

2013 4Q

Investment Relations

KC Green Holdings



A Global Leader in Green Business

– People & Technology Keeping Our Planet Sustainable...

“Preserving the clear sky 41 years, Global Environmental Leading Company”

Establishment	27 th Nov. 1973
Company	KC Green Holdings Co.,Ltd.
Business Area	Green Industry Holding Company
Capital	KRW11,217Million

Address	151, Yanghwa-ro , Mapo-gu, Seoul, Korea 121-817
Homepage	www.kcgreenholdings.com
CEO & President	LEE TAE YOUNG Bachelor's Degree from Seoul National University in business management MBA from Simon Fraser University in Canada Completion from Graduate School of Environmental studies in Seoul National University



< Head Office >



< Factory in Ansong si >



< Environmental Facility established
in Dangjin -Gun >

Establishment

1973 ~ 1989

- 73.11 Establishment
- 74.04 Technical License Agreement with Research Cottrell(U.S.)
- 79.09 Completed the construction of Incheon Korea Factory
- 81.07 Taked order for supplying EP (Boryong Thermal Plant)

Growth

1990 ~ 2000

- 90.09 Founded Taiwan Branch Office
- 92.08 Established R&D Institute
- 93.06 Awarded The 1st Environmental Grand Prize by Korea Government
- 94.11 Listed on the Korea Stock Exchange
- 95.03 Constructed New Headquarters
- 96.07 Acquired ISO9001 Certification
- 97.05 Acquired shares of Clestra Hauserman, Ltd.(J/V with Clestra Group, France)
- 98.02 Contracted with IHI to provide ESP (NIPPON Steel)
- 98.04 Moved Factory to Ansung

Take-off

2000 ~ 2010

- 00.01 Lee Tae Young Inaugurated as CEO
- 00.07 Founded KC Enviro Services Co.,Ltd
- 02.06 Founded KC Cottrell China Co.,Ltd (Changchun, China)
- 03.04 Founded KC Landfill Service Co.,Ltd.
- 03.12 Founded Jord KC Co.,Ltd.
- 03.12 (J/V with Jord Interantional Pty, Ltd. Australia)
- 05.03 Acquired Lodge Sturtevant Ltd. (UK) (Changed name to Lodge Cottrell Ltd.)
- 05.08 Founded KC Envirotech E&C (Fushun) Co., Ltd. In Fushun, China
- 06.04 Founded Lodge Cottrell Inc. (Houston, U.S.)
- 06.12 Founded Veolia ES&KC EcoCycle (J/V with Veolia Group, France)
- 07.09 Acquired Ansung Glass Co., Ltd.
- 07.10 Acquired Jeonglim Environment Co., ltd.
- 08.02 Acquired Hanmi Industry Co., Ltd.
- 08.03 Changed name to KC Cottrell Co., Ltd
- 08.04 Acquired shares of KC Samyang Water Systems Co., Ltd.(J/V)
- 08.12 Acquired shares of KC Energia Co., Ltd.(J/V)
- 09.01 Founded KC Cottrell Vietnam Co., Ltd.
- 09.01 Founded Lodge Cottrell India Pvt.,Ltd.
- 09.05 Acquired shares of NWL Pacific co., Ltd.

Global Leader

2010 ~

- 10.01 Split into KC Green Holdings.,Co., Ltd. And KC Cottrell Co., Ltd.
- 10.05 Founded Total Environment Planning co., Ltd.(J/V)
- 10.08 Acquired shares of NOL-TEC System, Inc. (US)
- 10.12 Acquired shares of NOL-TEC System Export Services Inc (US)
- 11.10 Acquired share of KC Ho-Nam Environment Co.,Ltd.
- 11.12 Disposed share of KC Samyang Water Systems Co.,Ltd.
- 11.12 Founded Busan-Sinho Solar Power Generation Co.,Ltd.
- 12.01 Founded KC Cottrell Taiwan Co.,Ltd.
- 12.03 Changed name Lodge Cottrell Inc. → KC Cottrell Inc.
- 12.04 Closed Total Environment Planning Co.,Ltd.(J/V)
- 12.04 Liquidated the KC Susan Solar Power Co.,Ltd.
- 12.07 Selected KC Cottrell Co.,Ltd. To the Excellent environment company
- 12.09 Acquired shares of Busan-sinho Solar Power Generation Co., Ltd. Additionally KC Cottrell co.,Ltd. Issued freely new shares.
- 12.11 KC Invall Green Energy Co.,Ltd → KC Green Energy Co.,Ltd.
- 13.03 Ansung Glass Industrials Co.,Ltd. → KC Glass & Materials Co.,Ltd.
- 13.04 KC Glass (Treasury shares incineration)
- 13.05 Founded KC air Filter tech Co.,Ltd.
- 13.05 Acquired shares of Noltec-Korea Co.,Ltd
- 13.08 Renamed KC Ho-Nam Environment Co.,Ltd. → KC Ecoenergy Co.,Ltd

Synergy Effect between Biz Units

Environmental Engineering & Construction(EPC)
Biz. Area

Environmental Services
Biz. Area

Environmental-Manufacturing
Biz. Area

Renewable Energy
Biz. Area

Major Businesses

Environmental Engineering

- Develop and manufacture environmental air pollution control facilities for sustainable global environment
- Expand Waste-to-Energy Business

Environmental Services

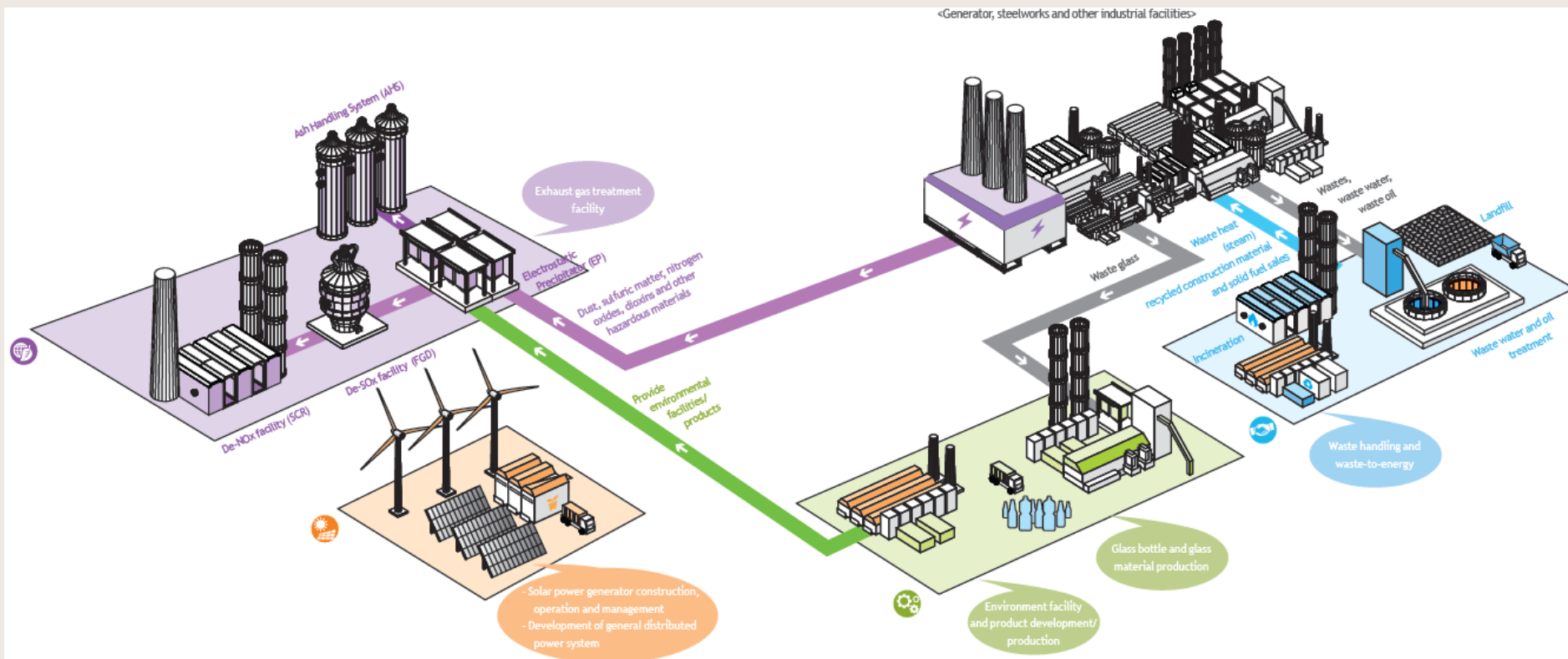
- Waste and sewage treatment system which restores nature in safe and clean manner

