

Energy Audit Program in Korea

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Kyung Soon, Park
Global Project Division

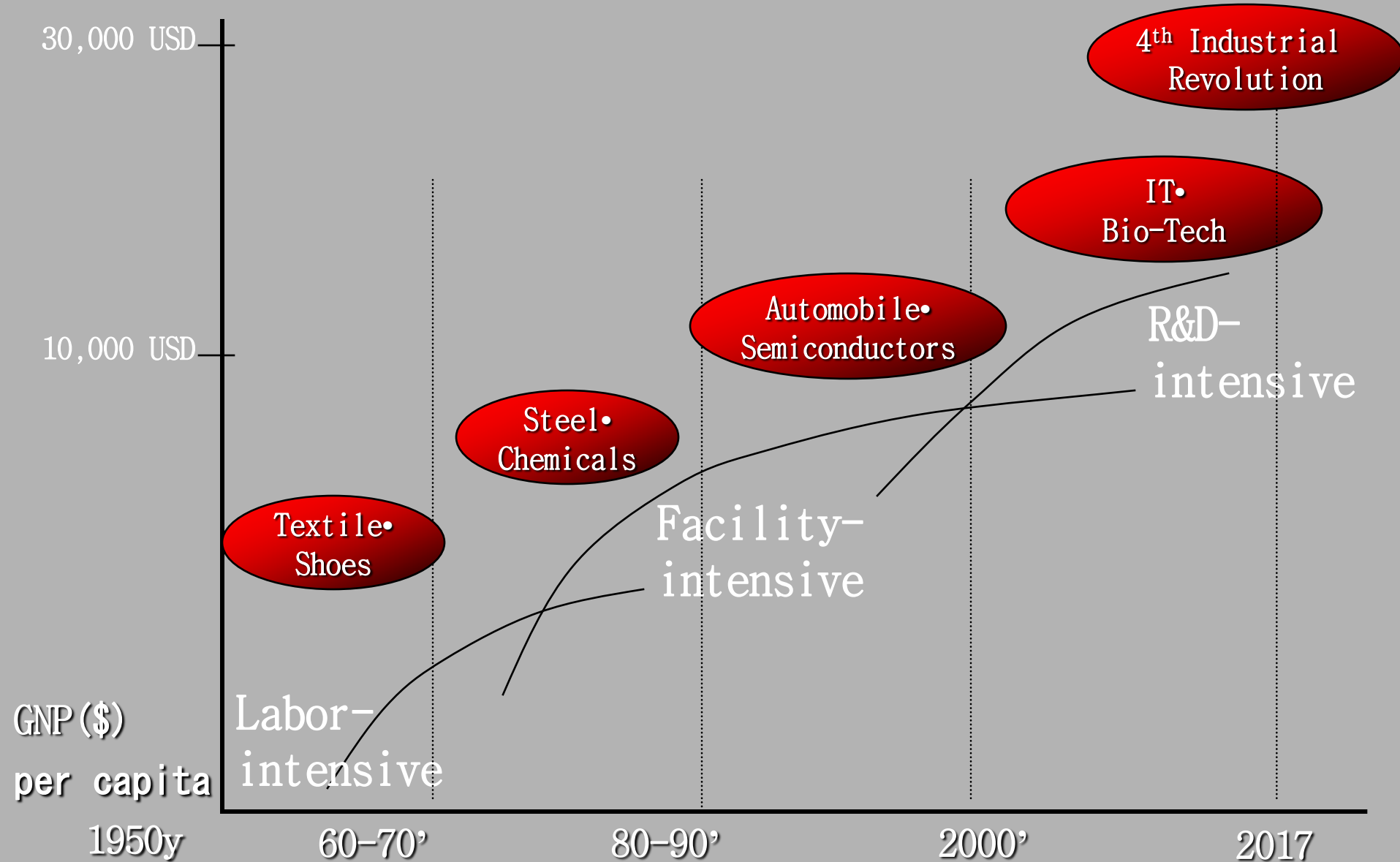
A brief History of KEA

Where are we from?

There was an emergency meeting
to cope with energy crisis in late 1970's
by the decision-makers of Korean economy.



