

The 3rd WORLD CM CONTEST

Donghae Bio-mass Power Plant CM



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Donghae Bio-mass Power Plant CM

I . Project Summary

I. Project Summary

1. The whole view

KOREA EAST-WEST POWER CO.,LTD.



동해 바이오매스 발전소(30MW x1기)



I . Project Summary

2. Project Summary

KOREA EAST-WEST POWER CO.,LTD.



Owner	Korea East West Power Comapany
Participation Company	• Design : EWP, KOPEC • Construction : Posco E&C • CM : Owner's CM • Material Supply : Boiler- Andritz, Turbine - Siemens
Adress	231, Guho-dong, Donghae-si, Gangwon-do, Korea
Type of work	☐ Civil ☐ Architecture ☒ Industry-Environment Facility ☐ The others
Detail Process	Bio-mass Power Plant
Business Scale	30MW × 1
Period of Business	2011.12 ~ 2013. 7 (20 Months)
Total Expense	₩ 141,487,000,000

Donghae Bio Mass Power plant Construction CM

II. Major Business of CM

- Project Management
- RISK Management
- Process Management
- Construction Management
- Quality Management
- Safety Management

II. Major Business of CM

Total Project Management

● Project Management

1. Main Contents of CM Business

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STEP	Details of Business	Role Allocation		
		Owner	Designer	Constructor
Common Task	Business meeting with construction participants	Supervision	Cooperation	Cooperation
	Licensing and public service	Supervision	Cooperation	Cooperation
Pre-Enforcement Design	Write general plan and enforcement plan of arrangement	Supervision	Cooperation	-
	Write Invitation to bid	Supervision	Cooperation	-
Enforcement Design	Establish ordering plan	Supervision	Cooperation	-
	Modify enforcement design and Review connectivity	Supervision	Cooperation	-
Construction Step	Disaster prevention , Safety-Environment management	Supervision	-	Cooperation
	Process Management and Establishing recovery of slup process	Supervision	Cooperation	Cooperation
After construction	Review plan of total test working and Confirm test working	Supervision	-	Cooperation
	Report final project management	Supervision	Cooperation	Cooperation

2. Project Forwarding Background

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- Comply with the government's expansion policy for the new renewable Energy
- Contribute to stabilize the electricity supply & demand, also vitalize the regional economy
- The first owner's CM in Korean power companys (including engineering)

3. Specialty of Owner's CM

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- Upgrade technical skills through the self engineering of basic designs.
- Develop the project of new renewable energy field through optimal selection of the location and economic analysis for the investments.
- Owner's CM group worked together as one and successfully performed.
(Optimal cost analysis and outstanding negotiation of contract)
- Construct the high-class power plant by the project management team and Construction team, by securing detail designs and construction technology

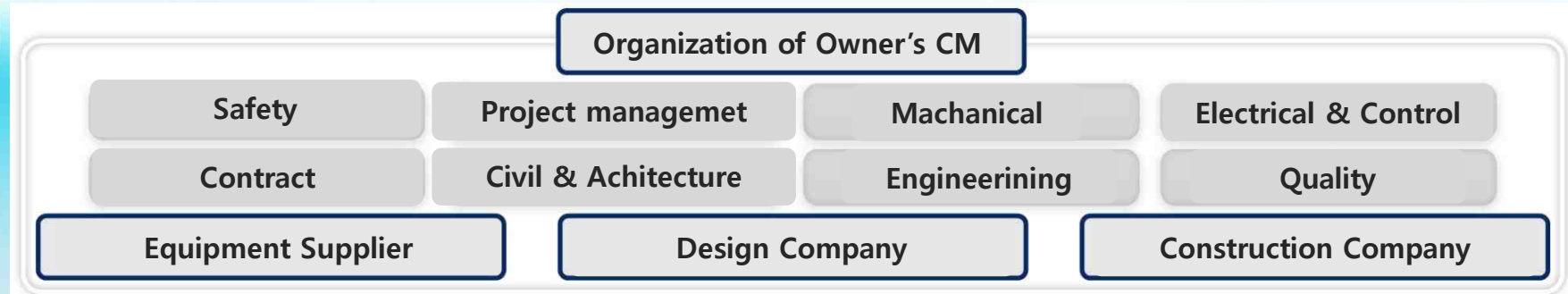
II. Major Business of CM

Total Project Management

4. Project Organization

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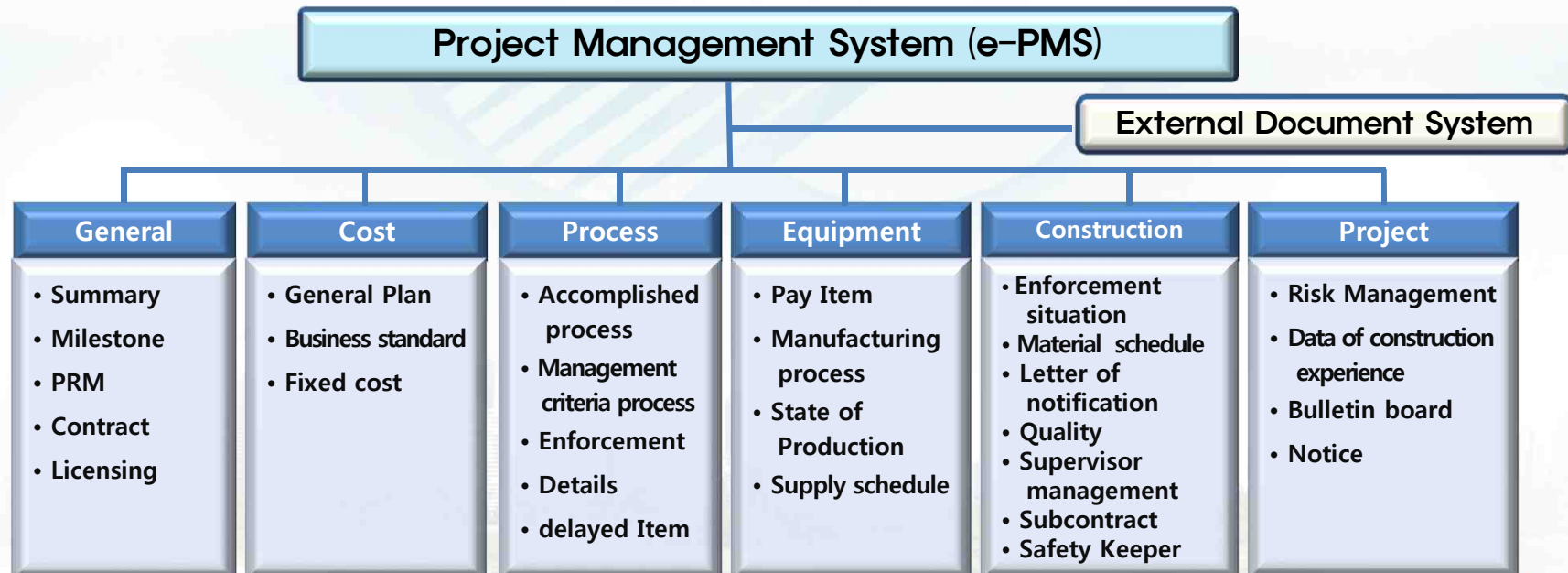
EWP