Environmental Manufacturing

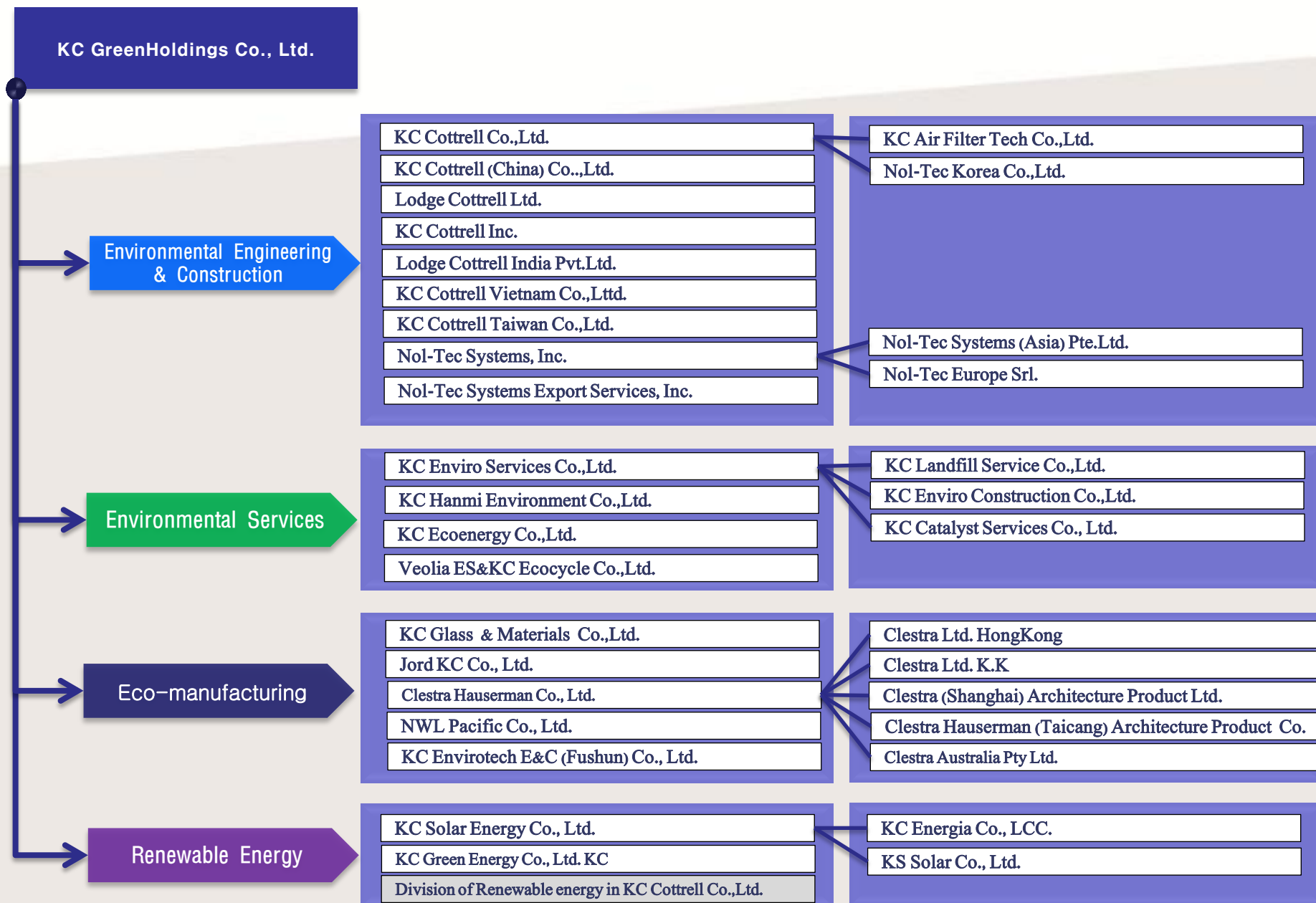
- Develop and manufacture high efficiency and high performance environmental equipment

Renewable Energy

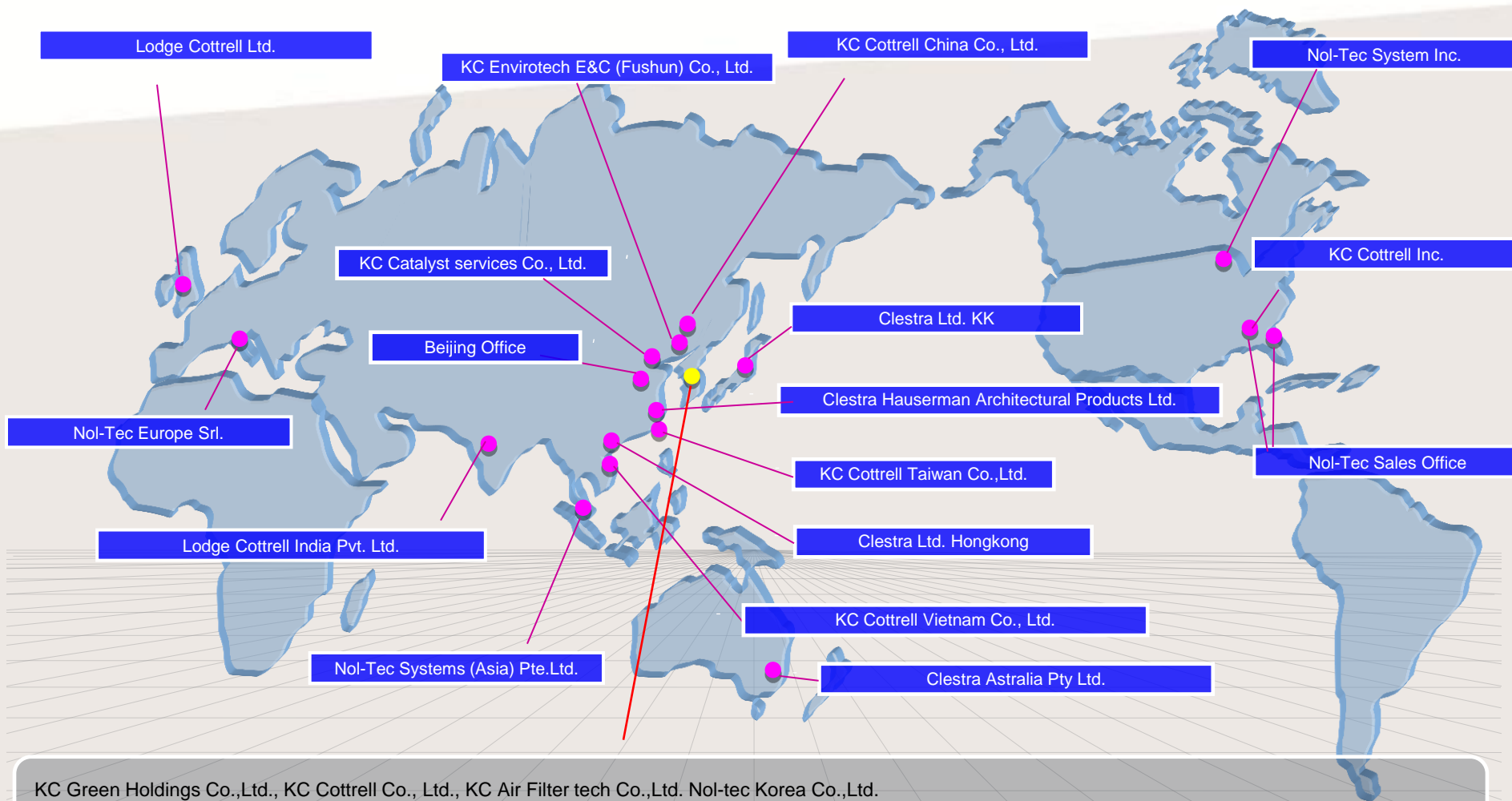
- Develop environment-friendly renewable energy for the future environment



Affiliated companies



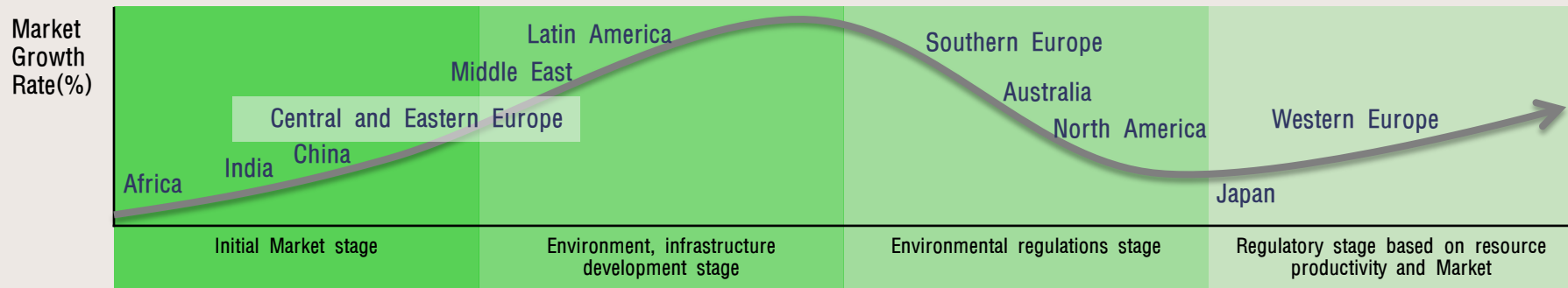
Worldwide Presence



KC Green Holdings Co.,Ltd., KC Cottrell Co., Ltd., KC Air Filter tech Co.,Ltd. Nol-tec Korea Co.,Ltd.
 KC Enviro Service Co.,Ltd., KC Landfill Services Co.,Ltd., KC Hanmi Enviro Service Co.,Ltd., KC EcoEnergy Co.,Ltd., KC Glass & Materials Co.,Ltd. , KC Environment
 Construction Co.,Ltd. , Veolia ES&KC EcoCycle Co.,Ltd.
 Jord KC Co.,Ltd., Clestra Hauserman Co.,Ltd., NWL Pacific Co.,Ltd.
 KC Solar Energy Co.,Ltd. , KC Energia Co.,Ltd. , KC Green Energy Co.,Ltd. KS Solar Co.,Ltd.