Industrial Development process of my country



Petroleum Cost in Korea till 2000s

Price (\$/bbl)

40

30

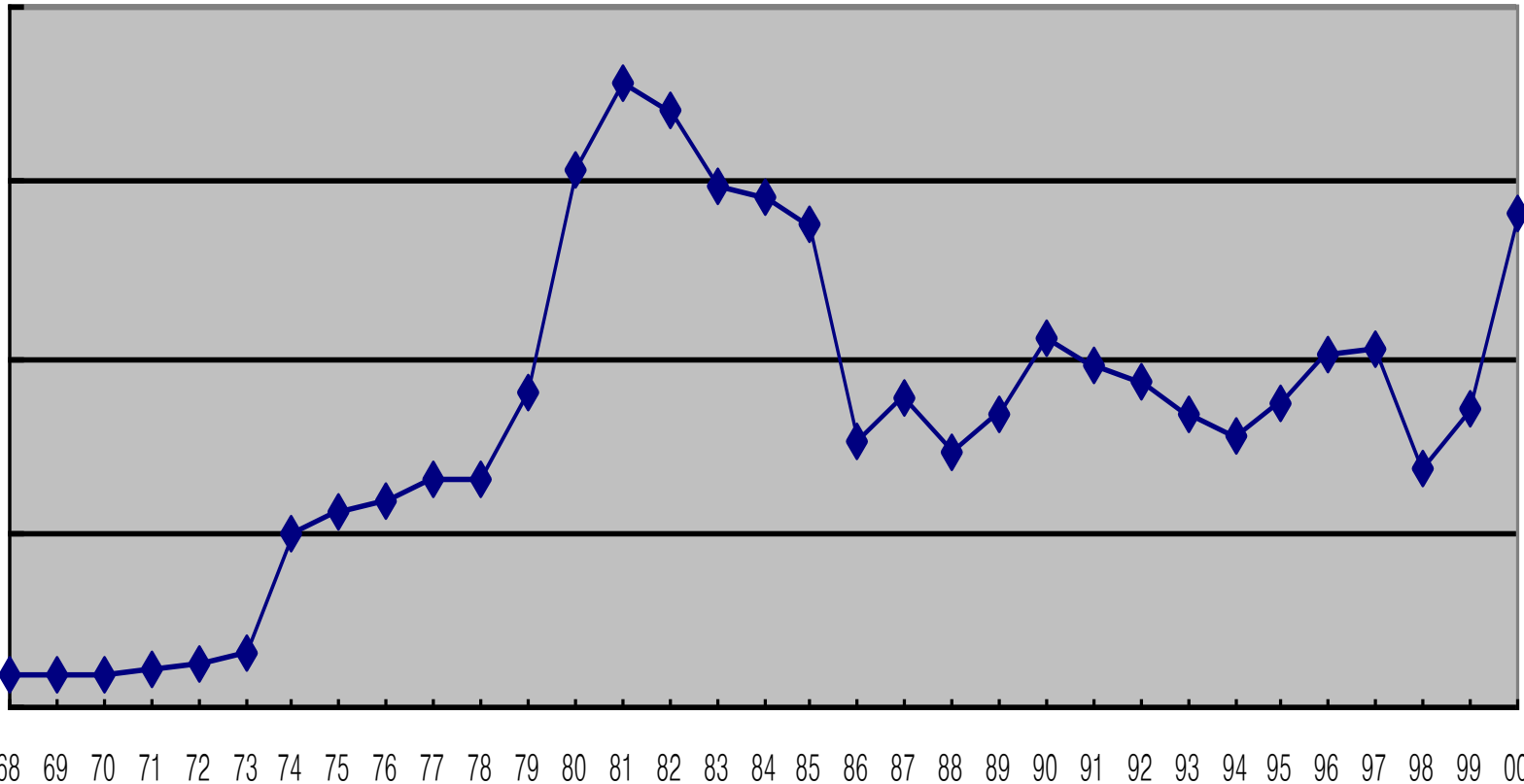