5. Operating System

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EWP



II. Major Business of CM

RISK Management

● Carry forward risk management strategically

1. Appraise and analyse by 'Risk Management System'

- Systematically appraise and analyse by management procedures of project risk
- Distinguish and appraise the risk through regular meeting
- Decide the risk level and adoption strategies of the risk
- Document the risk, also manage by designated staff

2. Risk analysis of Power plant construction

Analysis for major RISK Factor

• Shortage of experience for the construction of Bio-mass Power Plant.

• Limit of understanding expected problem in advance.



- Concern about bankrupt of subcontractors
- Concern about poor construction
- Concern about cost increase by changing design

- Narrowness of construction site
- Interfere management of existing power plants
- Local characteristics

RISK 1	Lack of Experience
RISK 2	Successful bid of low price
RISK 3	Poor location condition
RISK 4	Narrowness of site

II. Major Business of CM

Process Management

Process Management by using organized system

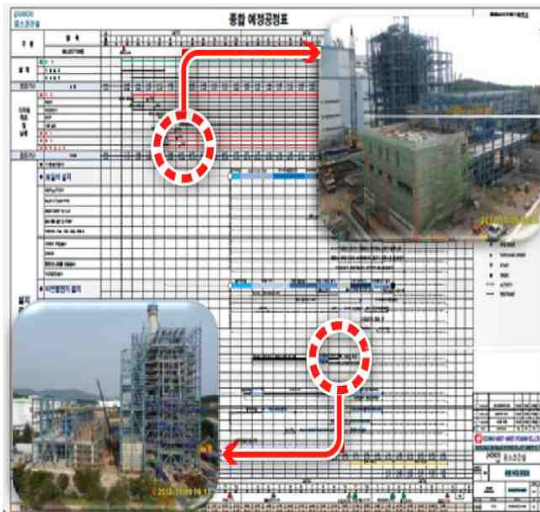
1. Web-based integrated process management in real time

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EWP

Process Management System

SITE



ePMS



Implement processing
monitoring using
computing system

* ePMS(EWP Project Management System) : EWP Construction project management system

1. Web-based integrated process management in real time

KOREA EAST-WEST POWER CO., LTD.



- Provide all processes with participants through computerized process management system
→ Immediately response in case of predicted construction delay and interference process.
/ Possible realtime search.
- Delayed processes are possible to check in real time. / Organically manage delayed reason.
→ Share the agenda among cooperative companies.
(By Providing delayed reasons and recovery measures with participants in real time)
- Set up a proposal system to check the associated processes.
- Register all design data through process management system, and minimalize user errors.
→ Resolve process management difficulties from the Fast-Track method
- Synthetically manage processes by designated staff in charge of Process management system.

II. Major Business of CM

Process Management

2. Regular PRM and Weekly & Monthly process meeting

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- Review interface between design and construction as well as interference in work classification.
- Review predicted delay processes in advance and implement analysis.
/ Share the information with project participants.
- Consult the recovering delayed process during the process meeting & PRM.

Project Review Meeting(PRM)



Weekly · Monthly Process Meeting



II. Major Business of CM

Construction Management

● Improve the equipment by technique group

1. Provide creative ideas by technique group

- Operating the technique group
: Owner's CM organization + Bio-Mass construction site + Construction company
- Operation period : 2011.12 ~ 2013.10 (23Months)