	Advanced Countries	Developing Countries
Market Situation	<ul style="list-style-type: none"> 85% of the Current Environmental Market A very large-scale investment in Environmental Infra. has already completed in significant portion The regulatory and environmental issues promote new investments and improve existing facilities 	<ul style="list-style-type: none"> Central and Eastern Europe, CIS, Southeast Asia, China, Latin America Rapid Growth in Water and wastewater treatment, waste management, pollution control, environmental monitoring and equipment sector Start growing demand in Wastewater, waste and air pollution, environmental technologies, renewable energy, soil restoration and environmental consulting
Growth Factors	<ul style="list-style-type: none"> Necessity to improve Resource efficiency for solving the global environmental problems (Climate change, Resource depletion and waste issues) Strengthening of environmental regulations Requirement of achieving high environmental performance by consumers and investors 	<ul style="list-style-type: none"> Economic development, industrialization and urbanization Need to expand and invest in environmental facilities (Water, wastewater, etc.) Need to conserve water, land, forests and scarce resources Serious pollution and resulting damage to health problems Strengthening of environmental regulations The concernment that environmental deterioration hinders the long-term economic growth and quality of life. For some industries like tourism stress on the environmental importance Increasing activities of multinational corporations in developing countries need to achieve world-class environmental performance

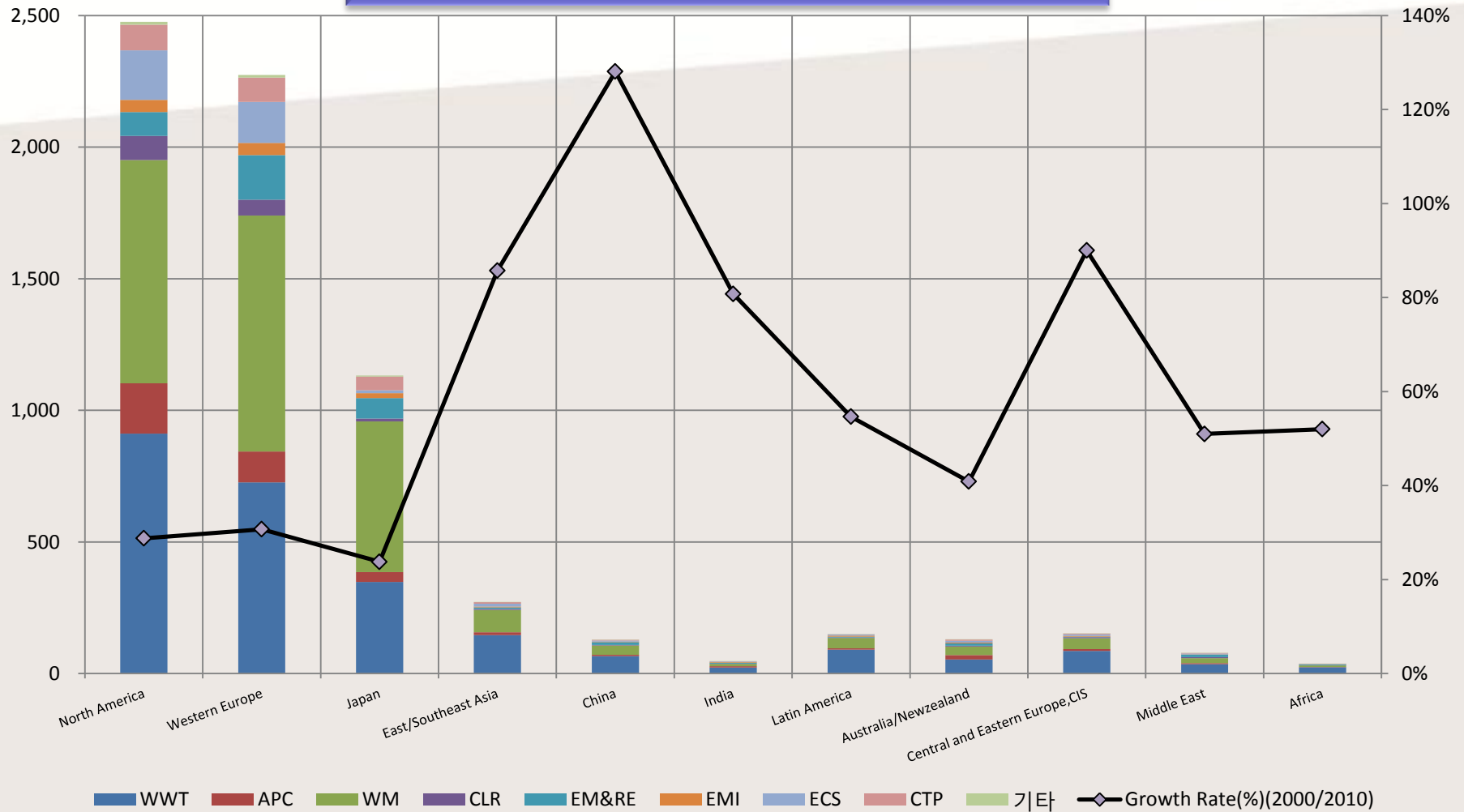
[Environmental Market Development Stage]



Status of Global environmental Market

[Billion US\$]

Environmental Market(2010) and Growth Rate(2000/2010)



WWT(Water & Wastewater Treatment), APC(Air Pollution Control), WM(Waste Management), CLR(Contaminated Land Remediation), EM(Energy Management), RE(Renewable Energy), EMI(Environmental Monitoring and Instrumentation), ECS (Environmental Consulting Services), CTP(Cleaner Technologies and Processes), NVC(Noise and Vibration Control), MPC(Marine Pollution Control)

■ The Features of the world's environment industry

1. Global Environmental Market in 2000

Unit : 1 hundred million USD

Index	WWT	APC	WM	CLR	EM&RE	EMI	ECS	CTP	Etc	Total	Rate(%)
North America	748	158	682	86	35	34	152	19	9	1,922	37
Western Europe	657	99	700	46	60	35	116	18	9	1,739	34
Japan	288	34	518	10	25	16	11	10	4	916	18
East/Southeast Asia	78	7	48	3	2	2	6	1	1	147	3
China	29	3	18	1	4	1	2	1	0.3	57	1
India	13	3	5	1	1	1	1	0.2	0.1	26	0.5
Latin America	56	4	27	2	1	3	3	0.3	0.1	97	2
Australia/New Zealand	38	12	27	3	4	2	6	1	0.1	93	2
Central and Eastern Europe, CIS	43	4	2	2	1	2	3	1	0.4	80	2
Middle East	22	3	14	3	5	1	2	0.5	0.3	51	1
Africa	15	1	5	1	1	1	1	0.1	0.1	25	0
Total	1,986	327	2,067	158	139	98	303	50	24	5,152	100
Rate(%)	39	6	40	3	3	2	6	1	0.5	100	

2. Global Environmental Market in 2010

Unit : 1 hundred million USD

Index	WWT	APC	WM	CLR	EM&RE	EMI	ECS	CTP	Etc	Total	Rate(%)
North America	912	191	848	91	91	46	189	97	11	2,475	36
Western Europe	726	118	896	60	170	46	156	92	10	2,273	33
Japan	348	38	572	11	78	18	11	52	4	1,134	16
East/Southeast Asia	146	11	85	4	6	3	10	6	1	273	4
China	66	5	36	2	11	2	4	3	1	130	2
India	23	5	9	1	4	2	2	1	0.2	47	1
Latin America	91	5	39	2	3	4	4	1	0.1	150	2
Australia/New Zealand	54	16	33	3	9	3	7	5	0.1	131	2
Central and Eastern Europe, CIS	86	7	41	4	2	3	6	3	1	152	2
Middle East	36	4	19	4	9	1	3	2	0.4	77	1
Africa	24	1	6	1	3	1	1	0.4	0.1	38	1
Total	2,512	404	2,584	182	387	130	392	262	287	6,882	100
Rate(%)	37	6	38	3	6	2	6	4	0	100	

WWT(Water & Wastewater Treatment), APC(Air Pollution Control), WM(Waste Management), CLR(Contaminated Land Remediation), EM(Energy Management), RE(Renewable Energy), EMI(Environmental Monitoring and Instrumentation), ECS (Environmental Consulting Services), CTP(Cleaner Technologies and Processes), NVC(Noise and Vibration Control), MPC(Marine Pollution Control)

■ Business Area of Affiliated Companies

APC : Air Pollution Control

KC Cottrell Co.,Ltd, KC Cottrell(China) Co.,Ltd, Lodge Cottrell Ltd. KC Cottrell Inc, KC Cottrell Vietnam Co.,Ltd, Lodge Cottrell India Pvt.,Ltd. Nol-Tec System Inc. KC Cottrell Taiwan Co.,Ltd.

WWT : Water & Wastewater Treatment

KC Hanmi Enviro Services Co.,Ltd.

WM : Waste Management

KC Enviro Services Co.,Ltd, KC Landfill Service Co.,Ltd, KC Honam Environment Co.,Ltd., KC Hanmi Environment Co.,Ltd. Veolia ES&KC Ecocycle Co.,Ltd. KC Environmental Construction Co.,Ltd. KC Catalyst Service Co.,Ltd.

CLR : Contaminated Land Remediation

KC Enviro Service Co.,Ltd.

ECS : Environmental Consulting Services

KC Cottrell Co.,Ltd.

EMI : Environmental Monitoring and Instrumentation

EM : Energy Management

RE : Renewable Energy

KC Solar Energy Co.,Ltd, KC Energia Co.,Ltd, KC Green Energy Co.,Ltd

NVC : Noise and Vibration Control

CTP : Cleaner Technologies and Processes

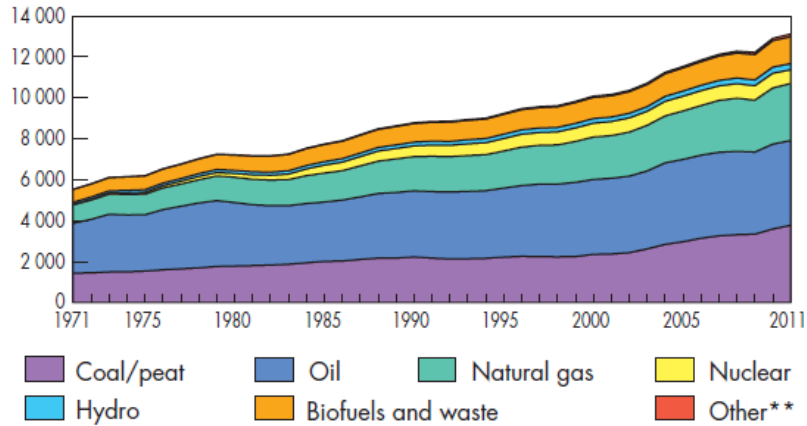
MPC : Marine Pollution Control

Eco-Manufacturing

KC Envirotech E&C(Fushun) Co.,Ltd, KC Glass & Materials Co.,Ltd, Jord KC Co.,Ltd, NWL Pacific Co.,Ltd. Clestra Hauserman Co.,Ltd.