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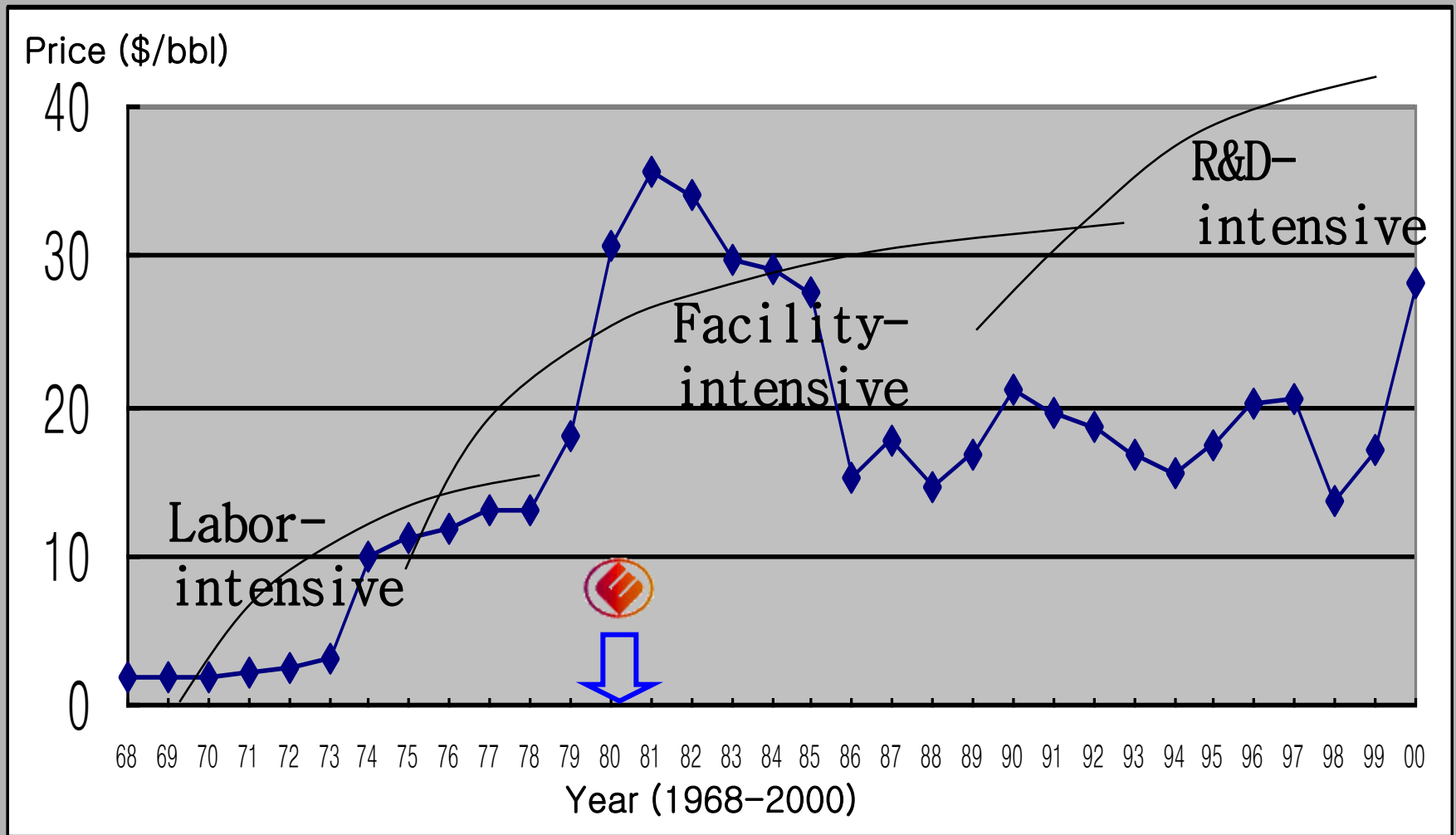
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Year (1968–2000)



