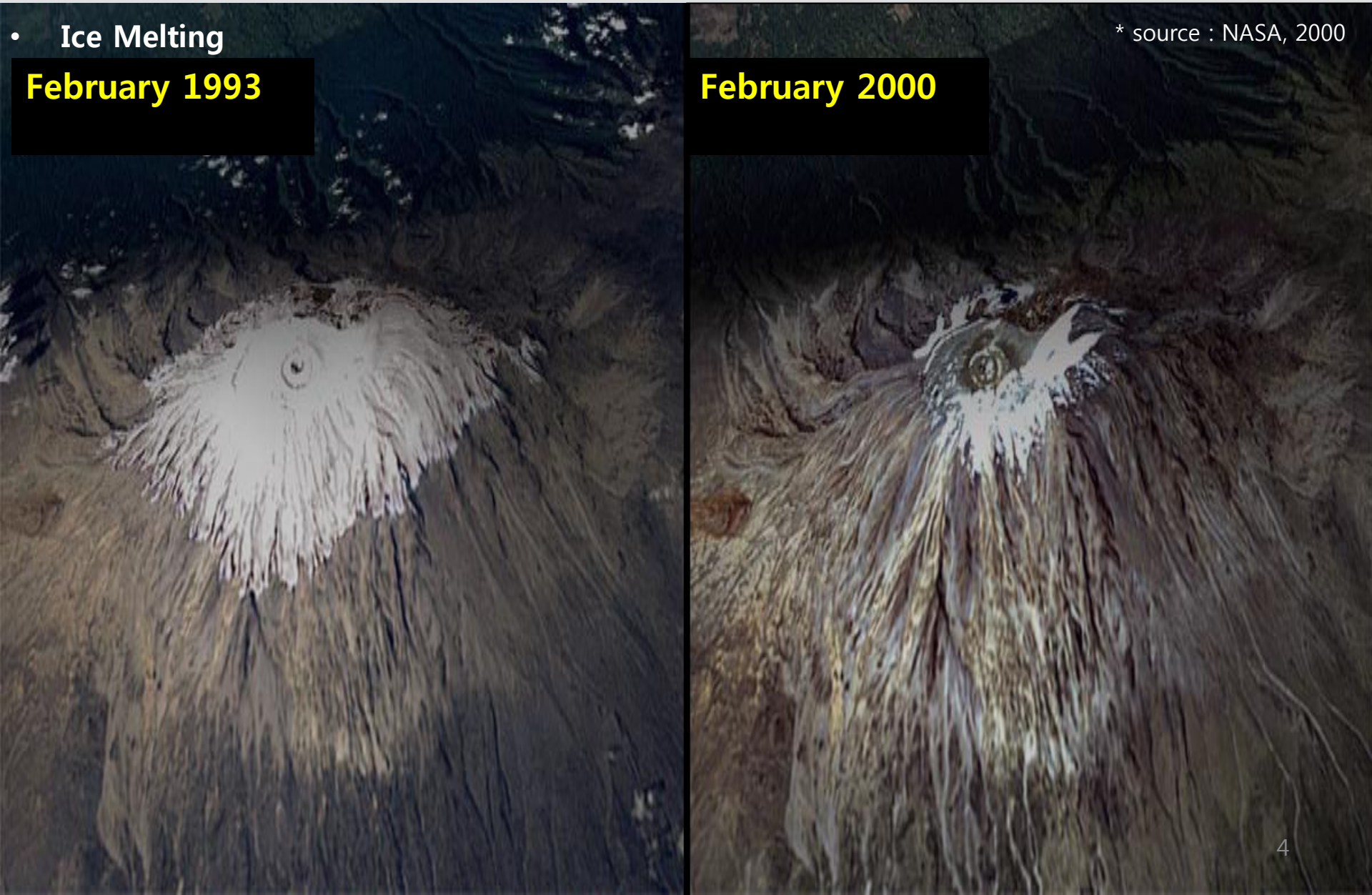
- **Dwindling Arctic Sea Ice**

* source : NASA, 2012



1-1. Issues of Global Climate Change

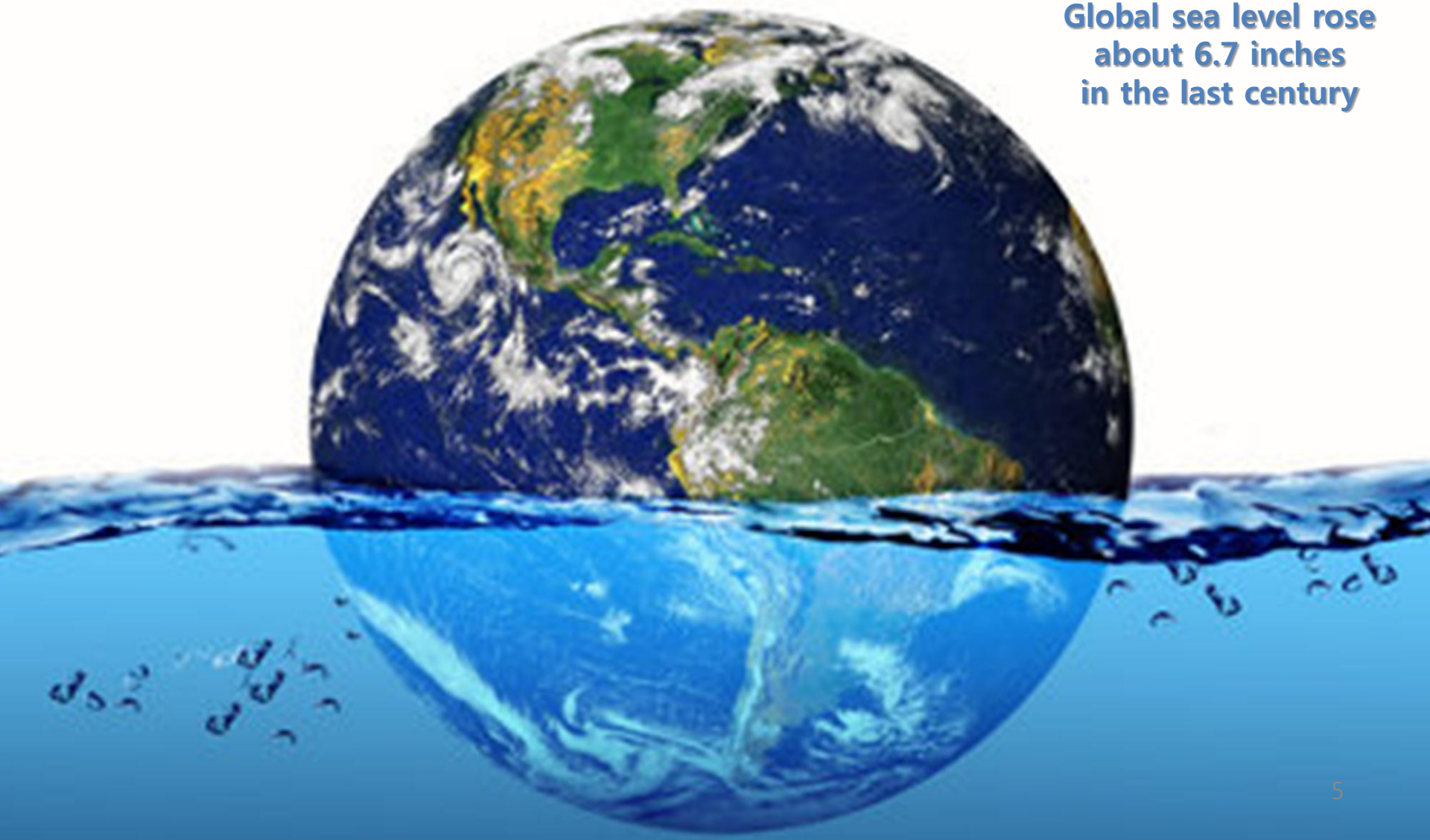
- **Ice Melting**



* source : NASA, 2000

1-1. Issues of Global Climate Change

- Rising Sea Level

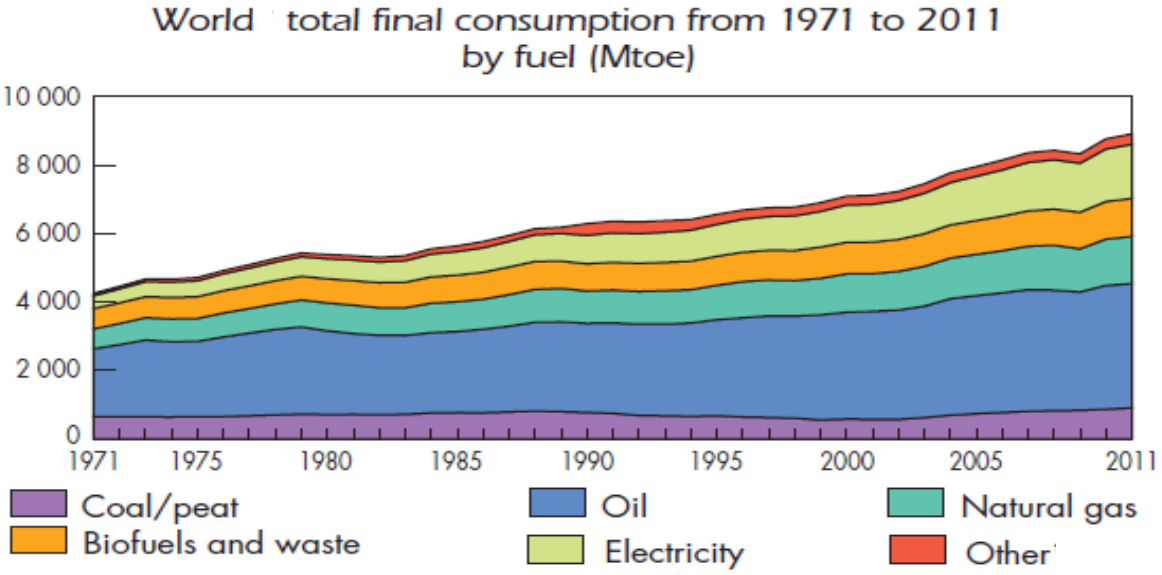


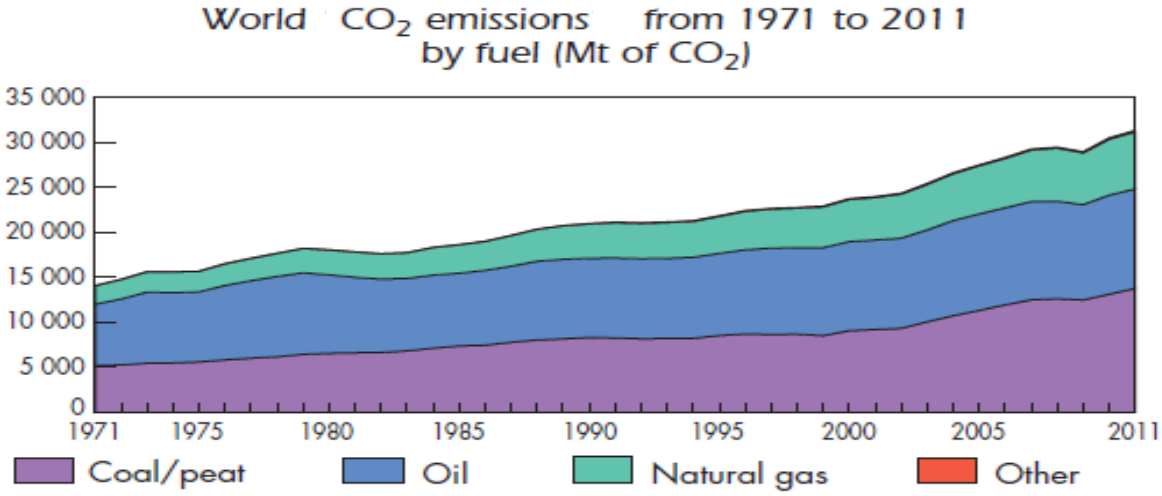
Global sea level rose about 6.7 inches in the last century