2. Major Instance : Improve the backfire trouble in fuel oil distribution system



Generate
backfire of
dust ingredient



Prevent ignition
by connected
duct for gas
recirculation



Install 4 channels
per Boiler's Day Bin



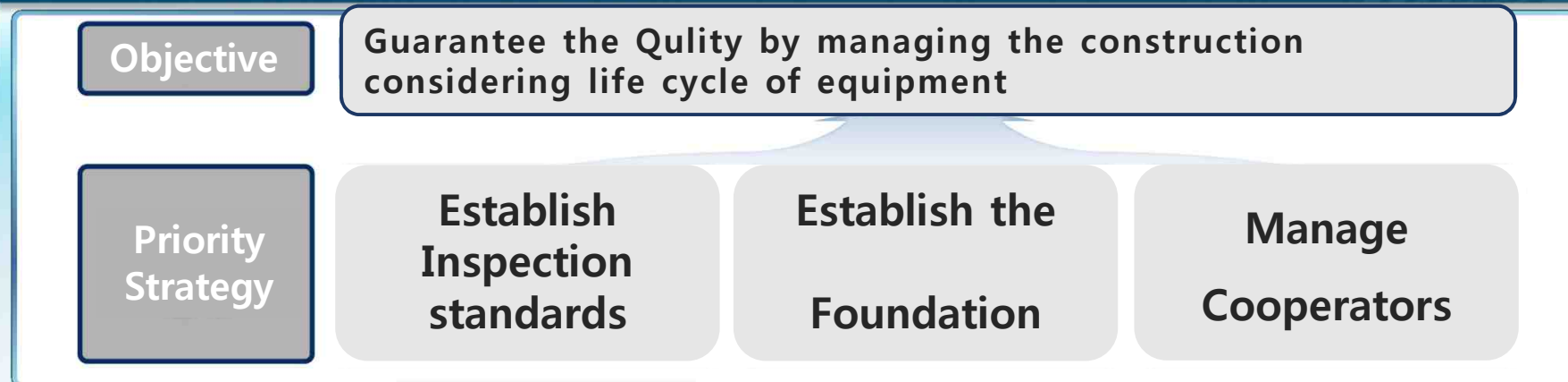
Remove the over
pressure toward
atmosphere :
2 Day Bins×4 channels

II. Major Business of CM

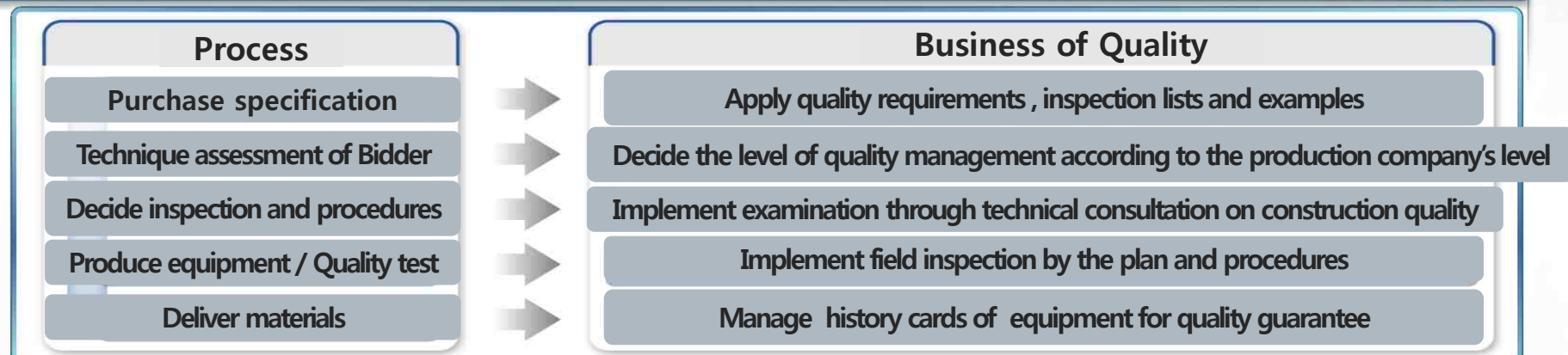
Quality Management

Systematical Quality management system

1. Strategy map of Quality management



2. Establish the process and comply with one



II. Major Business of CM

Safety Management

● Achieve a zero accident by systematical safety management

1. Safety management system

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2. Case of safety management activity

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- ◆ Manage committee of safety management and open workshop for person in charge of safety.

- Composition of committee

: University professors(2) + Occupational Safety and Health Agency(1) + Project participants(6)



Composition & management
of committee



Workshop opening



Presentation of
Safety measure

- ◆ Multiplexing of safety patrols

- Result : Point out and improve safety hazards. (more than 300)

2. Case of safety management activity

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◆ Resolution conference on Serious accident prevention and near-miss events



Resolution conference on accident prevention



Conference on near-miss event

◆ Multiplexing safety patrols

S	Shield Up	→	“개구부, 난간대 막고 ”
T	Tool Up	→	“안전망, 생명줄 치고 ”
O	Own Belt Up	→	“안전대, 안전고리 걸고 ”
P	Perfect Check Up	→	“안전작업 확인 ”

II. Major Business of CM

Safety Management

2. Case of safety management activity

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- ◆ Cooperatively inspected the construction site with project participants, also Educated on the safety management from experts



Cooperative inspection



Education on Construction Safety



Industrial Security regulation

- ◆ Implement "the autonomy program of safety"
 - Designate the safety responsibility zone
 - Observe unsafety acts / Operate the safety management register for improvement

Donghae Bio-mass Power Plant CM

Ⅲ. Major Performance

- Related Parties Management
- Construction Management
- Process Management
- Cost Management
- Design Management

III. Major Performance

Related Parties Management

Persuade the residents opposing to this construction

- ❖ After acquiring business license for electricity generation from government, we got the construction approval by continuously persuading the residents.

1. Milestone

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○ 2011. 02. 09	Make a contract of purchase
○ 2011. 04. 20	The 1 st Presentation on environmental effects for the residents(cancellation)
○ 2011. 05. 04	The 2 nd Presentation on environmental effects for the residents
○ 2011. 06. 08	Public hearing of the environmental effects evaluation
○ 2011. 07. 07	Acquire permission of power generation
○ 2011. 08. 01	Begin and discontinue construction at the same time
○ 2011. 09. 06	Apply for construction permission
○ 2011. 09. 08	Complete consultation of the environmental effects evaluation
○ 2011. 09. 15	Acquire permission of construction plan
○ 2011. 10. 07	Complete agreement of the residents (5 th meeting)
○ 2011. 11. 28	Complete agreement of Donghae city (3 th meeting)
○ 2011. 11. 29	Acquire construction permission
○ 2011. 12. 01	Resume construction / Change permission of construction plan ('13.3 → '13.7)
○ 2013. 07. 30	Completion / Begin electricity generation (20months after begin)

III. Major Performance

Related Parties Management

2. Results of consistantly persuading the residents

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- Actively persuade residents
- Discuss licensing with Donghae' local government



Construct the company housing in Bukpyeong



Construct "Dawn baseball park"



Opposition banner of residents



Presentation for residents

III. Major Performance

Construction Management

○ Arrange the site and upgrade construction method

- ❖ Modify site arrangement by additionally introducing fuel storage facilities according to the change in government policy
→ Delayed processes were recovered by improving construction method.