Put two things together (Industry vs. Petroleum Cost)



Then, Have we reached or passed the so-called decoupling point?
We are now sure of that, however,...

What I want to talk about is

- The concept of Energy Audit
- The environment of Energy Audit
- How to do it?
- Supporting Activities
- Training and Quality Control
- EA activities

The Concept of Energy Audit

Financial audits and energy audits are close kin.

Two Different words

Energy Audits :

is the general term for a systematic procedure that aims at obtaining an adequate knowledge of the energy consumption profile of a building or an industrial plant and at identifying and scaling the cost-effective energy saving opportunities.

Energy Assessments :

identify overall energy use in manufacturing processes and highlight opportunities for best energy management practices for industry, including the adoption of new, efficient technologies.

Different but related concepts

“Saving”

1. Rescue from harm, danger, or loss.
2. *Avoidance of excess expenditure; economy.*
3. *A reduction in expenditure or cost.*
4. Something saved.

“Energy Conservation”

1. The act or process of conserving.
2. *Preservation or restoration from loss, damage, or neglect:*

The Environment of Energy Audit

Things around EAP

Face of environmental crisis



Smokestack



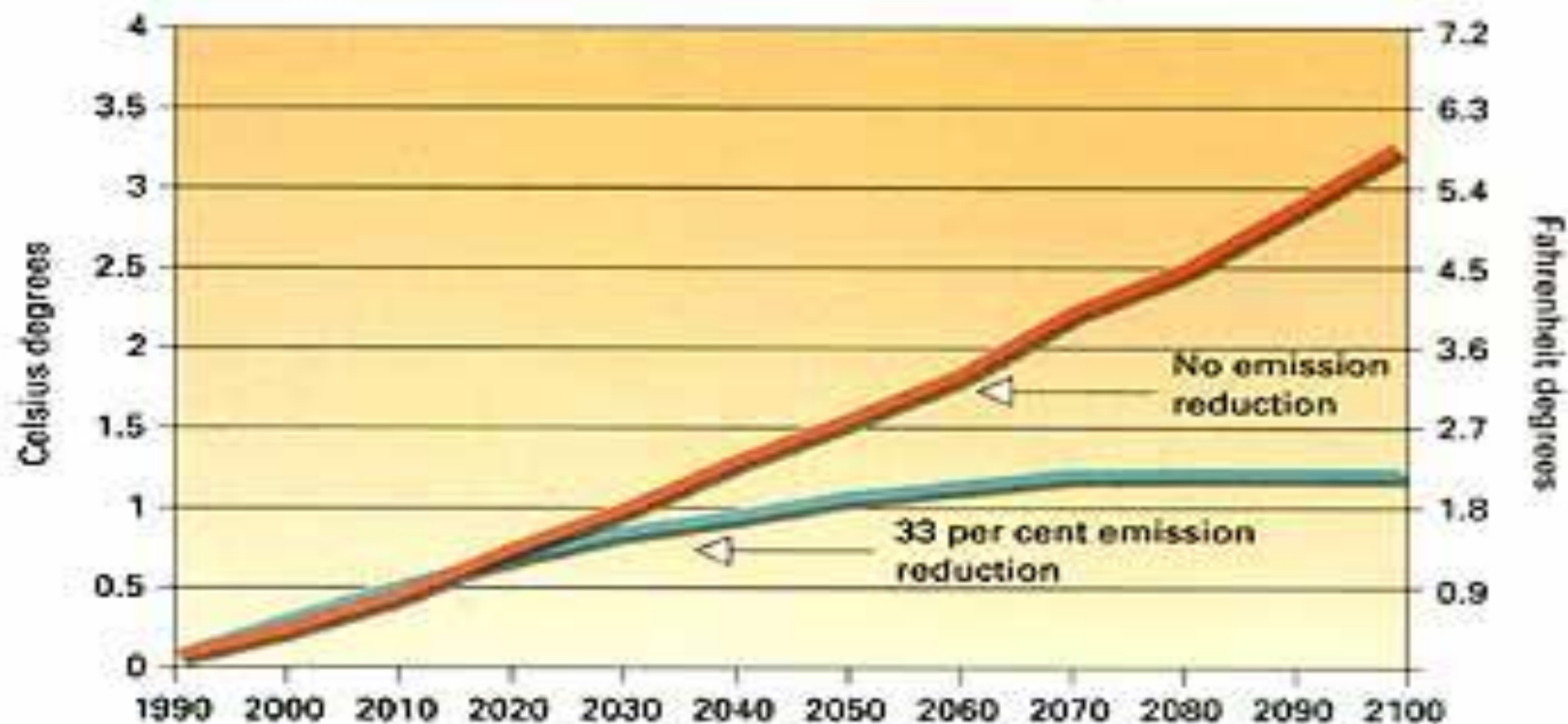
Nature



<http://www.climatehotmap.org>

What will happen in the future?