1-2. Causes of Climate Change

Industrial Revolution in 1750s

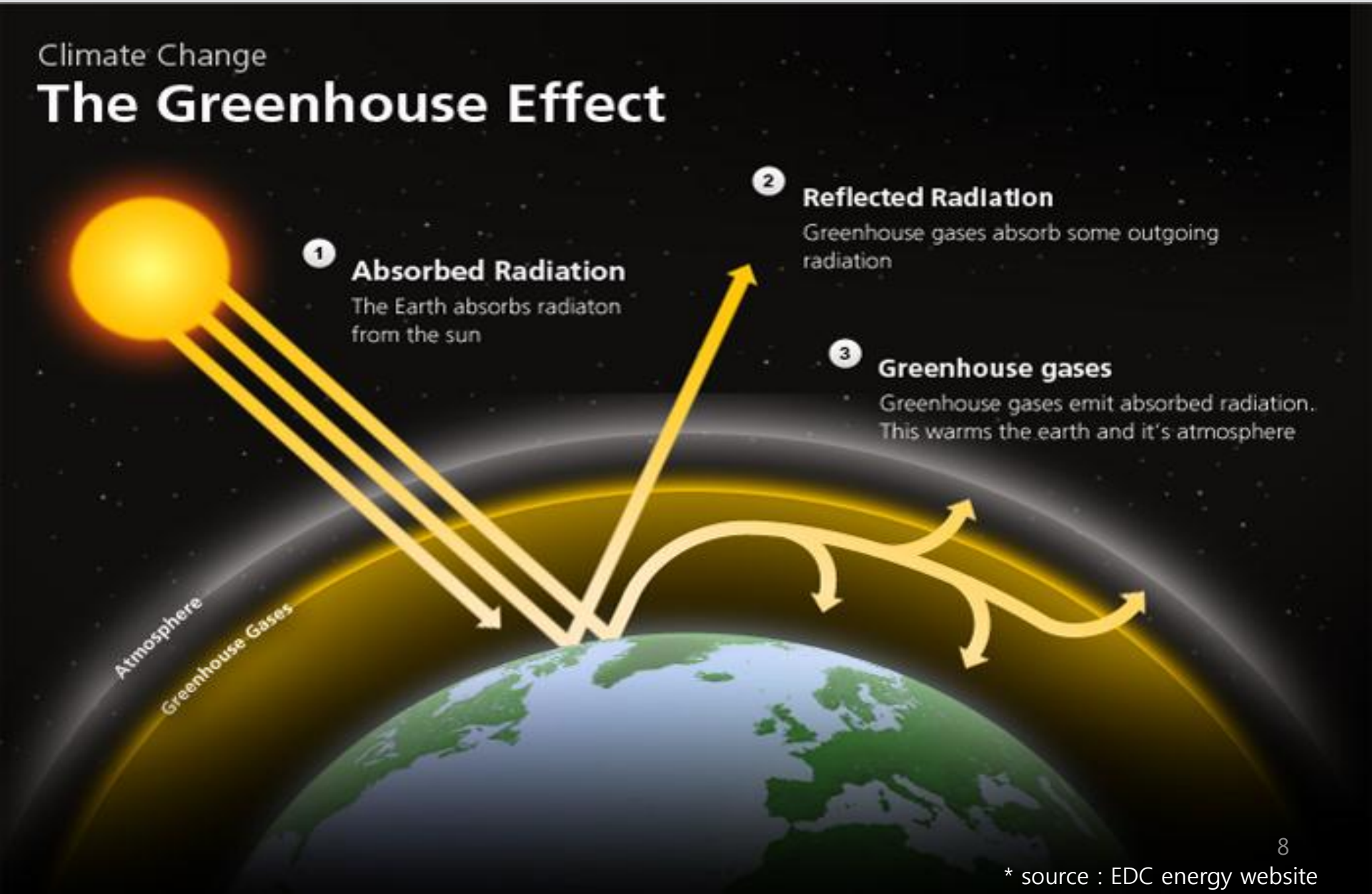
1-2. Causes of Climate Change





* source : 2013 key World Energy Strategy, IEA

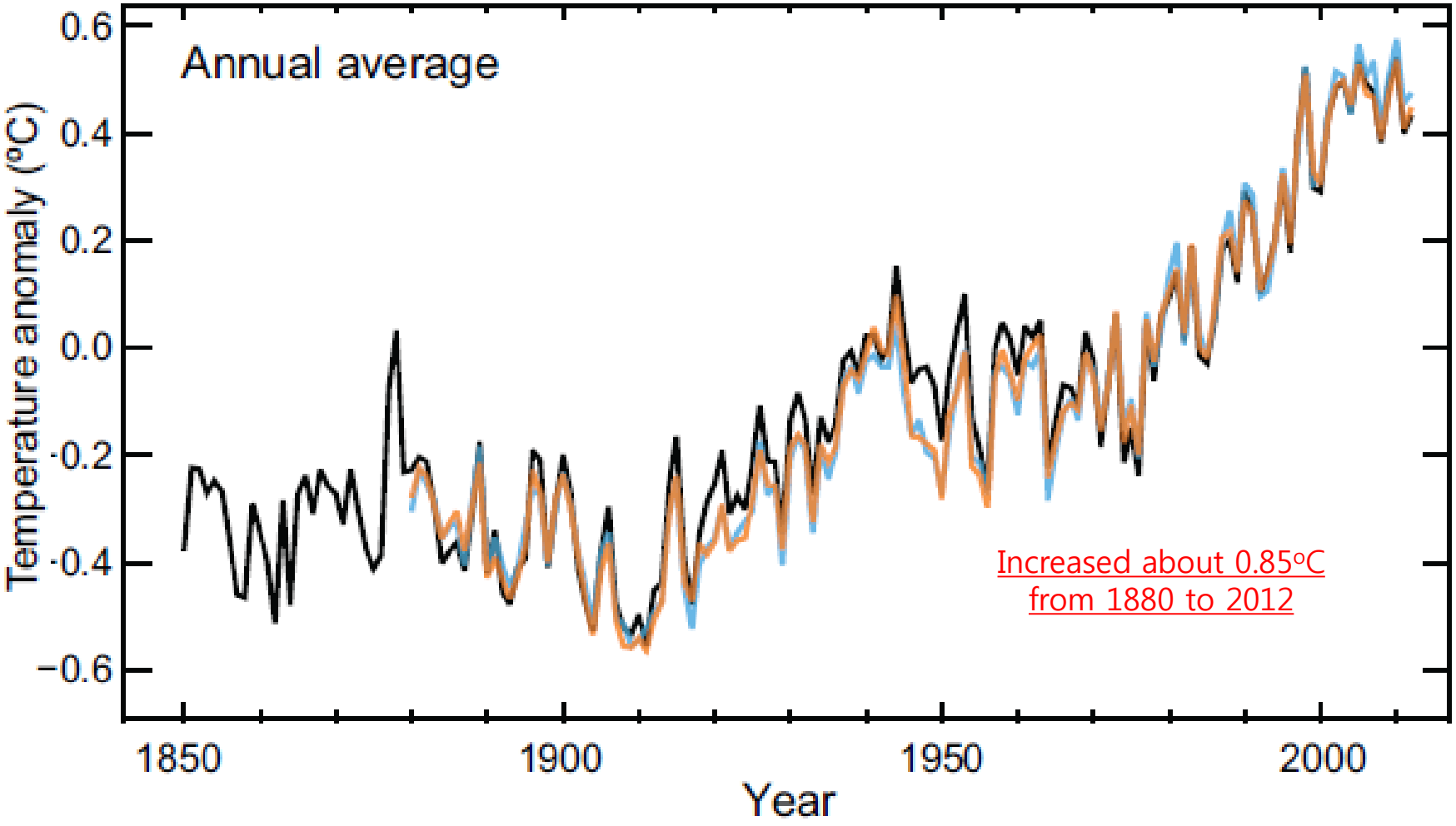
1-2. Causes of Climate Change



* source : EDC energy website

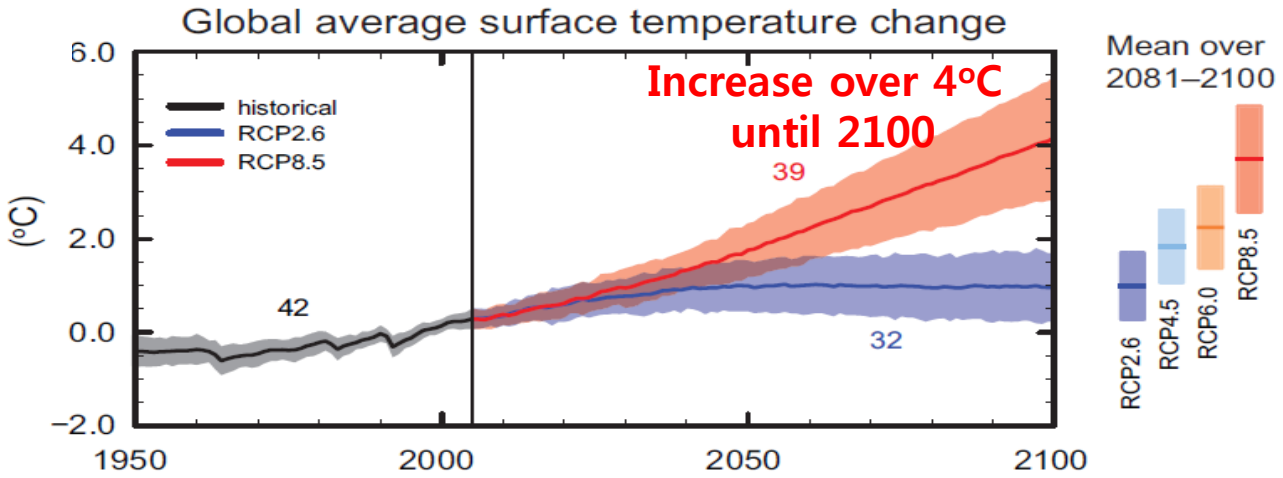
1-2. Causes of Climate Change

Global Annual Average Land-surface Temperature anomalies relative to 1961 - 1990



* source : IPCC WG1 5th Report (2013)

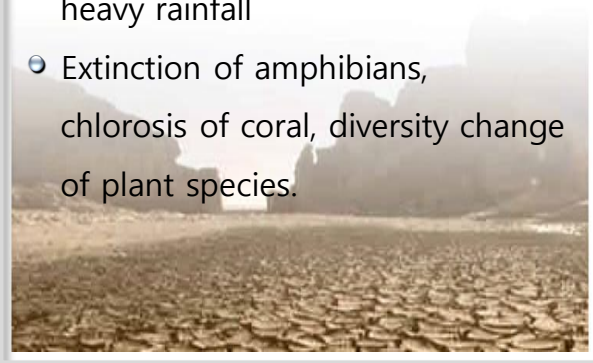
1-3. What will be happened?



* source : IPCC WG1 5th report, 2013

2°C

- Water Shortage for 0.4~1.7 billion people
- Increasing risk of flood and heavy rainfall
- Extinction of amphibians, chlorosis of coral, diversity change of plant species.



4°C

- Water Shortage for 1~2 billion people
- Risk of flood for 3 million people
- Extinction of most corals
- Extinction risk of 20~30% species

6°C

- Water Shortage for 1.1~3.2 billion people
- Risk of flood for 15 million people