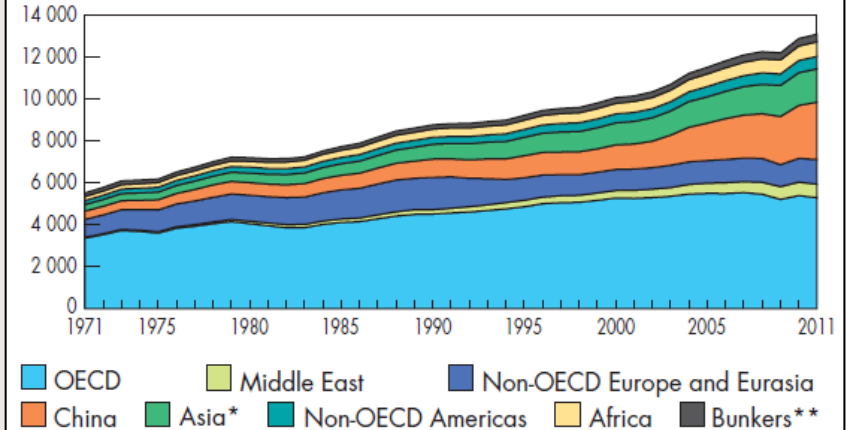
World

World* total primary energy supply from 1971 to 2011
by fuel (Mtoe)



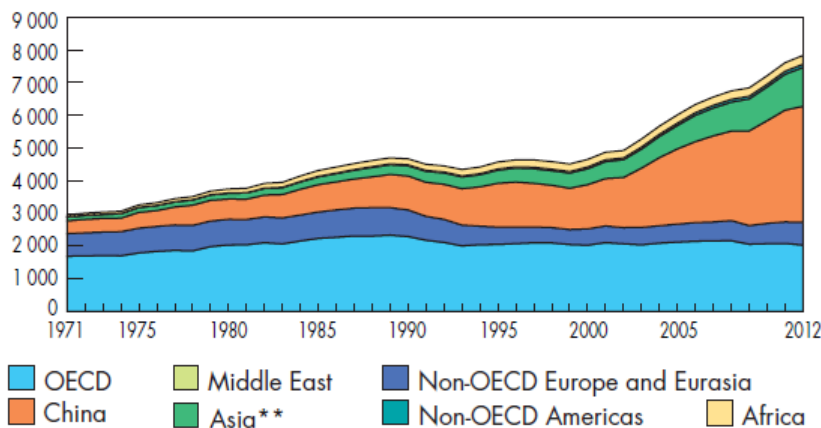
World

World total primary energy supply from 1971 to 2011
by region (Mtoe)



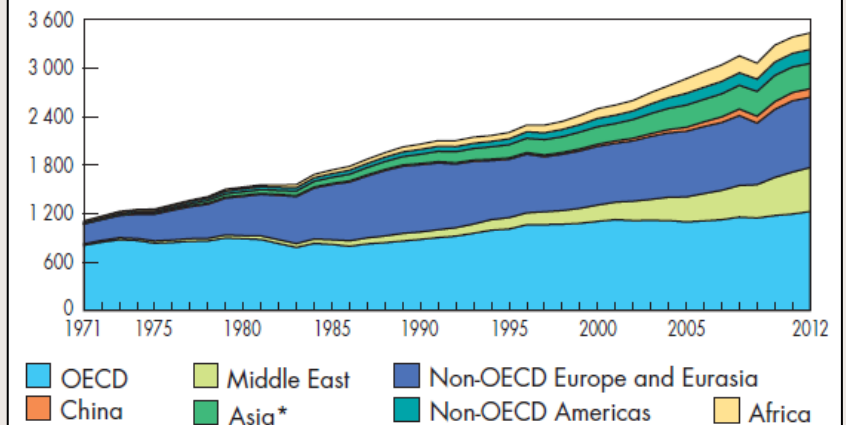
Coal Production

Coal* production from 1971 to 2012
by region (Mt)



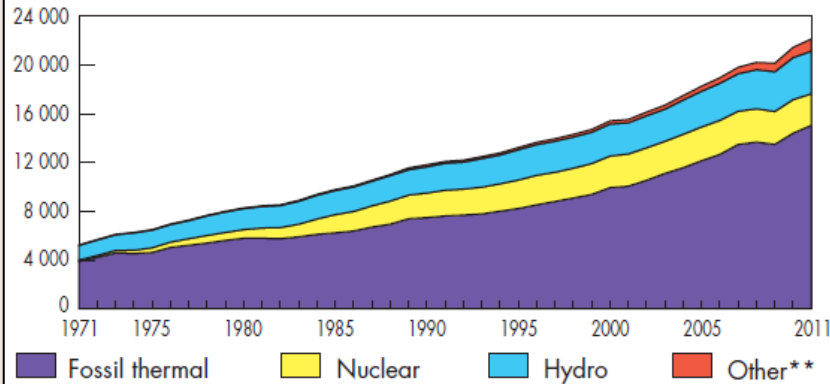
Natural Gas Production

Natural gas production from 1971 to 2012 by region
(billion cubic metres)



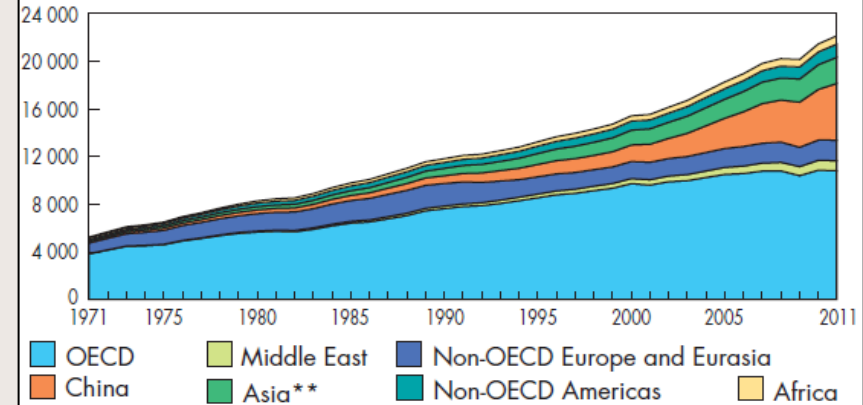
Electricity Generation by Fuel

World electricity generation* from 1971 to 2011
by fuel (TWh)

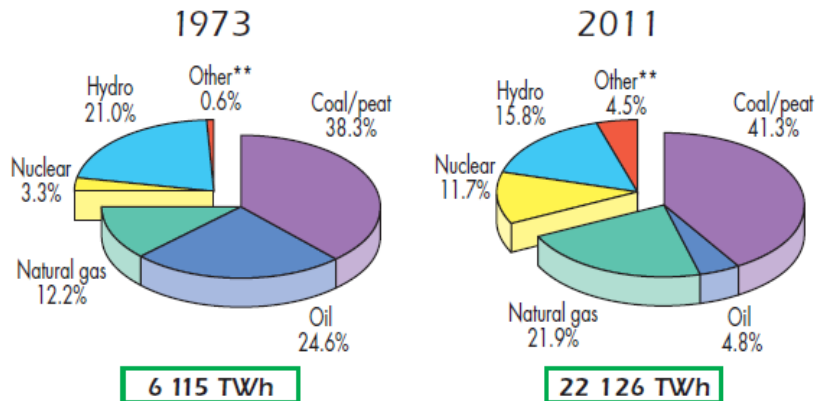


Electricity Generation by Region

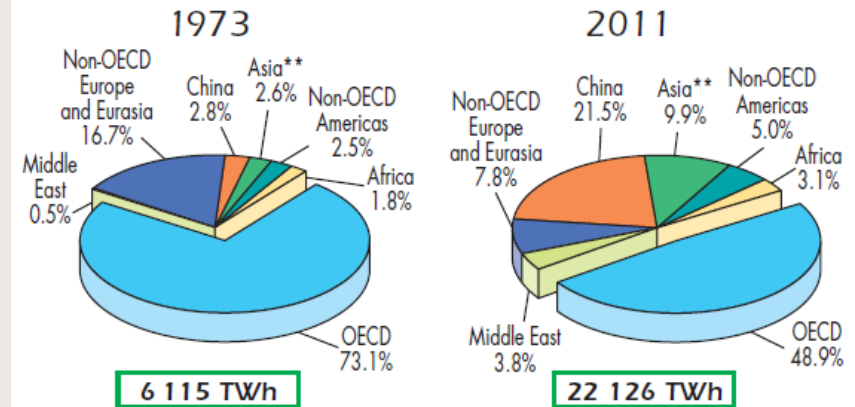
World electricity generation* from 1971 to 2011
by region (TWh)