How average global temperature might increase*



* Increases above the 1990 average global temperature.
Source: Intergovernmental Panel on Climate Change, a United Nations scientific organization.

How to do it?

Participants, Procedures,...

The Key Player of Energy Audit Program

MOTIE : Ministry of Trade, Industry, and Energy

KEA : Korea Energy Agency

EA_(Energy Audit) Firms, ESCOs_(Energy Service Companies)

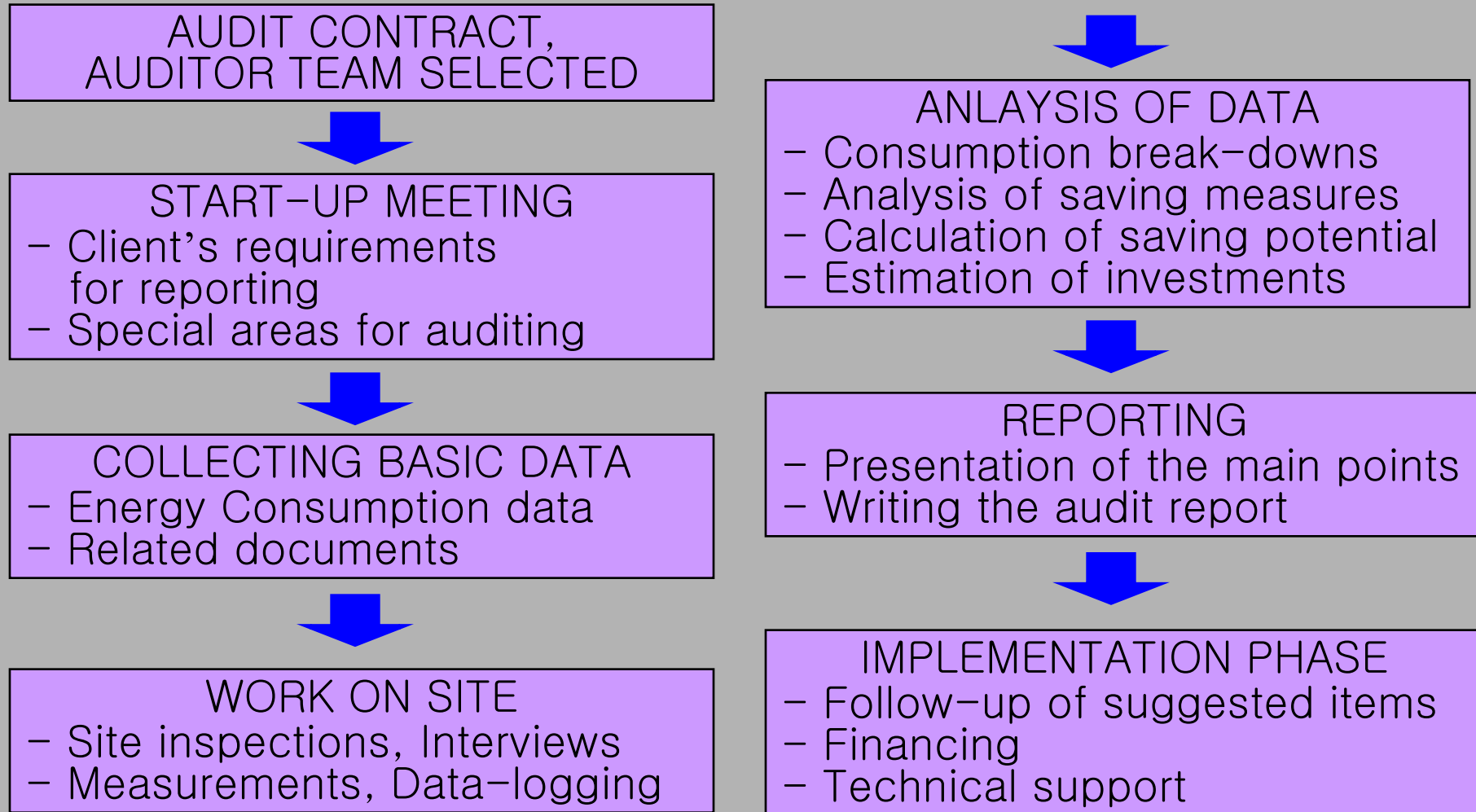
Energy Audit Client

- In-depth Audit : Industry, Building
- Free Audit : Small & Medium Sized Industry