- Extinction of most species existing in Earth

* source : IPCC WG2 4th Report, 2007

Contents

2-1-1. Progress of International Policy

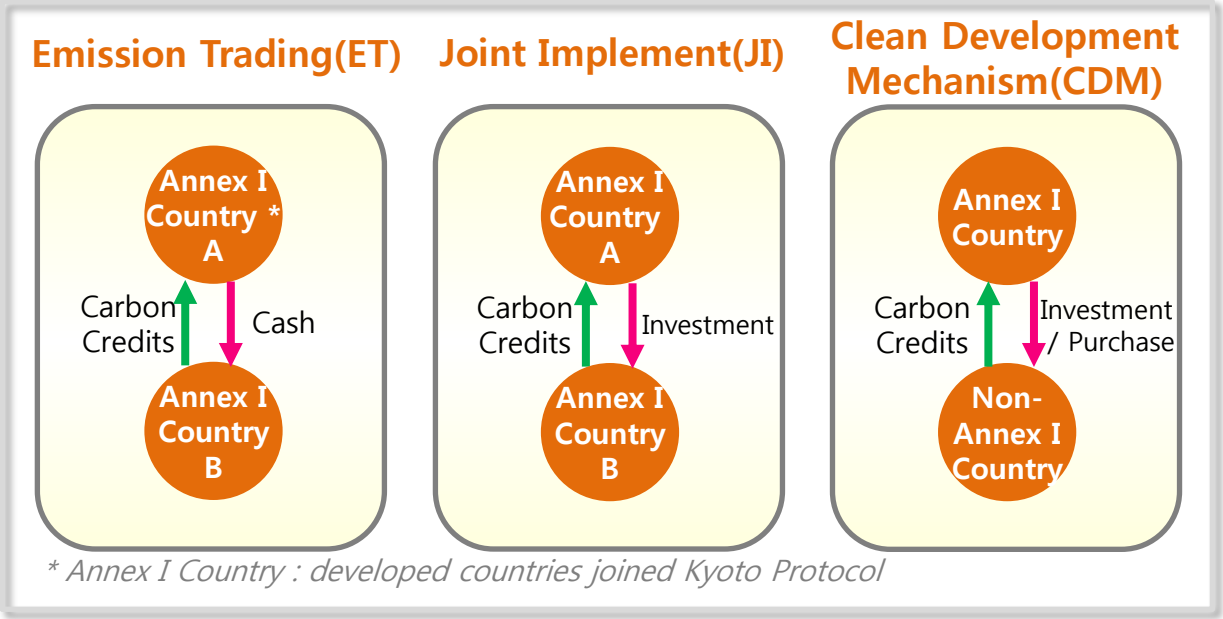
UNFCCC
(June 1992)

- ***First steps*** to a safer future (Rio Brazil)

> **The ultimate objective of this Convention** and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.
>
> **"...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system..."**

Kyoto Protocol
Dec 1997

- **Sets binding emission reduction targets** for developed countries
  ➔ ***Average 5.2% reduction*** over 2008 to 2012 compared to 1990
- Six GH Gases : CO_2, CH_4, N_2O, HFCs, PFCs, SF6
- It entered into force on 16 February 2005
- 3 ways to minimize the GHG reduction cost ***by Market mechanism***



** Annex I Country : developed countries joined Kyoto Protocol*

2-1-1. Progress of International Policy

Sunshine of the Life

UNFCCC
(June 1992)

- *First steps* to a safer future (Rio Brazil)

> "...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system..."