1. Modification of site arrangement

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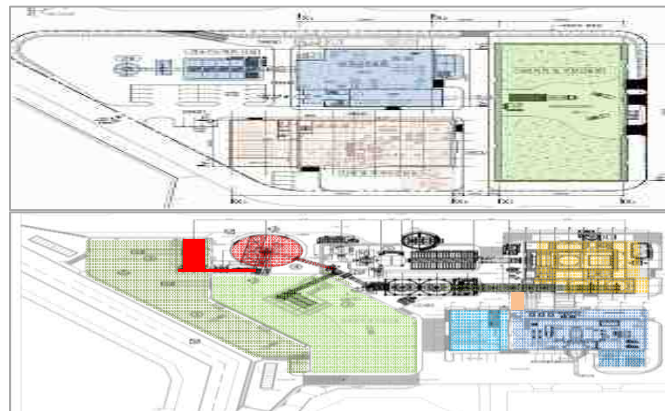


◆ Restriction conditions

- no modification of an appointed period despite changing arrangement plans.
- Increase licensing consultation with Donghae city owing to increase in road occupation.
- Implement 3 times contract of changing design owing to total modification of original arrangement plan.

Before

After

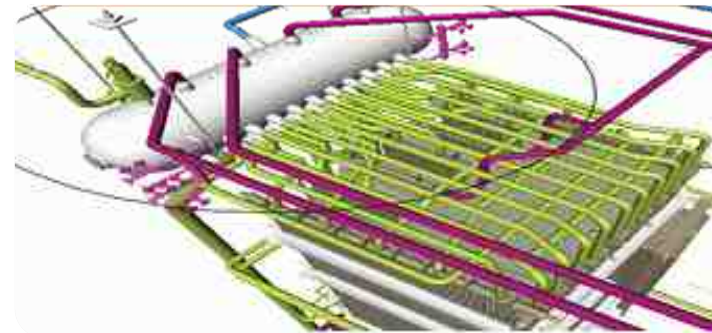


● Process recovery from building partnership

- ❖ Recovery process by communicating partners.
- ❖ Reduce the term of work and secure the quality by improving construction method in several meetings.

1. Re-make boiler drum

- ◆ Problem : Delay period for payment (Boiler installation process : Expect 3month's delay)
- ◆ Improvement of construction
 - Before : Drum → Water pipe of furnace wall
 - After : Water pipe of furnace wall → Drum [secure 25days of ramaining]
 - Secure quality by revising the work procedure regarding opposite process.
 - Day and night, double shift for welding work(10.20~11.10) and Safety inspection by stayed supervisors.



2. Improve drying method of fireproof materials

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◆ Problem

- Drying of self burner occurs local overheating in low temperature zone.

◆ Improvement of construction

- Secure the quality of fireproof materials by complying with a rate of temperature rising.



III. Major Performance

Cost Management

● Reduce cost by aggressively activating VE

- ❖ Reduce cost by actively improving facilities through creative thinking in design & construction step despite the greast capacity for the Bio-Mass power plant

1. Case of cost reduction

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Content	Before	After	Outcome
• Prevent scattering dust of Ash handling	• Construct the disposal area through the excavate material in original site	• Construct mounding(prevent against wind) by using the soil of original site	Reduce 180 Million Won
• Optimization of foundation pile	• Increase the area and quantity by changing position of the fuel oil storage building	• Review design adequacy of approach road and foundation pile	Reduce 210 Million Won
• Change material of drainpipe	• coated steel pipe (1,100mm)	• PC Box (Precast Concrete Box, 0.8×1.5m)	Reduce 180 Million Won
• Minimize field welding in the high pressure section of boiler	• Boiler 1'st Wall Panel → Divide into 9 Part	• Reduce Panel (→ 5part) • Lead to deliver the tube after working in shop	Reduce 100 Million Won