Roles of key players



General Procedures of Energy Audit



Measuring Instruments I (EA Div.)

The volume of Instruments : 49items, 218sets

■ Infrared Camera (3EA)



■ Ultrasonic Flow-meter(8EA)



■ Infrared Moisture Meter(1EA)



■ Data Logger(5EA)



Measuring Instruments II (EA Div.)

Electricity Analyzer (3)



Combustion Gas Analyzer (12EA)



etc.



Process Simulation Software and More...(EA Div.)

<Software List>

Aspen HYSYS. PROCESS

Aspen HTFS. TASC

Aspen HTFS. APLE

FLUENT PACKAGE

THERMOFLEX

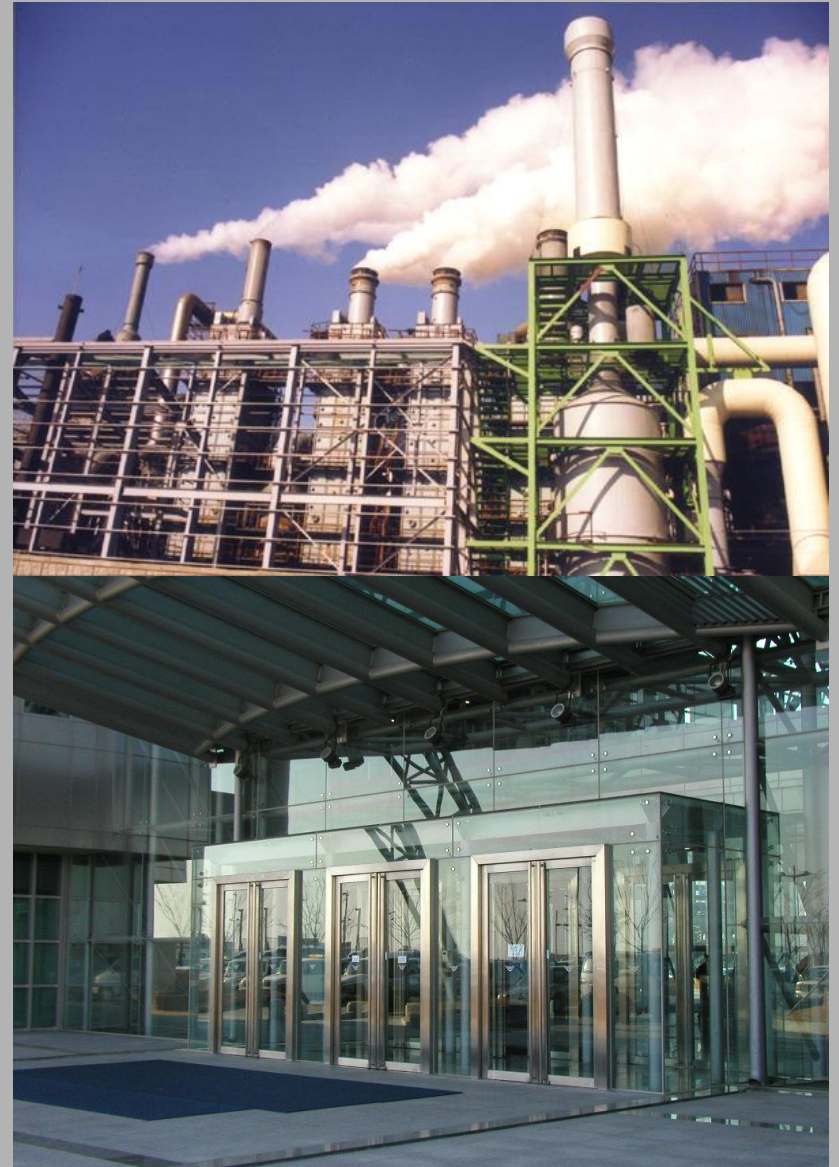
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Energy Audit Work on Site