Kyoto Protocol
Dec 1997

- Sets binding emission reduction targets for developed countries
  ➔ *Average 5.2% reduction* over 2008 to 2012 compared to 1990
- Six GH Gases : CO2, CH4, N2O, HFCs, PFCs, SF6
- it entered into force on 16 February 2005
- 3 ways to minimize the GHG reduction cost *by Market mechanism*

Bali Road Map
Dec 2007

- Developed & Developing countries all agreed for the participation in construction post-2012 system
  - Developed countries
    : additional negotiation for reduction to 2009
  - Developing countries
    : Specifying adoptable actions for reduction by countries.

Cancun Agreements
Nov 2010

- hold the increasing of global average temperature ***below 2 ℃ above preindustrial levels***
- Agreement on ***foundation of GCF(Green Climate Fund)*** in order to induce Developing countries' participation in climate change actions
  ➔ Funding Target : 100 billion dollars a year by 2020

2-1-2. Trend of Policy by Country

- Suggestion of higher goal for reduction than the other Developed countries.
  (20% more reduction until 2020 compared to 1990)
- Implementation EU ETS by stage
  - 1st step('05~'07), 2nd step('08~'12), 3rd step('13~'20)
  - To participant 12 thousands companies & target for 45% of EU's CO_2 emissions

- No obligation for reduction owing to disagreement to Kyoto Protocol
- Targeting to reduce 17% emissions until 2020 compared to 2005
- Emission trading in force by regional unit

- 4th largest emission country in the world
- Reduction 25% emissions until 2020 compared to 1990
- No obligation to allocate emission rights in consideration economic influence
  (putting off introduction emission trading system)
  - but, implementation voluntary emission trading ('05~) in Environmental Office

- 1st amount of emissions in the world, Having difficulties in emission reducing absolutely
  by their industrial structure
- Suggestion of goal for reduction in 40~45% emissions per GDP by 2020 compared to 2005.
- Started emission trading system in 7 regions form 2013 & Plans to expand to all the country by 2015

Contents

2-2-1. Phenomenon of Climate Change in Korea

Sunshine of the Life

Drought

매일경제

2013년 08월 20일 화요일 A26면 사회

폭염에 가뭄… '타들어가는' 남부지방

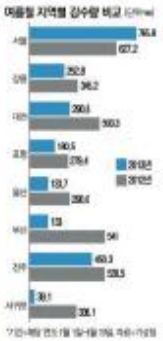
울산·포항·진도 저수지 물까지 말랐다

제주 50년만에 최악

작물 말라죽고 가축 폐사

신안·해남군 섬지역

식수 바닥나 비상급수



algal bloom

경향신문

2013년 09월 12일 목요일 015면 사회

E 때문에 녹색빛을 띠고 있다.

김병만 마창진환경운동연합 사무국장 제공

수질예보제 후 첫 '경계' 발령

792개체/㎖로 지난
체/㎖에 비해 5일
증했다고 밝혔다.
도는 1만㎎/㎥였
농도가 7일 중 4일
를 초과하면서 남조
㎖ 이상일 경우 '경
된다. 수질예보는
계→심각 단계 등
해진다. 경계단계
2012년 12월 4대강
수질예보제 도입

창원한인보와 합친
주수는 3만4000개/

㎖로 정점을 이룬 뒤 9월에는 160
개 수준으로 급감했다.

낙동강환경청은 4대강사업으로
물의 흐름이 느려진 것이 가을철에
도 녹조가 확산된 이유라고 분석했
다. 낙동강환경청은 "현재 영양 염
류가 풍부하고(강물의 부영양화가
심하고), 일사량과 수온(섭씨 25~
30도), 강물 체류시간 등이 최적 서
식 여건이 되고 있어 당분간 증감을
반복하며 녹조가 유지될 것"이라고
밝혔다. 이어 "현재까지 남조류 녹
조물질은 먹는 물(정수) 권고 기준
을 넘어선 곳은 없다"고 밝혔다.

권기정 기자 kwon@kyunghyang.com

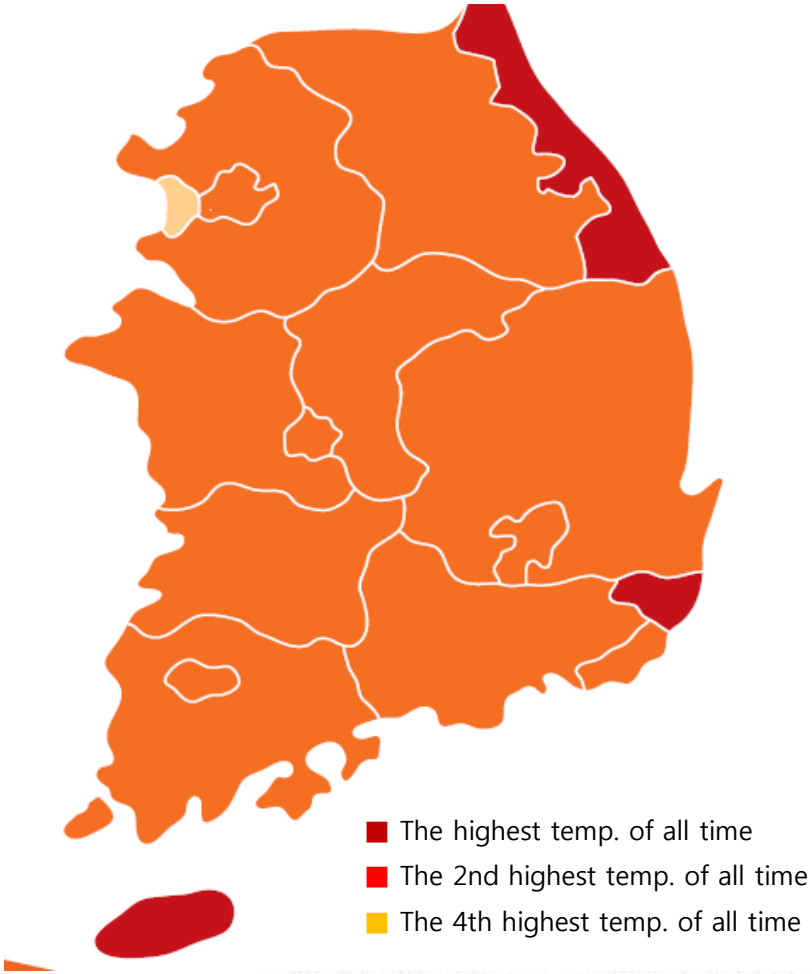
Heavy snowfall

경인일보

2013년 02월 04일 월요일 101면 종합

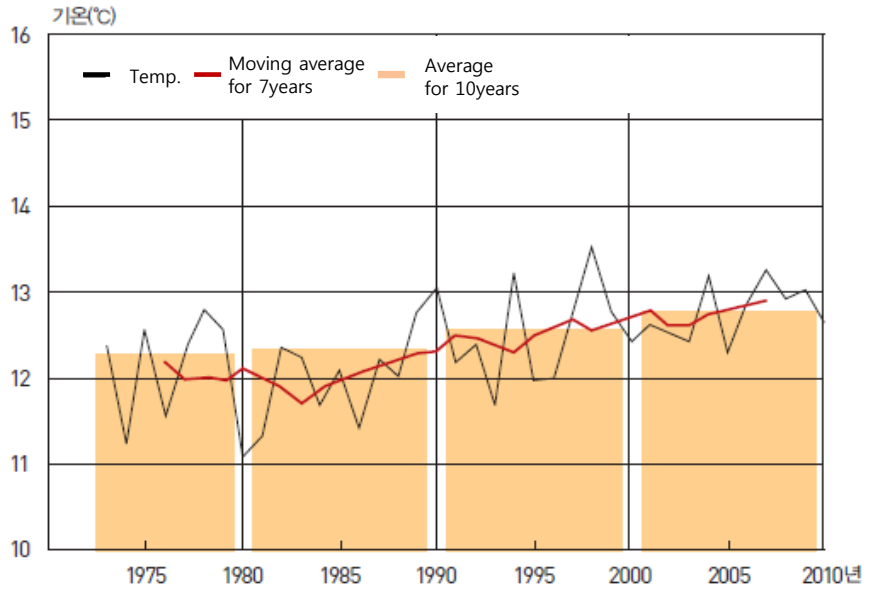
2-2-1. Phenomenon of Climate Change in Korea