III. Major Performance

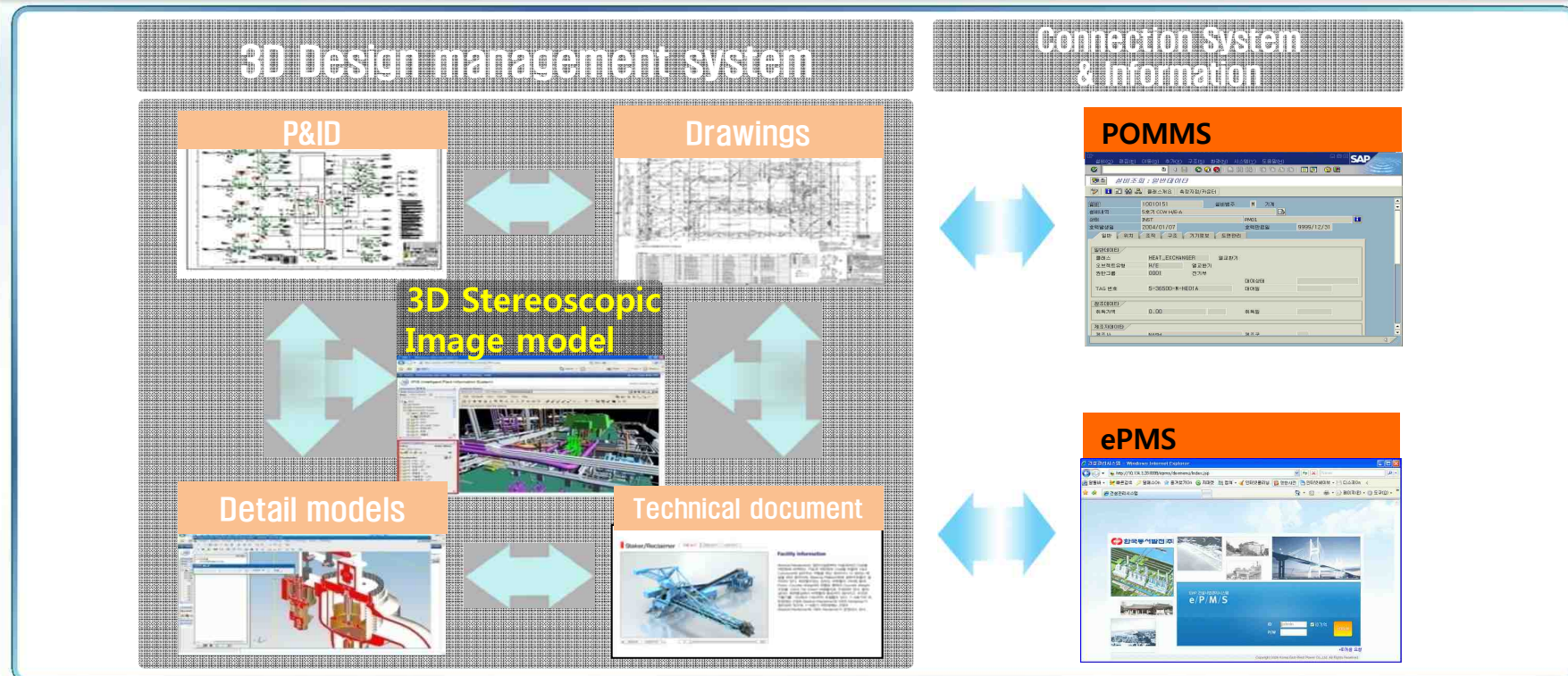
Design Management

● Design total management using 3D system

- ❖ Prevent errors of design & construction by reviewing interference in advance using the stereoscopic image program(Navisworks) for Boiler, Turbine and auxiliary equipment.

1. System of 3D stereoscopic image model

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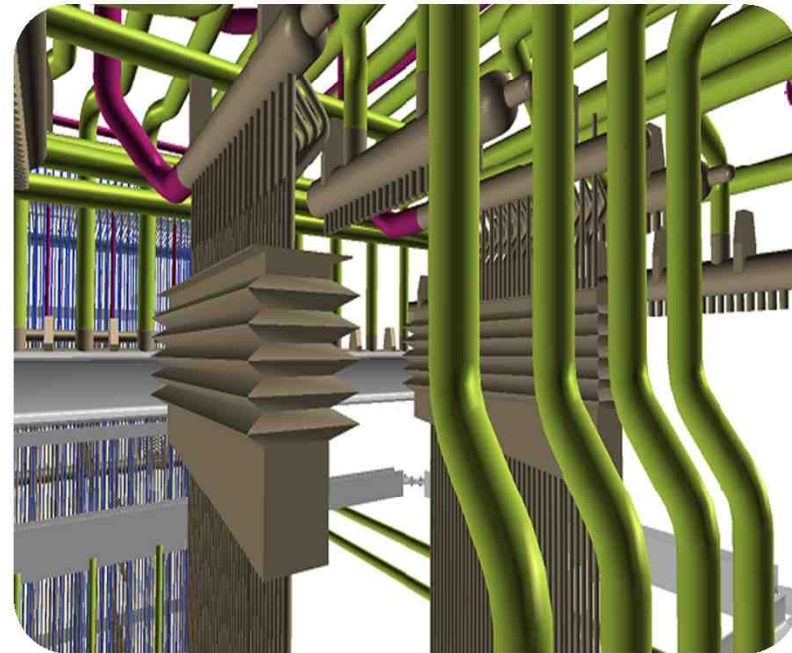
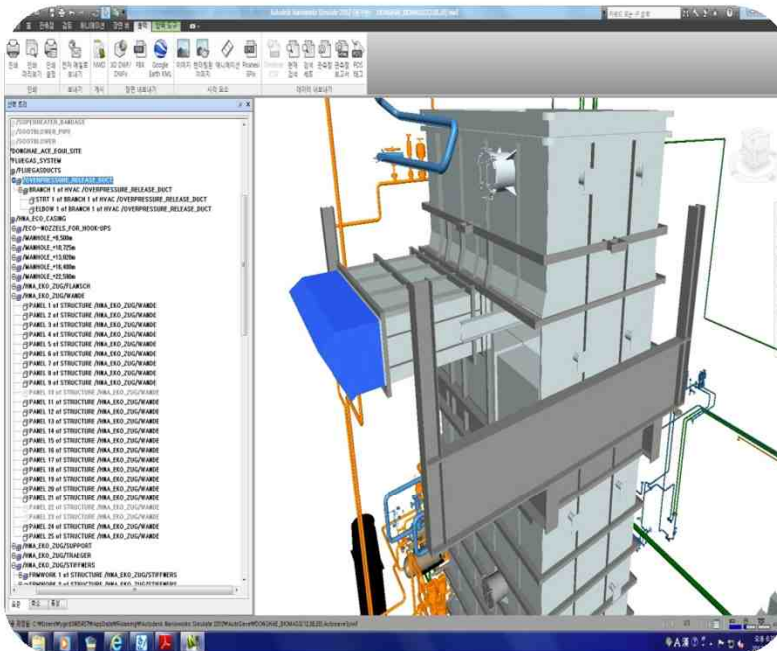
2. Application cases of 3D design system

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- ◆ Prevent errors of design by reviewing interference in advance