My Colleagues at Work on Site



Supporting Activities

Promotions, Regulations, Several Solutions of Barriers

Different Approaches-Different Needs

The promotion level of
Energy Audit



Mandatory by law →
Low Need for
promotion

Voluntary →
Promotion is
essential

Several Barriers of EA

Free Audit may have low values
Energy saving is not “very exciting”

	Audit	Investment
Companies	<ul style="list-style-type: none">– Profitability– Right Contact– Time– Knowledge– Money– “Spy(Confidential)”	<ul style="list-style-type: none">– No Core Business– Other Investment more profitable– Environmental issues– Time– Money– Knowledge
Buildings	<ul style="list-style-type: none">– Many Decision Makers– Money– Knowledge	<ul style="list-style-type: none">– Long Payback Time– Financing– Knowledge

Solutions

Efficient Administration(*well organized*)

Creditability of Auditors

- Certification
- Quality Control

Stick and Carrot

- Information + Subsidy + Financing
- Tax Reduction
- Mandatory by law(from 2007 to present, 5 years term)

Training and Quality Control

What we should do for better Quality?

Skill-sets that Energy Auditors need

- Technical knowledge
- Experience in working on site(measurement, etc)
- Basic knowledge of safety on site
- Basic training in energy economics
- Basic training in marketing skills
- Observing skills
- Communication skills
- Confidence

Energy Auditor Training includes

- Basic academic training as background
- Procedure training on energy auditing
- Training on how to apply the theoretical skills in practice
- Training on site work :
observing, measurement, etc
- Training on how to find the economic saving potential
- Training on how to focus and engage the audit work

Experience

- Experience is very important and cannot be gained through training only
- Auditors usually become specialized in a certain specific field (specific industry, building, co-generation, etc)
- Working together with an experience auditor is the best way to learn

Quality of EA

- The market will eliminate poor audit work, but this takes time
- Authorization for a limited time is one approach
KEA introduced “*EA Firm Rating System*” for QC.
- Sticks from Operating Agent :
Cancellation of Authorization
- Completion of a certain number of approved audit report is a good proof of the auditor’s skill

Certification of Auditors

- The Energy Auditor Certification was introduced by KEA. However, it was not so successful as we have anticipated in the beginning.
- But, still, it could be one option.