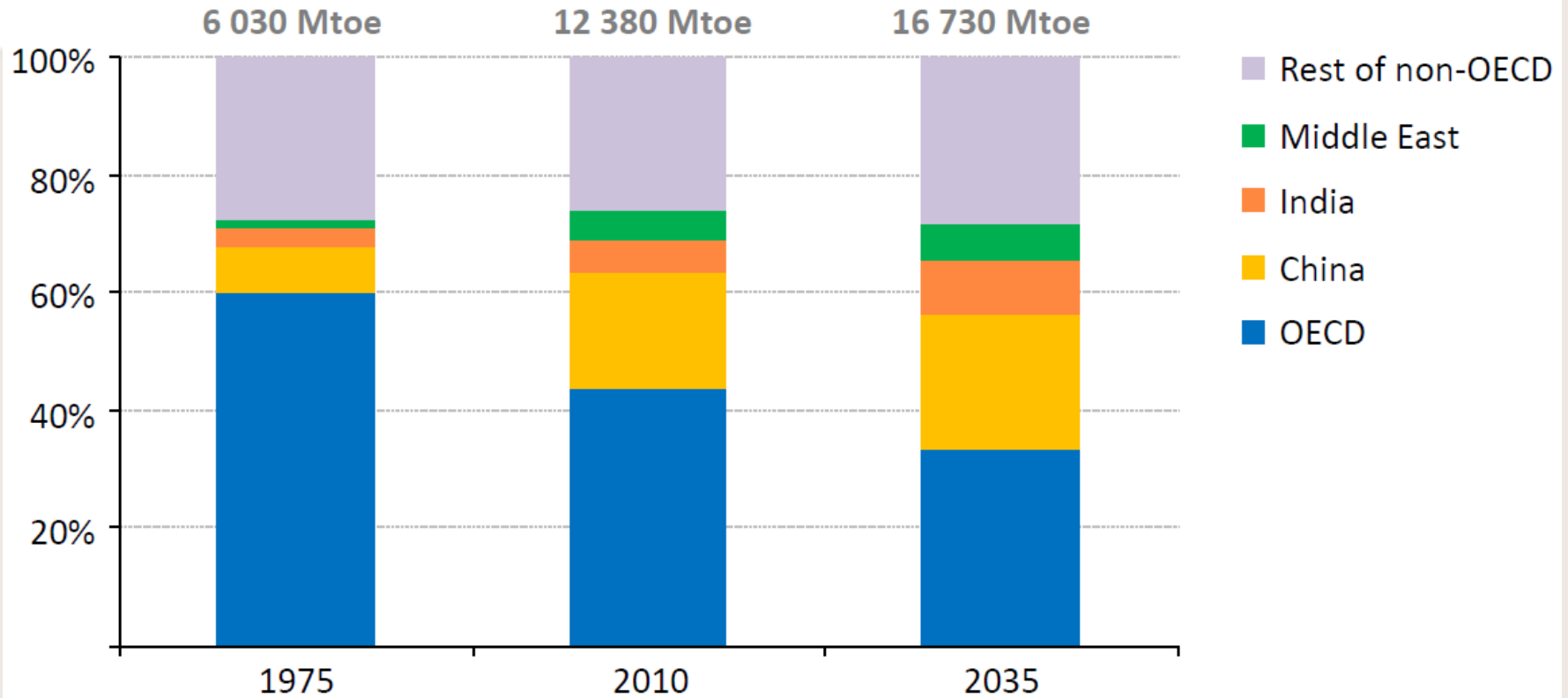
1973 and 2011 fuel shares of electricity generation*



1973 and 2011 regional shares of electricity generation*

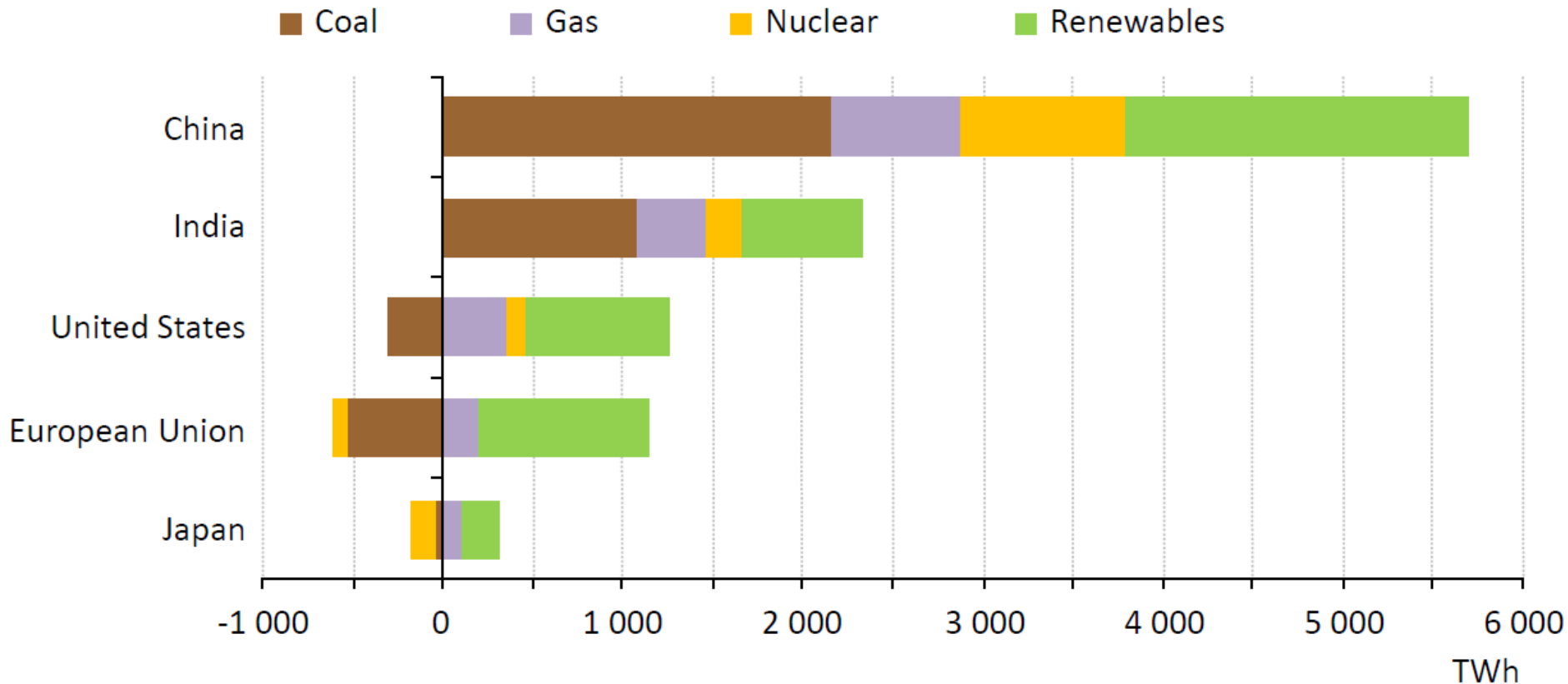


Share of global energy demand



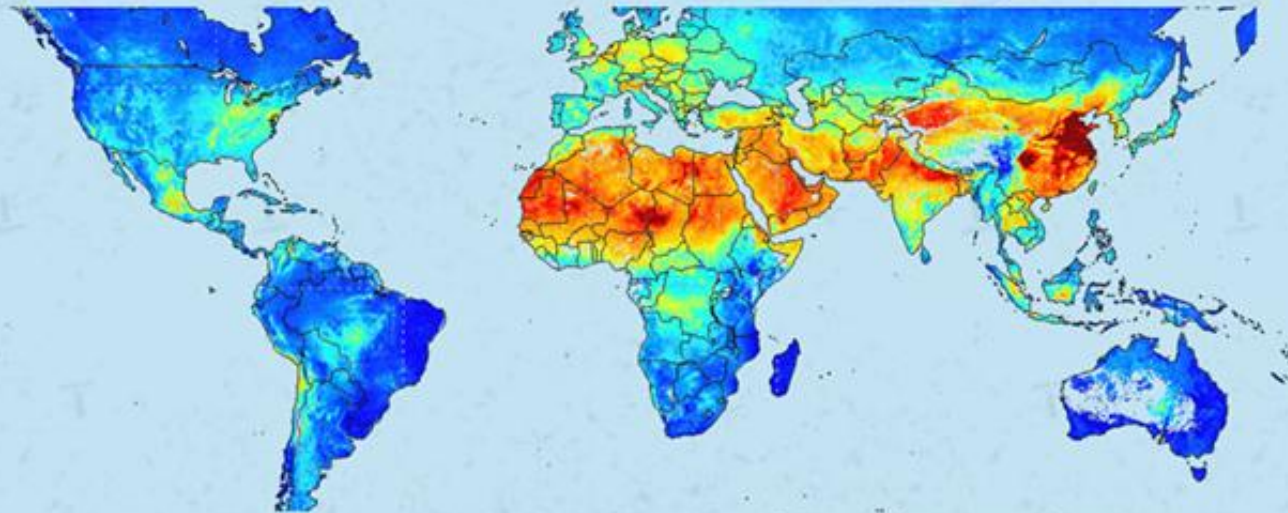
Global energy demand rises by over one-third in the period to 2035, underpinned by rising living standards in China, India & the Middle East

Change in power generation, 2010-2035

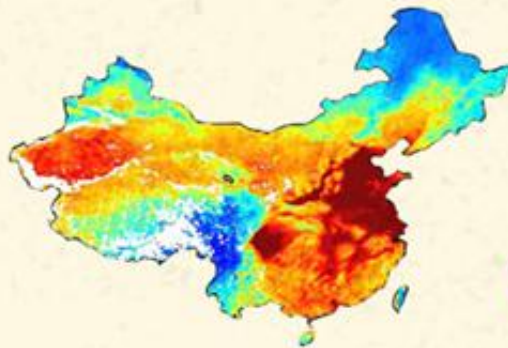


The need for electricity in emerging economies drives a 70% increase in worldwide demand, with renewables accounting for half of new global capacity

Satellite-derived PM2.5 (Global)



Satellite-derived PM2.5(China)



China coal consumption map
for power plants above 6MW (2009)