Review interference in advance



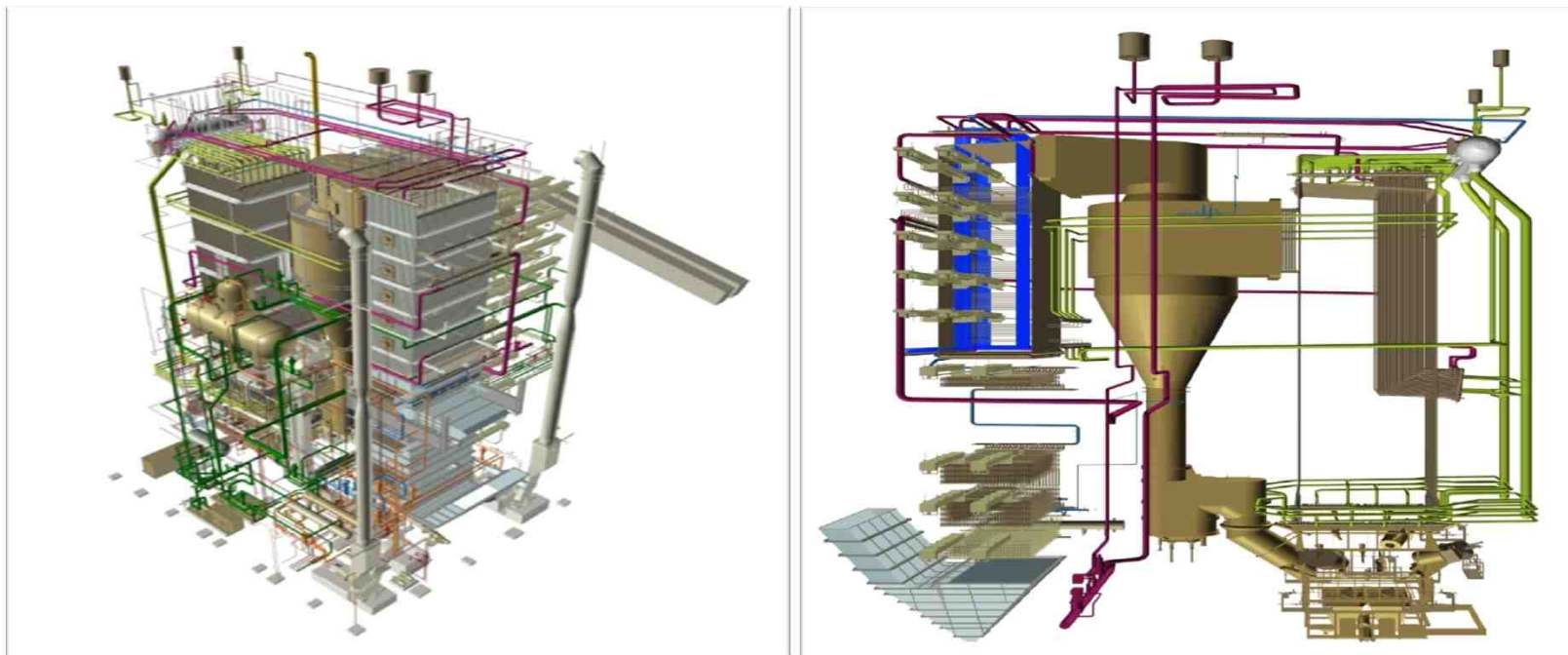
2. Application cases of 3D design system

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- ◆ Prevent errors of construction by reviewing terminal point in advance among construction companies

Review connection of terminal point



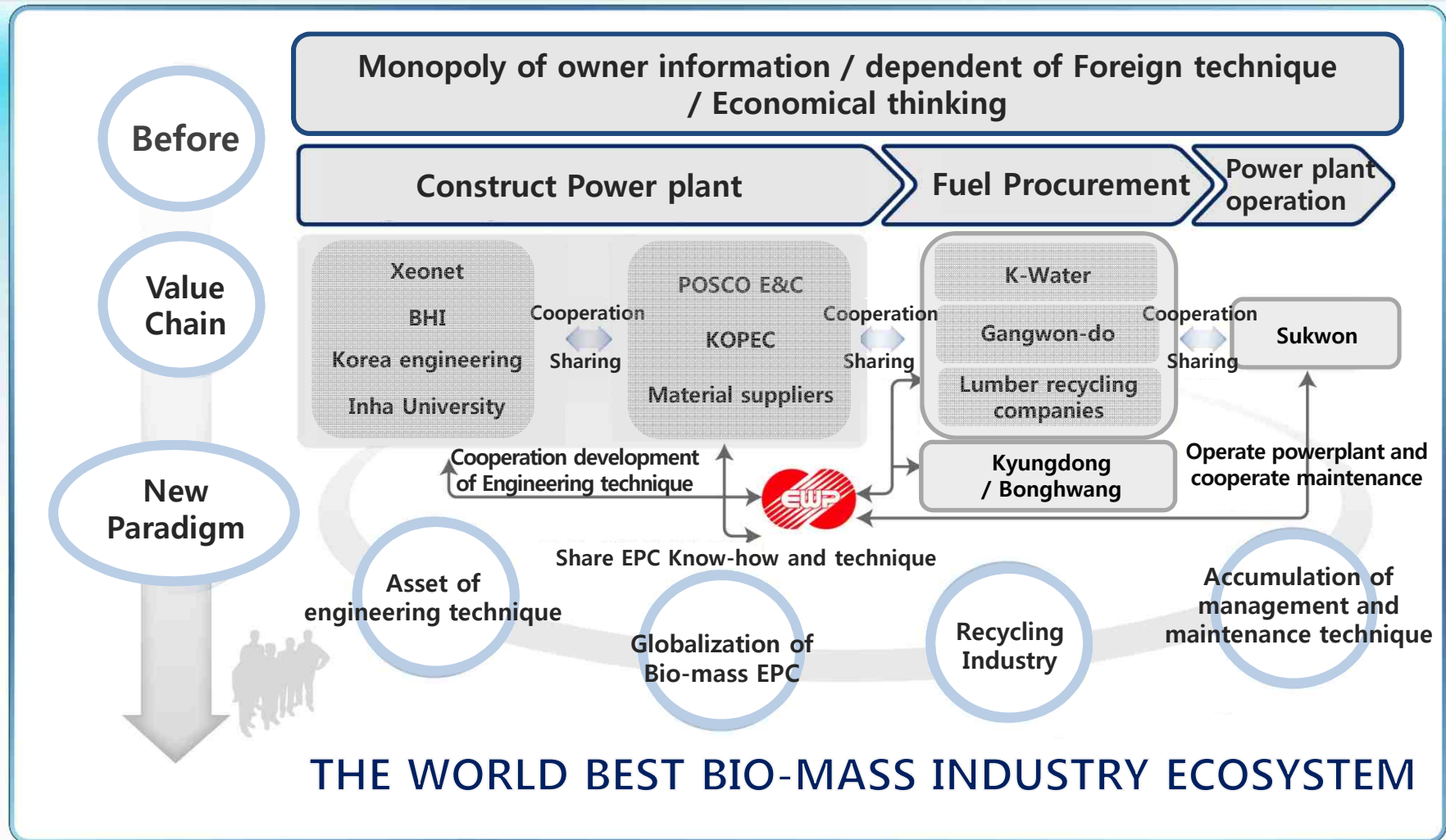
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IV. The Others