The Highest Temperature recorded in 2013 ever since observed



Temperature

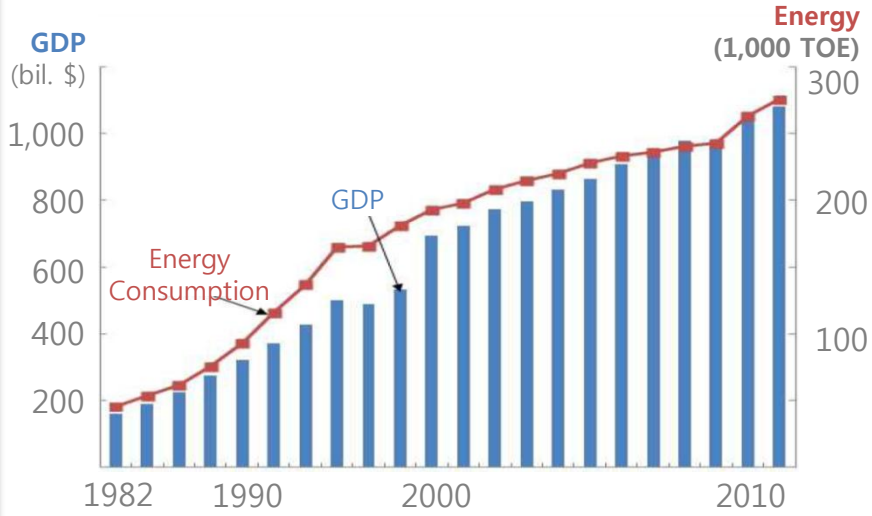
Average temperature for the year keeps going higher!



2-2-2. Status of Energy & GHG in Korea

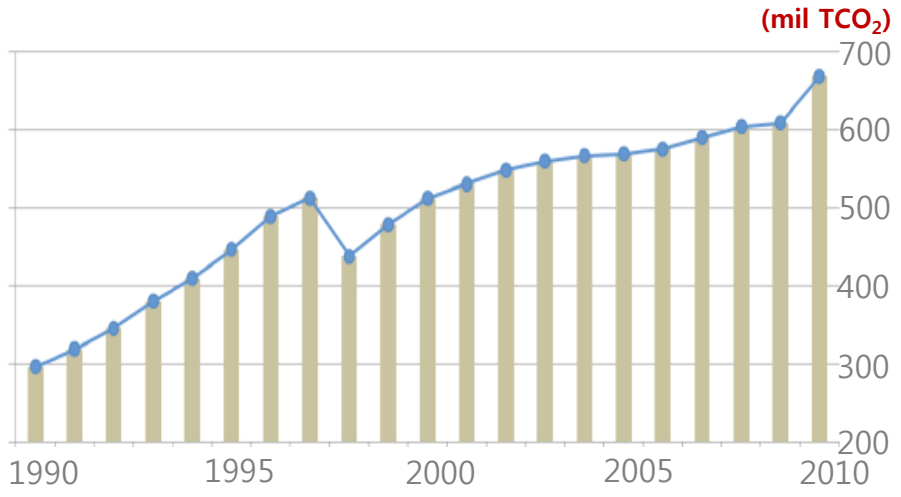
Sunshine of the Life

GDP & Energy Consumption in Korea



- source : 2013 Energy Statistics Handbook (Korea Energy Management Cooperation)

National GHG Emissions



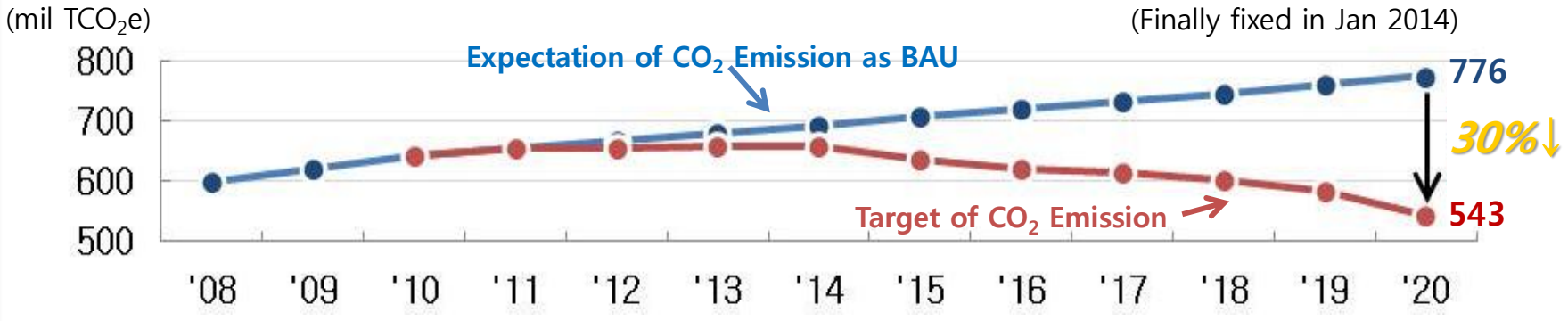
- source : Greenhouse Gas Inventory & Research Center of Korea

2-2-3. Climate Change Policy of Korea

✓ *Declaration of National Visions (Aug 2008)*
'Low Carbon, Green Growth'

✓ *National Goal Setting*
➔ ***30% GHG Emission reduction*** compared to 2020 BAU

* BAU : Business as Usual



Implementation of 'Korea's Target Management Scheme' (2012)

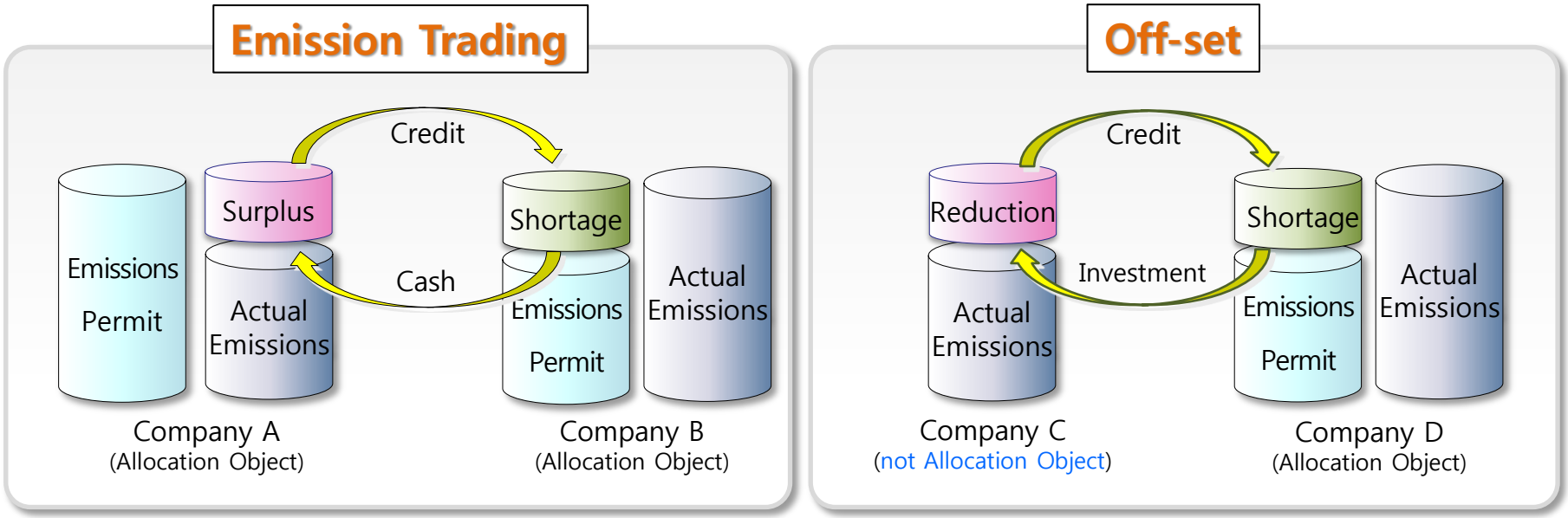
- Controlling to over 486 companies & facilities with high levels of GHG emissions (about 69% of total GHG emissions)
- Based on 'Emission Trading Scheme' and Global Carbon Trading