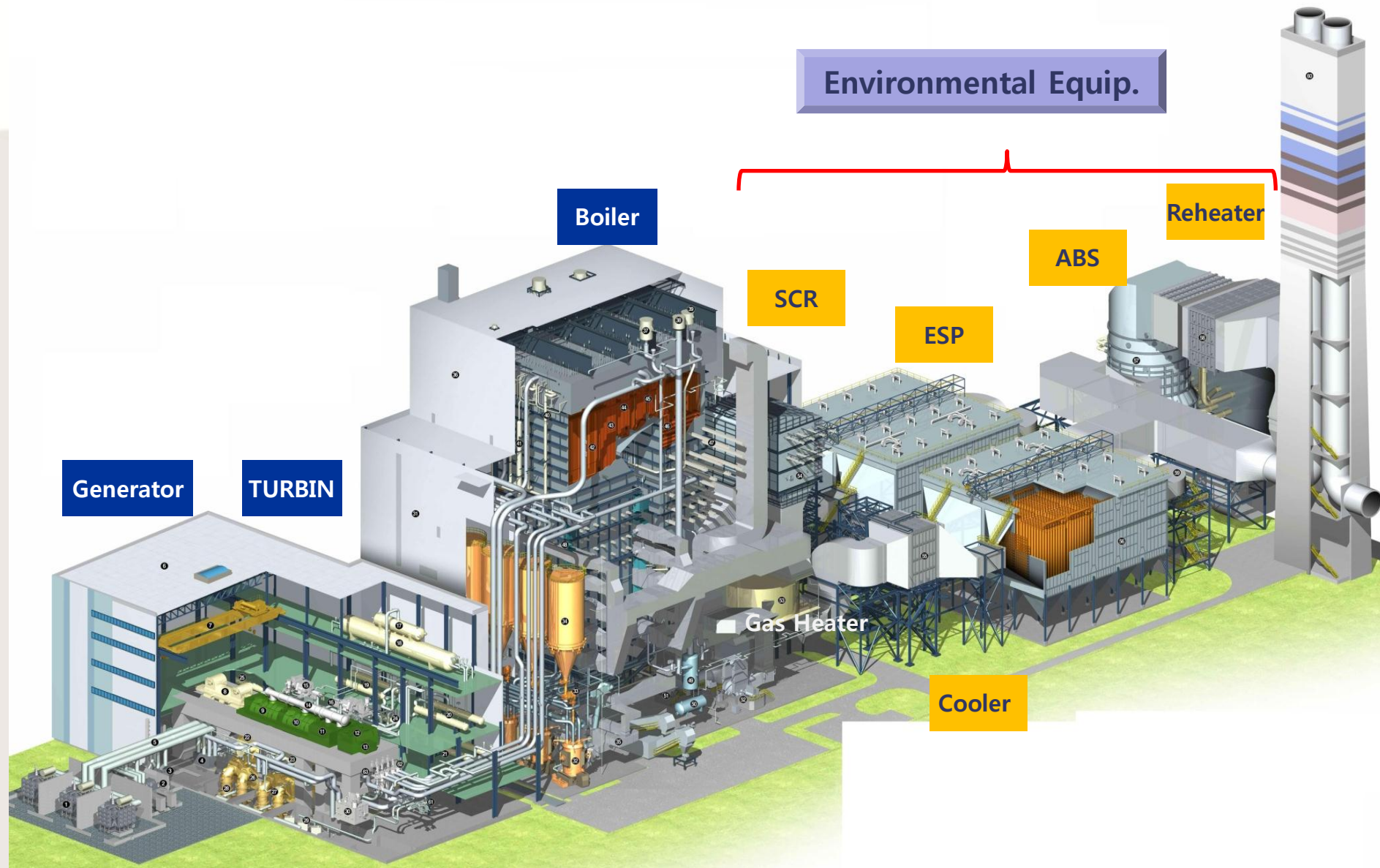


China suffered world's heaviest PM2.5 pollution, which is the direct result of its overreliance on Coal. In 2009 China burned near half of world coal, and coal accounts near 70% in china's energy mix.

[Link to Real-time Air Quality index visual map](#)

■ Major equipment configuration of thermal power plant

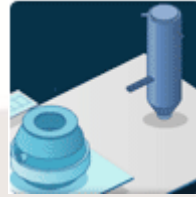
KC Green Holdings





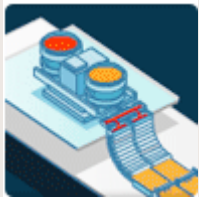
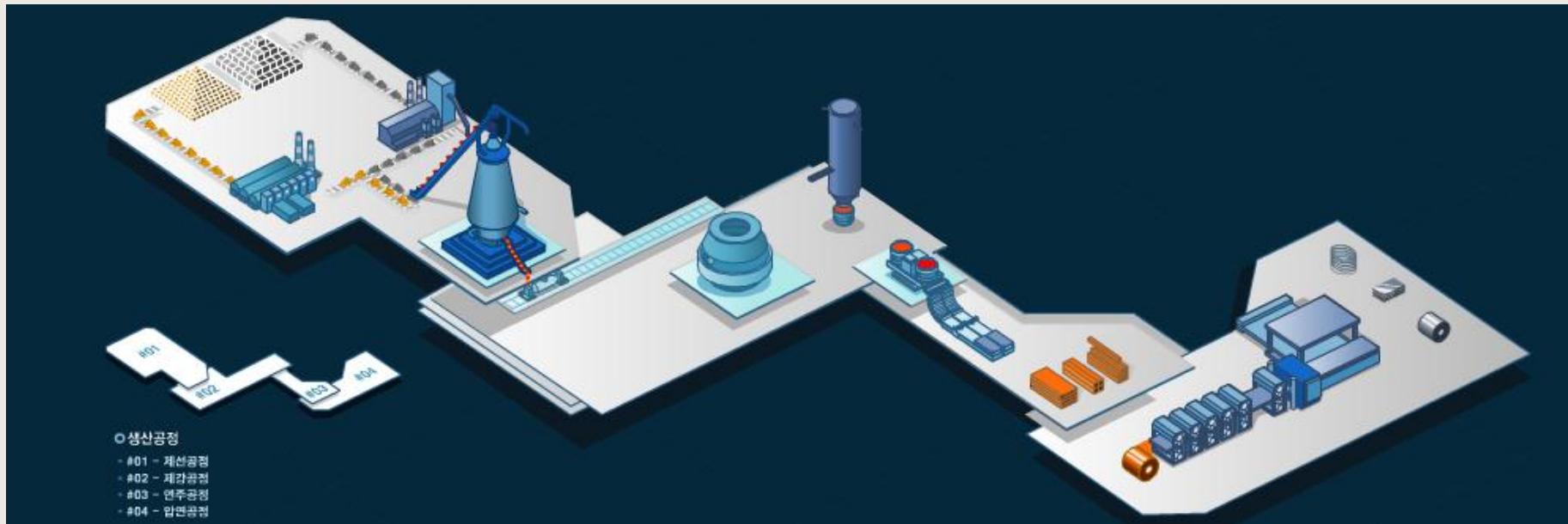
1. Ironmaking: Basic course to produce molten metal

Iron ore and Coking coal into the furnace
[ESP, Bag Filter, De-Sox, De-Nox, De-Dioxin]



2. Steelmaking steelmaking process from molten metal

Produce molten steel by removing impurities
(phosphorus, sulfur, carbon etc) from molten metal.
[ESP, Bag Filter]



3. Continuous casting: Solidification of molten steel

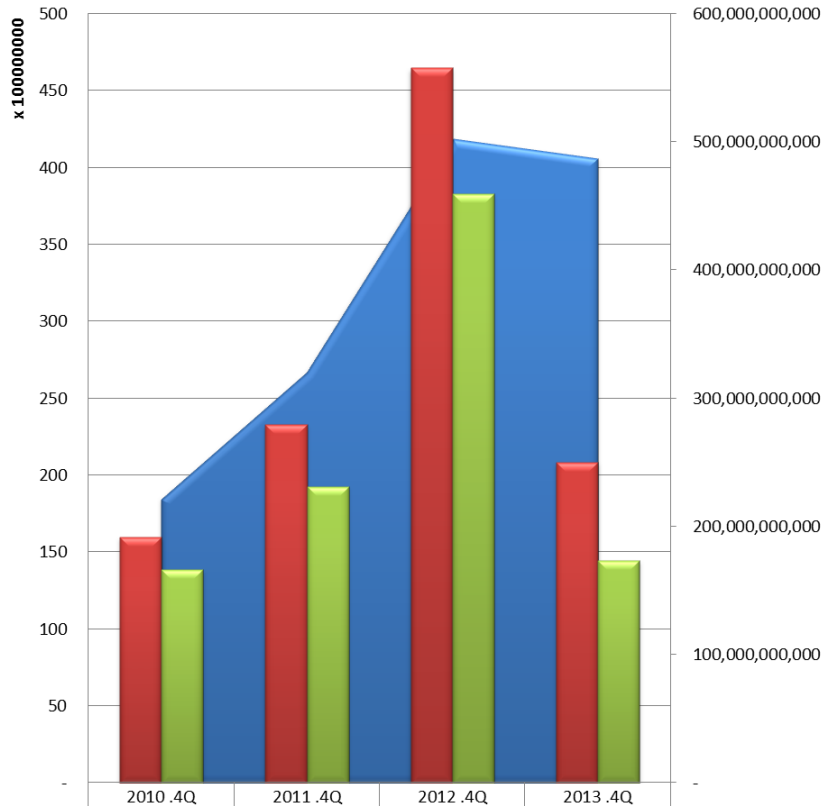
The molten steel is injected into cooling
solidification as slabs, blooms, billets, etc
[ESP, Bag Filter]



4. Rolling: Making wire and steel plate from iron

Making the iron increased and sliced by
passing through several continuous roll
[ESP, Bag Filter]