IV. The others

1. Construct ecosystem of korean Bio-mass power plant

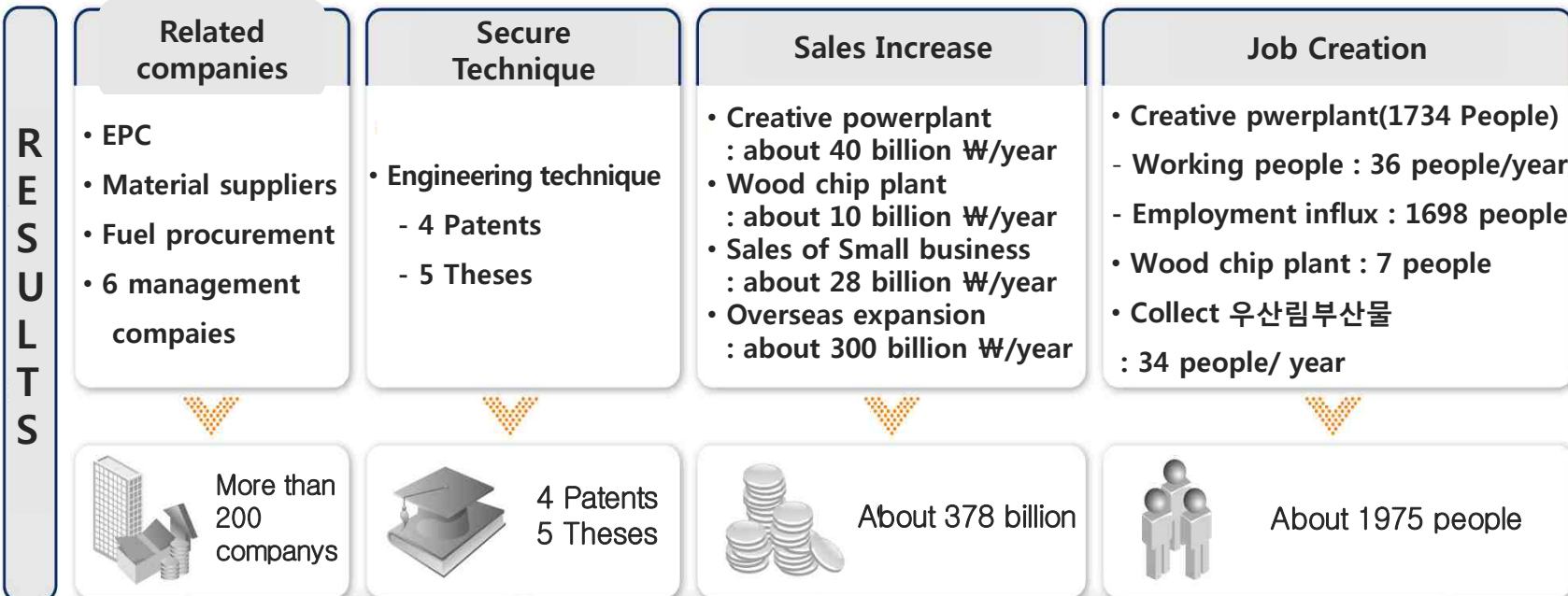
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IV. The others

2. Niche Market → Construct bridgehead of overseas expansion

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This effectiveness is infinite when we expand toward overseas based on the competitiveness of ecosystem.

IV. The others

3. Knowledge capitalization through cooperation

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- ◆ Successfully implement collaborative research with small businesses(Xeonet, Korea engineering, BHI) and Inha university after being selected as a national project. ('13.8)
- ◆ Applications · Registration of Patent (4)

Patent name	Date	No.	Nation	Company	Division
연소효율이 우수한 목질칩의 제조방법	'11.05	10-2011-0052092	Korea	Inha	Registration
저온 반탄화법에 의한 고발열량을 갖는 목질계 고형연료의 제조 방법	'12.04	10-2012-0039486	Korea	Inha	Application
고열량을 갖는 목질계 고형연료의 제조방법	'12.04	10-2012-0039487	Korea	Inha	Application
패턴인식 기술을 이용한 제어설비 고장진단 시스템 및 고장진단 방법	'12.03	10-2012-0030539	Korea	Xeonet	Application

- ◆ Publish in thesis academic journal

Thesis name in SCIE	Author	Name of academic journal	Publication year
A Study on Copyrolysis and Heating Value of Polystyrene /Wood Chip Composite as Cogeneration Plant Fuel	Ryu.J.S	Journal of Industry Engineering Chemistry (SCIE, Submitted)	2012