2-2-4. Climate Change Policy of Korea

✓ ***Emission Trading Scheme (Jan 2015)***

- Companies may achieve targets through Emission trading as well as voluntary mitigation efforts

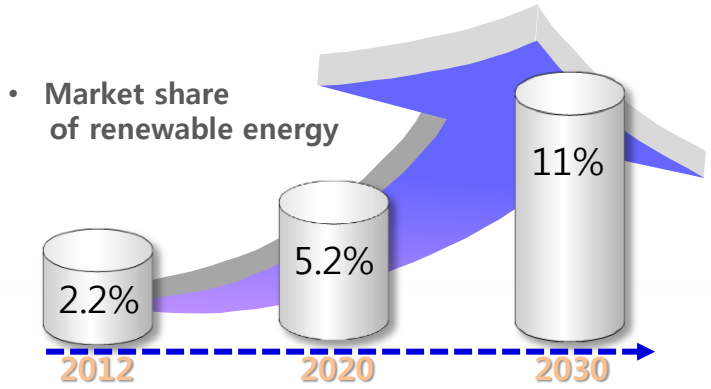
- ETS is a market-based, cost-effective way to reduce GHG emissions



2-2-5. Policy measures for reduction of GHG Emission

Sunshine of the Life

Activation of New Renewable Energy

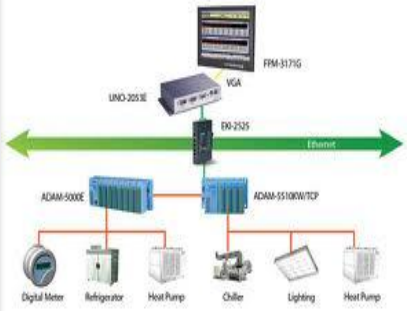


* source 2nd Energy Master Plan (Jan 2014)

Investment to GHG Reduction

- **CCS(Carbon Capture & Storage) Project** for negative emissions
  - Investment about **$150mil by 2019**
  - the CCS technology can **reduce 19% global carbon emissions** by 2050 (source : IEA)

Support for High-Efficiency Technology Based on ICT



EMS
(Energy Management System)

ESS
(Energy Storage System)

LED

2-2-6. Green Climate Fund

What is GCF?

Green Climate Fund

- A fund within the framework of the UNFCCC founded as a mechanism to transfer money from the developed to the developing country, in order to assist the developing countries in adaptation and mitigation practices to counter climate change
- Adopted at the COP 17 (Durban) in 2011
- To raise Climate Finance of $100 billion a year by 2020

* Opened Song-do office in Korea (Dec 2013)

Contents

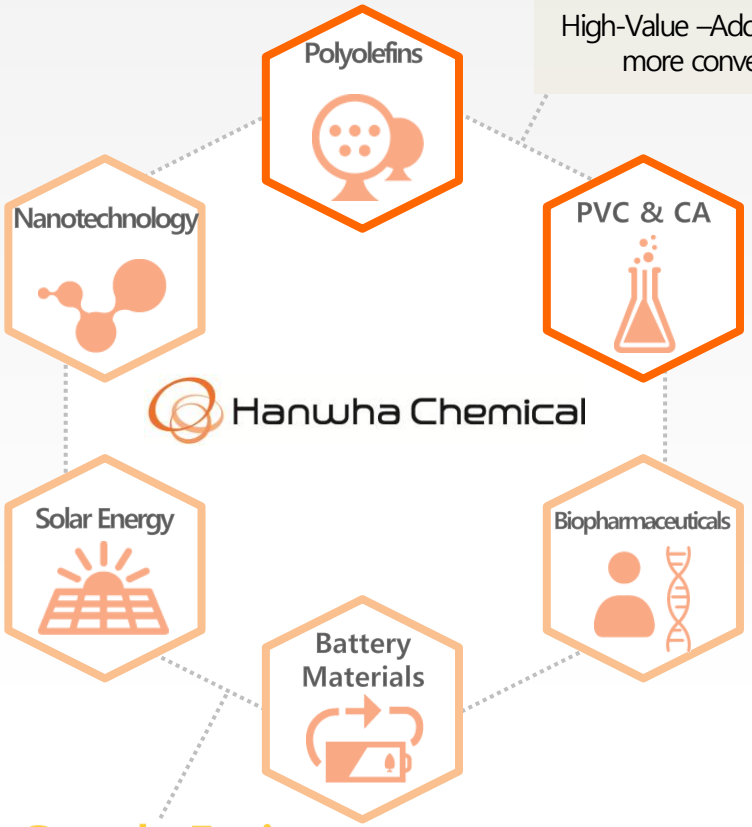
3-1. About Hanwha Chemical

Sunshine of the Life

Business Areas

Petrochemical Business

High-Value –Added products for more convenient living



New Growth Engines

Environmentally friendly technologies for a sustainable future

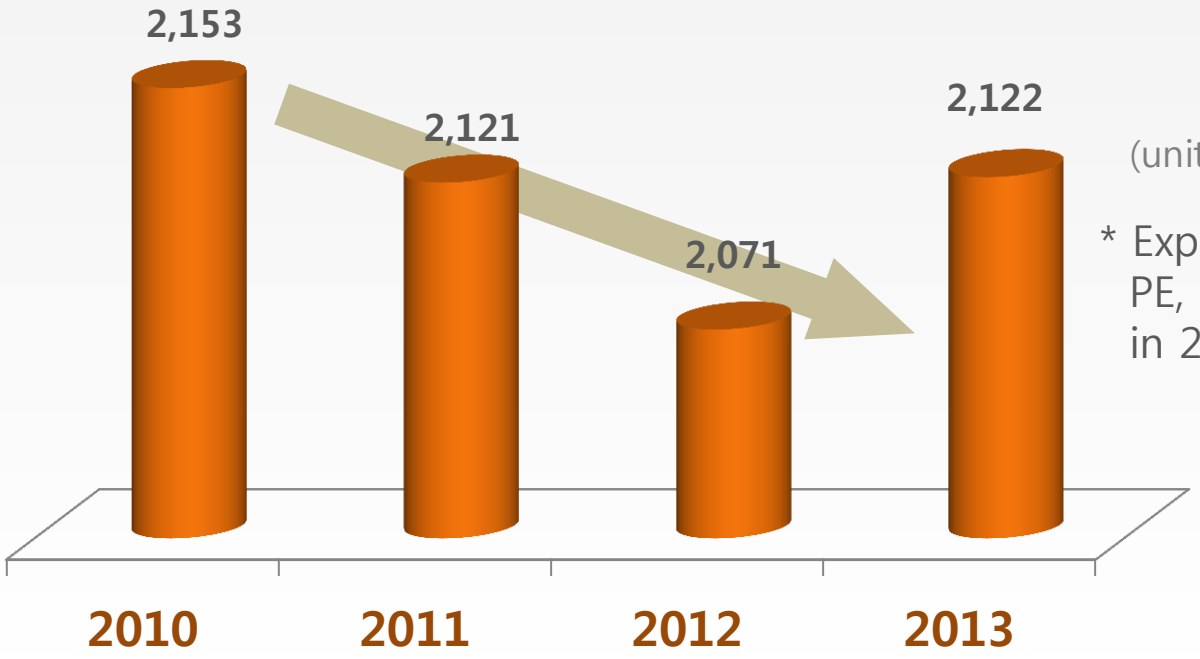
2013 Financial Highlights

(Unit : million $)

Total Assets	7,731
Sales	7,177
Operation Income	140

Including YNCC(50% of share), HNC, HCT

3-2. GHG emission of Hanwha



(unit: kilo TCO_2e)

* Expansion of PE, PVC plant in 2013

- 0.3% of National total emissions(about 700 mil TCO_2e) in 2013
- 8th largest emissions in the petrochemical field in Korea

3-3. Carbon Management Vision

Sunshine of the Life

Vision

1st Green Chemical Company

Target

- 15% Reduction of CO_2 Emission compared 2020 BAU
- Activation of Renewable Energy Business
- Carbon management certification at the international level