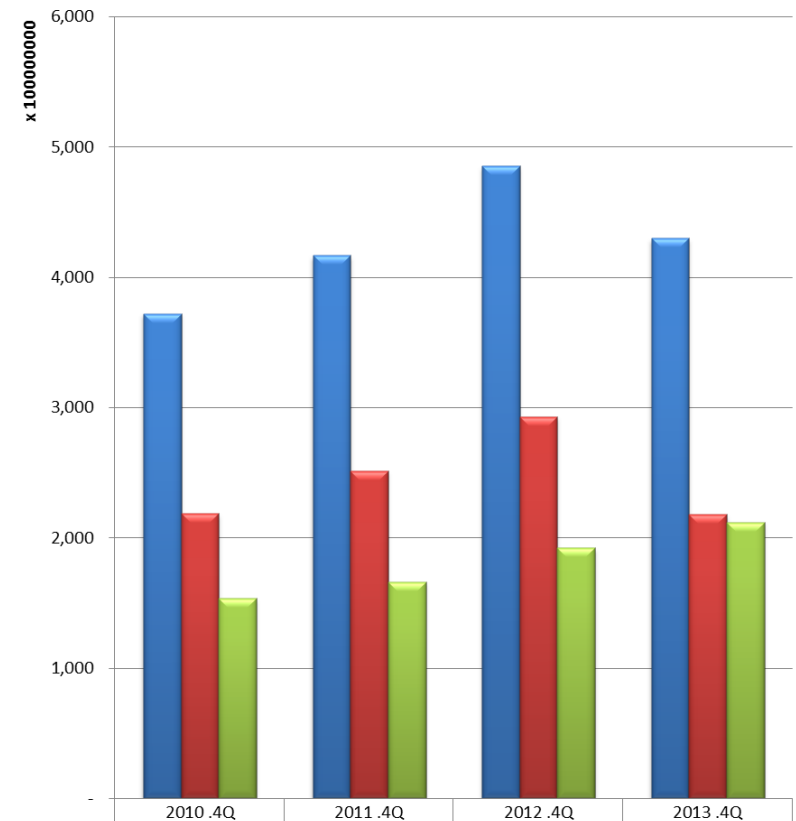
Yearly Consolidated Income



	2010 .4Q	2011 .4Q	2012 .4Q	2013 .4Q
Operating Revenues	221,455,065,413	320,436,617,393	502,629,849,285	487,271,569,423
Profit from Operation	15,985,249,221	23,318,451,301	46,491,395,128	20,866,703,638
Net Income	13,878,673,663	19,271,204,538	38,313,934,535	14,473,778,750

Yearly Consolidated Financial status

[Unit:KRW]



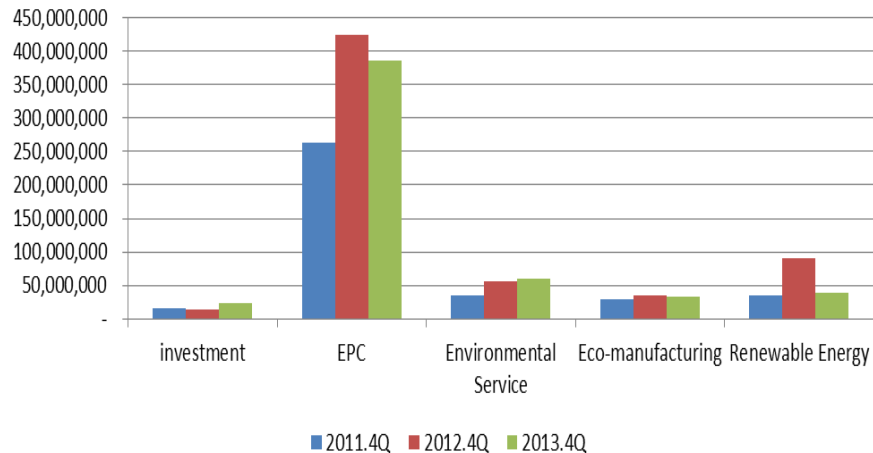
	2010 .4Q	2011 .4Q	2012 .4Q	2013 .4Q
Assets	372,036,036,217	416,823,410,124	485,305,388,691	429,933,872,785
Liabilities	218,700,757,033	250,982,135,134	293,082,382,060	217,906,899,413
Equity	153,335,279,184	165,841,274,990	192,223,006,631	212,026,973,372

K-IFRS financial statement by Business area

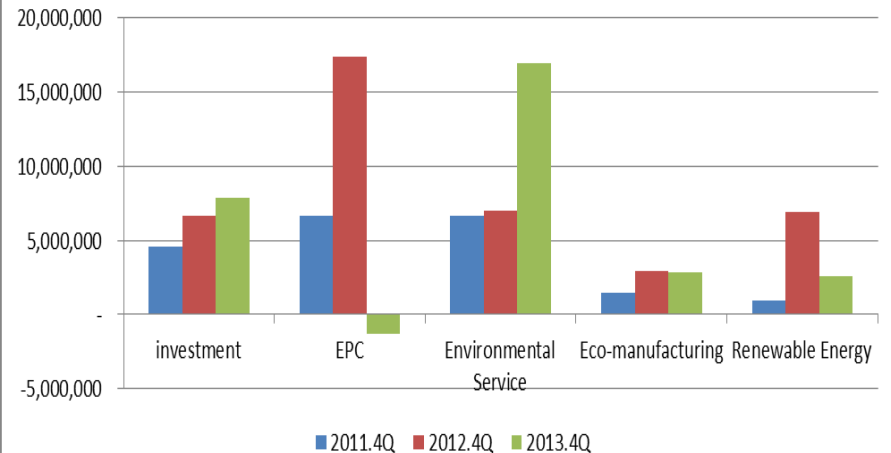
[unit : 1,000 KRW]

Index	investment	EPC	Environmental service	Eco-manufacturing	Renewable energy	Adjusted total
Sales(accumulated)						
2011.4Q	15,194,242	263,881,508	34,793,292	29,213,993	35,487,352	2011.4Q
2012.4Q	13,500,644	424,848,493	56,040,174	34,106,917	90,170,107	2012.4Q
2013.4Q	22,966,151	386,973,628	59,525,310	32,914,867	39,500,726	2013.4Q
Operating profit(accumulated)						
2011.4Q	7,844,727	5,594,799	8,837,748	2,124,058	1,006,004	2011.4Q
2012.4Q	8,842,003	19,142,452	8,987,803	3,434,725	7,344,963	2012.4Q
2013.4Q	14,852,031	-6,241,987	12,279,041	3,464,737	3,764,172	2013.4Q
Net income(accumulated)						
2011.4Q	4,563,433	6,613,694	6,641,774	1,445,874	904,798	2011.4Q
2012.4Q	6,650,121	17,356,777	6,959,882	2,966,157	6,878,114	2012.4Q
2013.4Q	7,899,171	-1,278,779	16,931,592	2,879,214	2,558,406	2013.4Q