EA activities

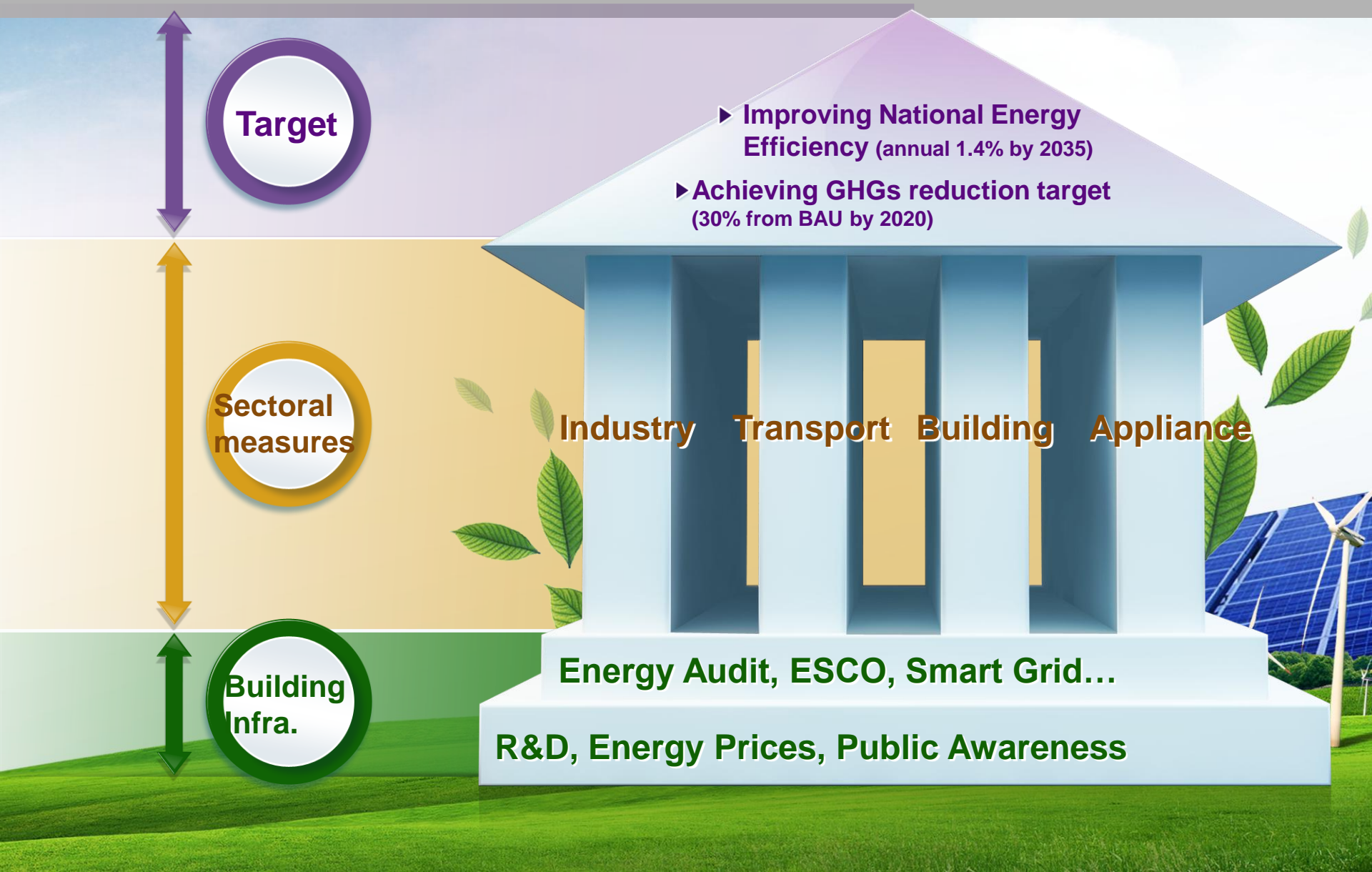
Voluntary & Mandatory EA system

EA activities of Korea

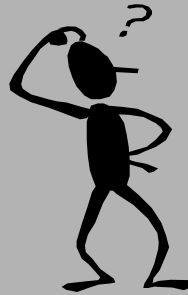
Domestic	Voluntary	Mandatory (1 period)					Mandatory (2 period)					Total
	(`80~`06)	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	
Project	2,531	43	21	23	11	13	13	14	10	12	11	2,702
Saving (ktoe/y)	3,086	178	340	367	134	156	136	166	174	216	256	,5209
Rate (%)	9.9	7.9	11.2	8.2	10.5	6.6	4	4.4	4.2	8.2	6.2	7.4

Overseas	2009	2010	2011	2012	2013	2014	2015	2016	Total
Project	1	1	2	2	2	3	2	2	15
Saving (toe/y)	59,034	2,377	10,656	6,277	19,114	10,997	5,044	10,639	124,138

[Ref] EE policy Implementation of Korea



Question and Comments



Thank you !

(kspark@energy.or.kr)

[FYI] General Energy Saving Data

How much can we achieve?

Energy Cost relative to total Production Cost

Industrial Sector	Share of Energy Cost
Ice	70%
Cement	55%
Ammonia	50%
Aluminum	30%
Steel	30%
Glass	30%
Fertilizer	25%
Paper	25%
Ceramics	20%
Metallurgical	15%
Textile finishing	12.50%
Food products	10%
Oil refining	7.50%

General Energy Saving Potential

Industry	Potential Reduction in Energy Use
Metals	20–45%
Chemicals	25–40%
Petroleum	30–45%
Cement	10–50%
Food	25–45%
Glass	30–40%

- Reference : Manual on financing energy efficiency project