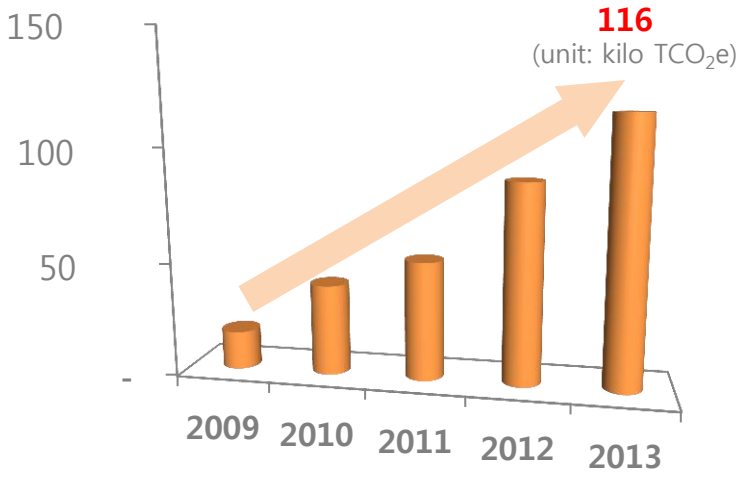
Strategy

Energy Reduction Activities	Renewable Business	Green Communication
▶ Idea development - Projects for Energy Reduction ex. Operational Excellence - High efficiency ▶ Infrastructure - Management System (H-GEMS)	▶ PV Cell ▶ Cathode for Secondary Battery ▶ Hydrogen Storage Material	▶ Shared Growth with Partners ▶ Certifications - Green Tech. & Products - CTS (Carbon Trust Standard) - CDP(Carbon Disclosure Project)

3-4. GHG-Reducing Activities

- Activities to reduce Energy
  - TF for Efficiency of Energy (2000 ~ 2008)
  - TF for Low-Carbon Green-Growth (2009 ~ 2012)
  - TF for Operational Excellence

- Cumulative reductions during 2009~2013



- HCC's Operational Excellence
  - Task force to reduce energy, increase productivities, improve quality, reduce SG&A costs and so on at the corporate level
  - **Schedules**

Yeosu Plant *(2013.06 ~ 2014.11)* — Target : ***$17bil. cost saving*** in Yeosu Plant

HNC/HCT *(2014.01 ~ 2015.05)*

Ulsan Plant *(2014.06 ~ 2015.09)*

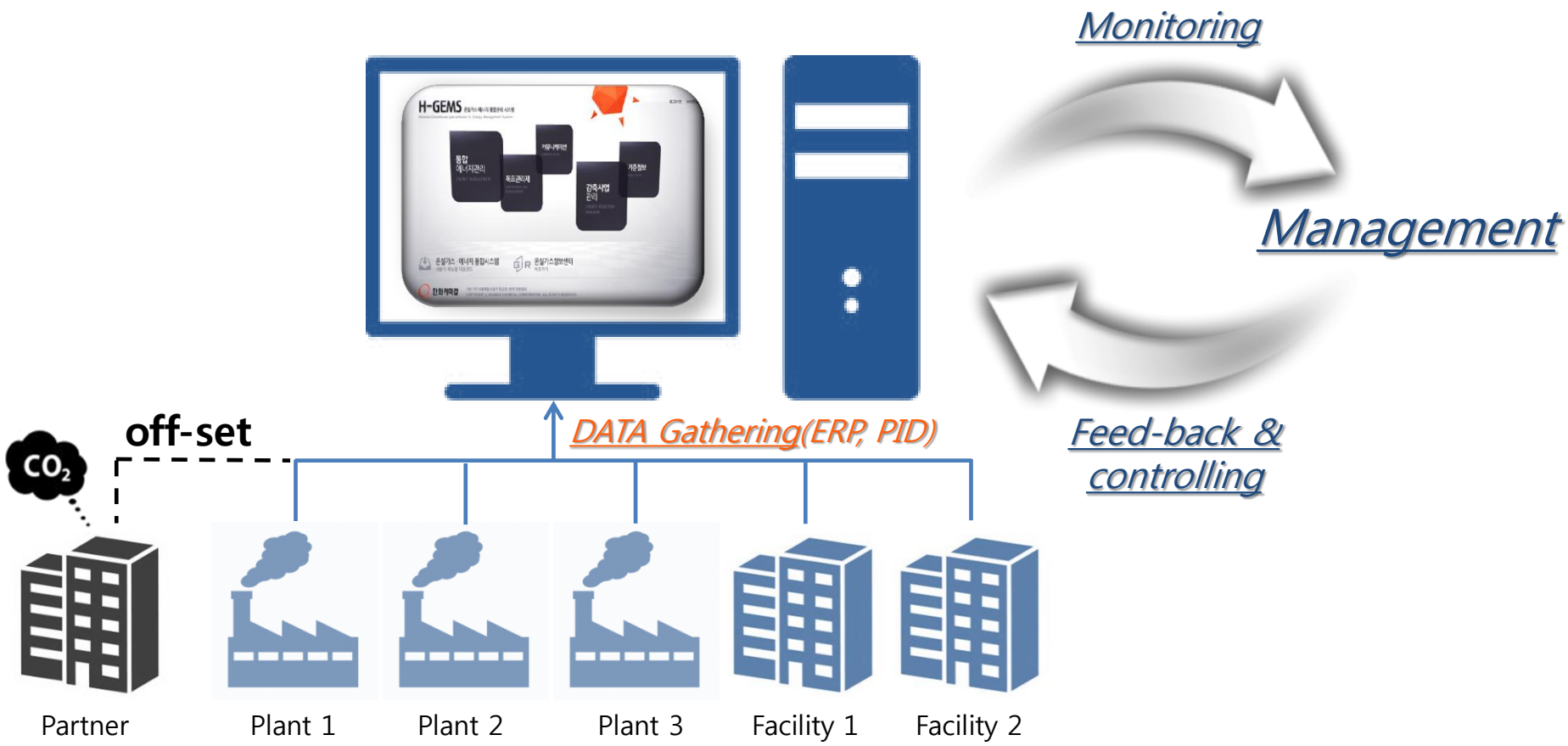
- Others

Solar Power Generation

Replace with LED Lamp

3-5. Energy-Saving Activity (Management System)

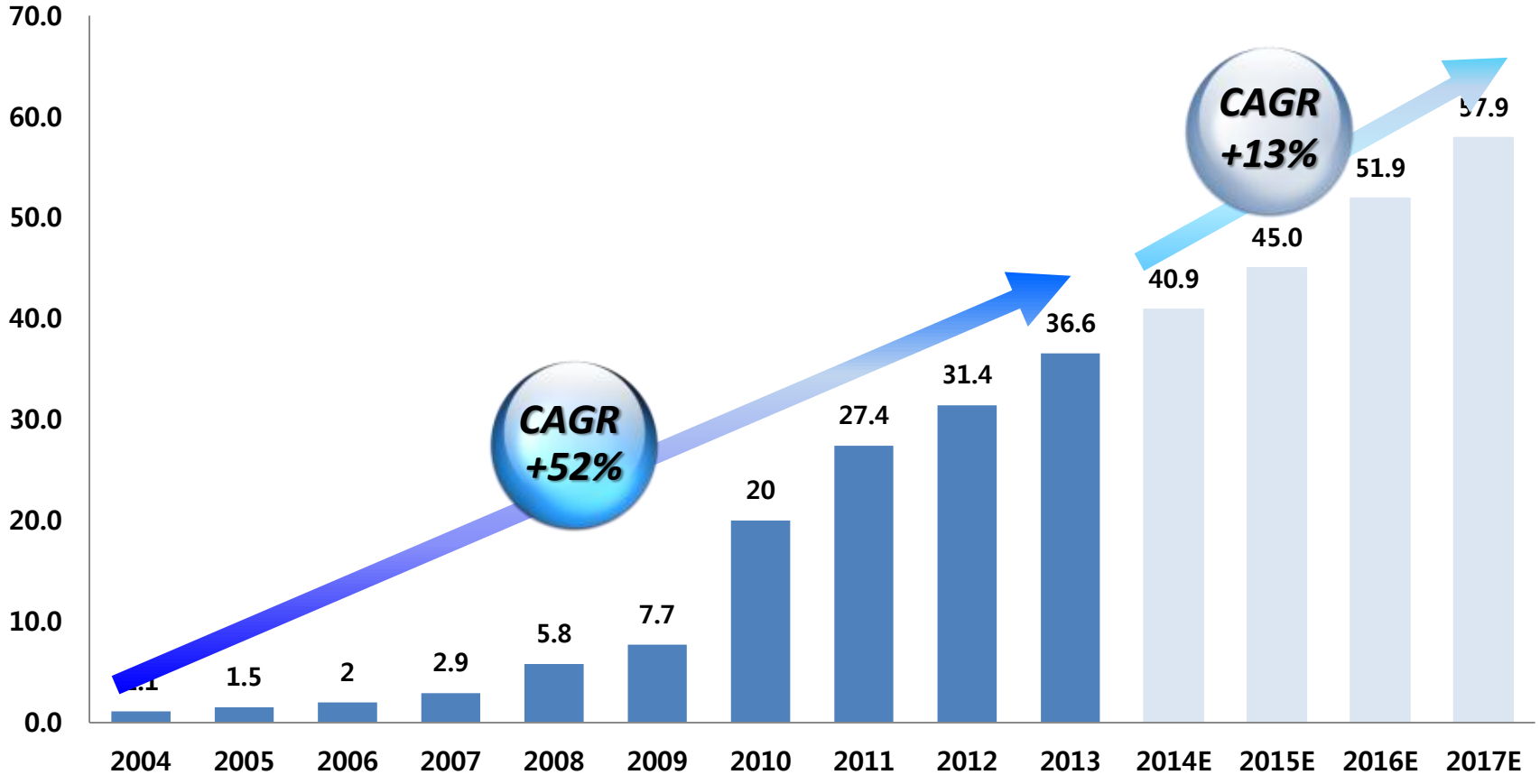
- Established the Energy Management System (H-GEMS)