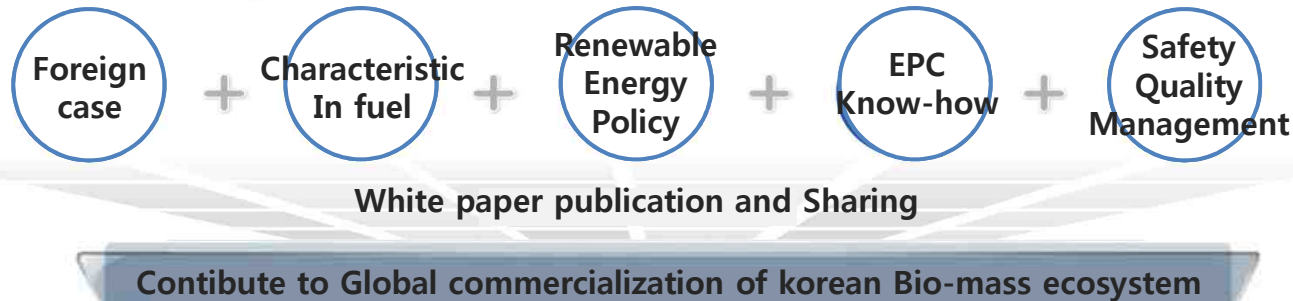
IV. The others

4. Share the success know-how

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◆ Prosecute publishing 「White book of Bio-mass」



◆ Major cases of sharing the success know-how

	Meeting of sharing the construction know-how	Field fair for interchanging the technology and the results of engineering research	Co-sponsor with Seoul University, Engineering Conference	The technical exchange with USA Bio-mass power plant
Period / Place	'13.9.5~6 / POSCO E&C	13.9.12 / Seokmoon Energy	'13.11.1 / Seoul University	'13.12 / EWP
Content	Inform to Posco E&C and KEPCO E&C of the know-how	Promotion of technology to Seokmoon Energy	Inform small businesses of the technology and experience	Introduce technology of Bio-mass power plant to private companies

IV. The others

5. Publicity activities for success of Creative economy

KOREA EAST-WEST POWER CO.,LTD.



◆ Public broadcasting / Major daily newspapers / SNS



MBC NEWS ('13.11.8)



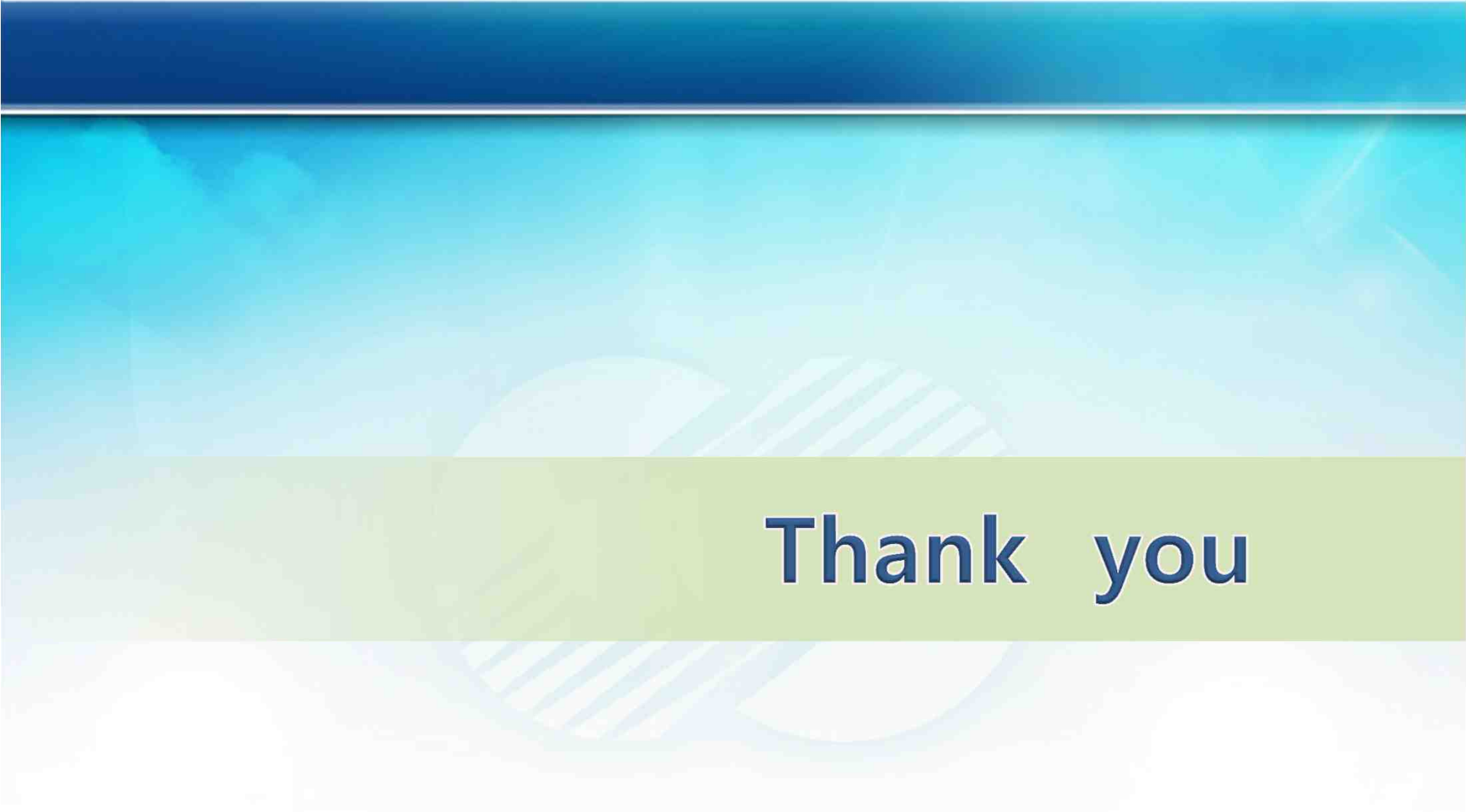
KBS NEWS ('13.11.9)



Electronic Newspaper ('13.9.26)



Blog, Twitter, Facebook



Thank you