3-6. Renewable Energy Business - Solar

Sunshine of the Life

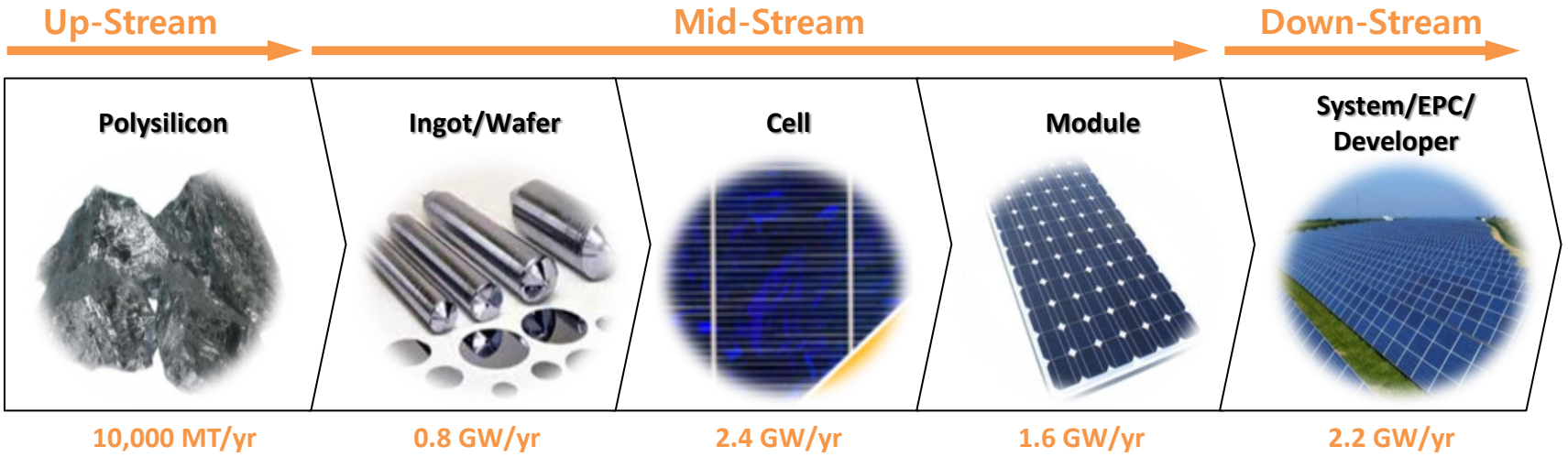
- Prospect of Solar business



* Source: IHS Integrated PV Market Tracker

3-7. Renewable Energy Business – Solar (ctnd.)

- Vertical Integration of Solar business



Hanwha Chemical

Hanwha SolarOne

Hanwha Q CELLS

Hanwha Q CELLS Korea

EPC Hanwha E&C

Equipment Hanwha TechM

EVA Hanwha L&C

Finance
Hanwha Securities
Hanwha Asset Management
Hanwha Life Insurance

IT system Hanwha S&C

Global Network Hanwha Trade

3-8. Renewable Energy Business – others

Sunshine of the Life

Battery Material

- Products

  : LFP (lithium iron-phosphate)
  → High Safety, Long cycle-life
  → Gained Patents

- Applications

- Production

  - Established the 1,000 MT/yr scales plant for cathode material in 2010
  - Expansion plan up to 20k MT/yr by 2020

Hydrogen Storage Materials

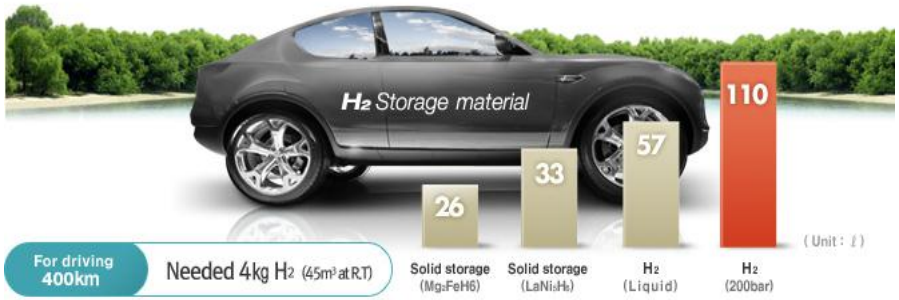
- why?

  - The exhaustion of fossil fuel
  - Environmental regulations

  ➔ Needs for Hydrogen Energy

- Products (R&D stages)

  : Solid type HSM for safety and efficiency



3-9. Green Communications

Sunshine of the Life

Carbon Trust Standard (CTS)

- **Global certification system** of authority which was first enforced in 2008 by Carbon Trust
- Over 800 global firms have achieved the certification worldwide
- HCC have been certified first among petrochemical company in Korea
- Needs to reduce over 4.5% per 2yrs


CERTIFICATE OF ACHIEVEMENT

Hanwha Chemical Corporation

Green Certification

- **Public Certification** for Green Technology & Green Project
- Government supports for Investment or Tax
- HCC was certified the products & technology for **secondary battery materials**

Green Certification


녹색기술제품 확인서

산업통상자원부장관


녹색기술 인증서

산업통상자원부장관

Carbon Disclosure Project (CDP)

CARBON TRUST STANDARD
REDUCING CO2 YEAR ON YEAR

- Disclosure the carbon management information to financial institutions for the corporate sustainability assessment
- HCC joined in the CDP since 2009 and were selected by CDP as **an exemplary company of the raw material sector** in 2011


탄소정보공개프로젝트(CDP)

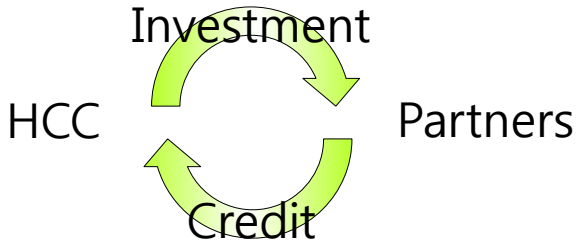
Awards

Shared Growth with Partners

- **Sharing HCC's technology and know-how with partners to maximize synergies**
  - GHS·Energy Mitigation Service
  - Technical Service
  - Quality Management Support Service
  - ESH Consulting Service

- Other Business Support Service
  - Operation of the Shared Growth fund etc.

Under the 'Emission Trading Scheme',
Win-win strategy with partners through 'off-set' trading



Contents

4-1. Risks of Climate Change

GLOBAL WARMING

Regulation on GHG

Risk on Regulation

Compulsory reduction & extra cost incurrence

Risk on Supply Chain

Cost increase of raw material & parts

Risk on temperature rise

Asset damage, project delay, a change on pattern of customer purchase

Increase on social request

Risk on reputation

Discredit of customer and investors

Risk on product&technology

Change of Competition area due to new technology development

Risk on Sue

Class action

4-2. Opportunities of Climate Change

Temperature Rise

Insurance
Product related to weather

Building
new technology on cold/hot

Clothing
Cool Biz Industry

Electrics
New model development
(ex. refrigerator, air conditioner)

Green Energy Industry

New Renewable Industry
Development of New Technology
(ex. Solar, wind power)

High-efficiency electronics
Development of Hybrid car, LED

Carbon Market

Finance
Carbon Fund, development & investment on financial product related to GHG emission credit

Company
Investment on emission credit trading, CDM business

Consulting Company
Consulting on technology/financing/emission trading sales.

- Planning the mid & long-term strategy in response to the climate change
- Internally, performs the energy-saving activities based on low-carbon organization culture
- Externally, promotes new business related to carbon market

Green growth by Change of awareness about Climate Change

4-3. The Role of Government

- Emission Trading Scheme(ETS) is not Regulations,
  but it is a way to minimize the GHG Reduction cost by market mechanism.

- It is very important to establish 'the allocation plan' reasonably.
  - Over-allocation can cause 'Market Crash'
  - Limited allocation for the new business can cause 'shrinkage of investment'

- It is needed to simplify 'off-set trading process' and activate 'future trading'
  for activating the emission trading market

- Preparation to global emission trading


Thank you