Sales

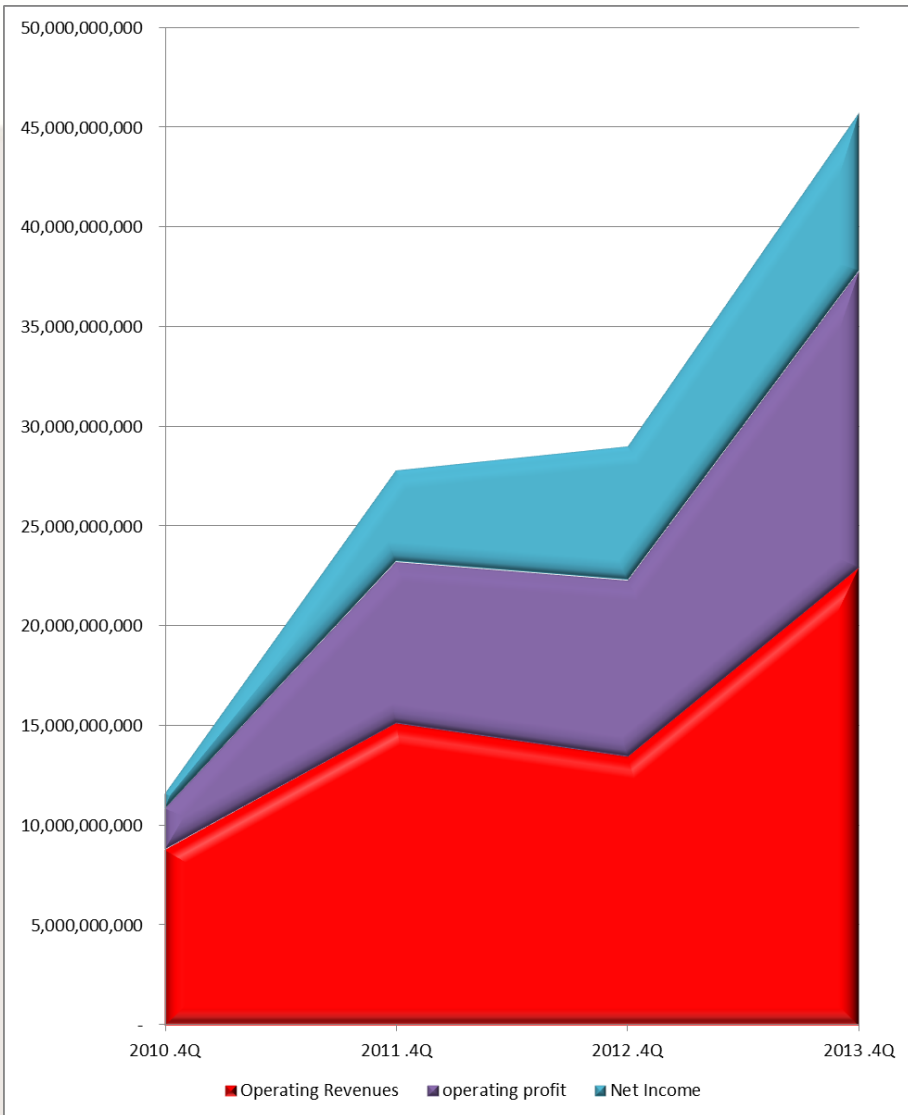


Net Income



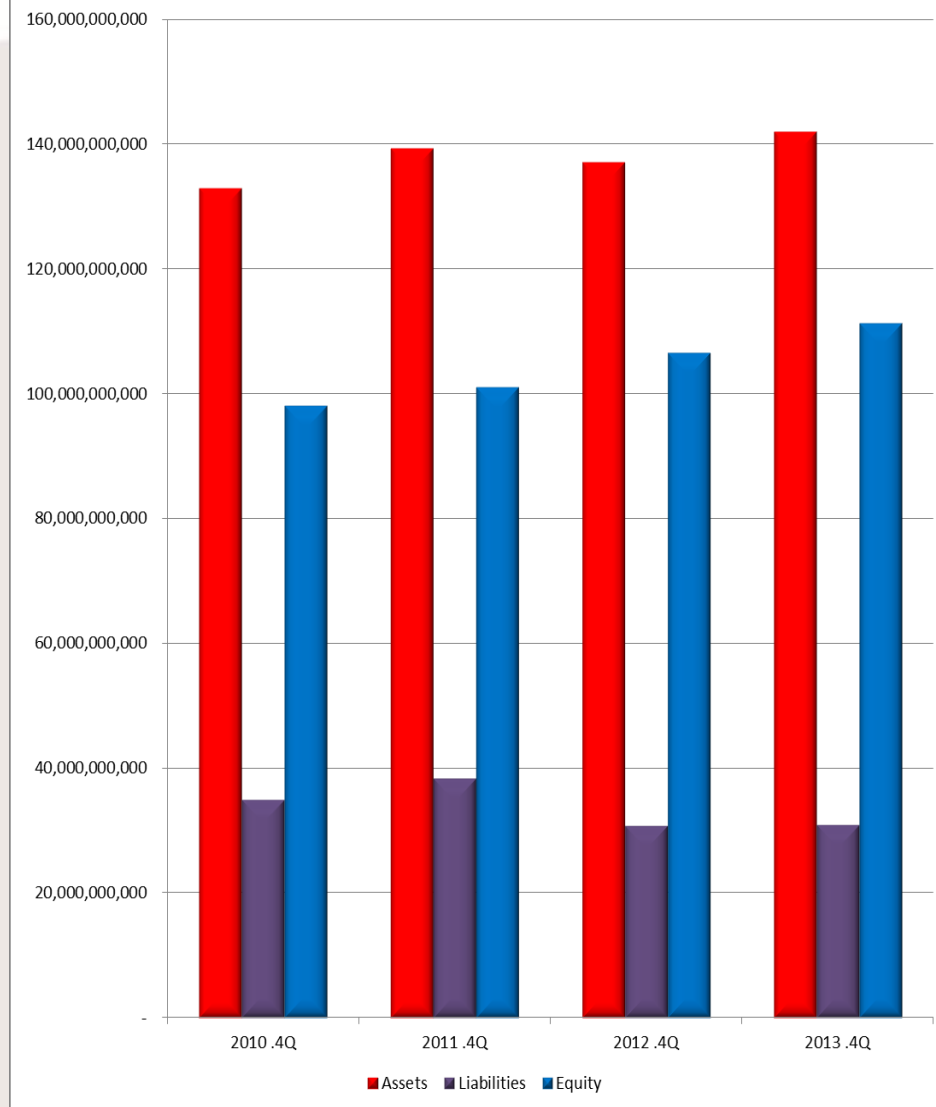
Separated Financial Statement(K-IFRS)

Yearly Separated Income



Yearly Separated Financial status

[Unit : 1 KRW]



Affiliated Company

KC Cottrell Co.,Ltd. (KCKR)

C E O Lee, Tae Young

Founded on November 27th, 1973
(January 1st, 2010 Split into New Company)

A d d r e s s 151, Yanghwa-ro, Mapo Gu, Seoul Korea

W e b s i t e www.kc-cottrell.com

KC Cottrell, has steadily grown to the Korea's Leading environmental specialist, since its founding in 1973 as an environmental air specialist, by continuously expanding its business areas into air pollution control equipment design and manufacturing, technological consulting and new renewable energy

Business Content

- ✦ Electrostatic Precipitators, Bag Filters
- ✦ De-SOx System (FGD, GSA SYSTEMS)
- ✦ De-NOx System
- ✦ Ash Handling System
- ✦ Environmental Machinery
- ✦ Technical Consulting
- ✦ Renewable Energy, ETC



De-NOx system at Tangin Thermal Power Plant



Dry-type Ash system at Boryeong Thermal Power Plant



Electrostatic Precipitators at Taean Thermal Power Plant



Gimhae Myeongdong water Purification Plant. 1.5MWp



Factory, Anseong

With an ESP, direct high voltage is applied to create a corona discharge to charge particles suspended in the gas and collect them through electrostatic attraction

❖ Dry Type ESP

- Customized system design
- Collection with G-Opzel Plate
- DURATRODE discharge electrode
- MIGI (Magnetic Impulse Gravity impact) rappers
- Semipulse and Multipulse for high collection and energy efficiency

❖ Wet Type ESP

- Low particulate emission
- Excellent collection efficiency for high resistance dust and mist
- Effective water film design
- Multiple designs for discharge electrode
- Comprehensive waste water treatment

❖ De-Tar ESP

Removes tar from coke oven with a byproduct recovery system used in high temperature carbonization



Boryeong Thermal Power Plant



Gwangyang Minimill, POSCO Wet ESP



TLC Slag

Kasima Power Plant



Vertical Wet ESP-Japan



Fabric filters are used for a broad range of industries including steel, non-ferrous metal, cement, power generation, chemicals, lumber and incineration plants. The choice of filter technology and filter media used depends on the type of gas being cleaned and the properties of the dust particles being removed.

❖ Reverse Air Fabric Filter

- Suitable for large facilities (range: 1,500~100,000m³/min)
- Low air to cloth ratios
- Simple design with few moving parts
- Easy maintenance
- Compartment ventilation during maintenance

❖ Pulse Jet Air Fabric Filter

- Wide variety of applications (range: 50~25,000m³/min)
- Bags are kept on the clean side, eliminating the need for ventilation during maintenance
- High air to cloth ratios
- Less space required for installation

❖ Ceramic Filter

- NaHCO₃ and slaked lime injected as sorbents for HCL and SO₂ removal
- Enhanced dioxin ratio
- Integration with optimal dust removal system lengthens catalyst lifespan and removes the need to reheat gas
- Can be used in Heat recovery Plant
- Greater efficiency throughout entire process



Bag Filter (Japan)



Ceramic Filter ESP



DISEC B/F

Featuring a charging device installed before flue gas passes through the bag filter, the electrostatic bag filter is designed to lower equipment and operating cost compared to using only a bag filter. It combines the benefits of the ESP and bag filter.

- Formation of dendrite layer of dust by using electrostatic force
- Less clogging by preventing fine particles from entreating into the filter
- Enhanced collection efficiency
- Less friction loss due to increase in filtration surface
- Reduced pressure loss
- Increase in filtration speed and amount (assuming identical facilities)
- Longer filter lifespan due to longer dust removal cycle
- Low initial investment and operating (energy) cost



Asan Marine base



Ssangyong Cement e-BF

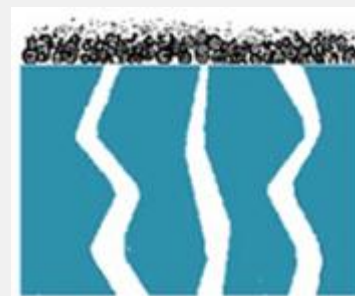


➤ High-volume air sampler

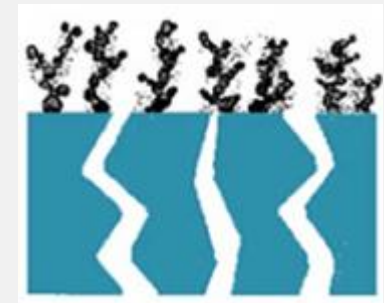
•Korea Patent No. : 0227127 (

•Registration Date 30th July 1999))

- Trapped particles gain properties of an electrostatic filter due to polarity of the filter. As a result, particles are also captured by already trapped particles. Particles branch out in the shape of twigs as they collect dust.
- Less pressure drop, savings in maintenance and energy cost, longer filter lifespan



➤ General particle Collection



➤ Charged Particle Collection

This unit removes fine dust particles and purifies air in tunnels and underground space. Tunnel air containing dust passes through the ESP, which features negatively charged electrodes and positively charged collecting plates. Dust is absorbed by the collecting plates so that only clean air is emitted. The system deals with the captured dust particles through periodic cleaning with water.

Dust collecting blast fan



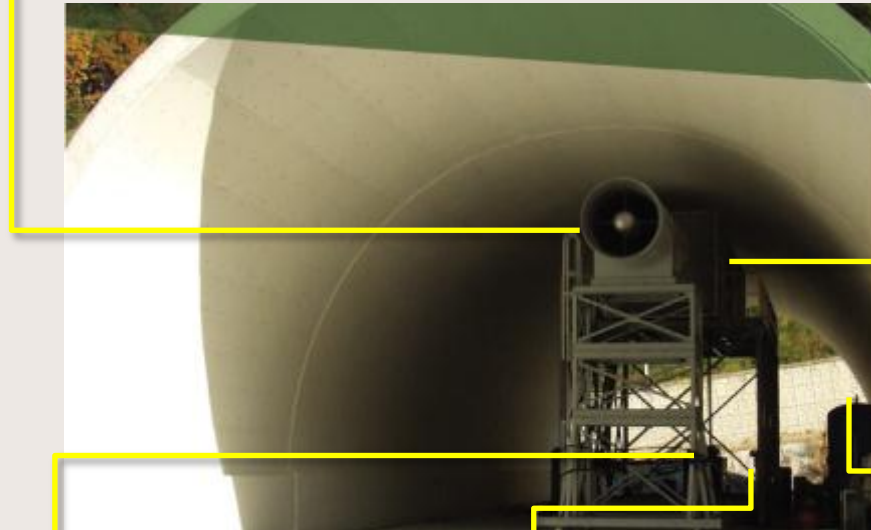
Integrated cell cleaning device



Exterior of ESP



특허번호 : 제 10-0871601호
(등록일 2008년 11월 26일)



신기술인증 : NET 제0258호 지식경제부
(인증일 2008년 8월 26일)



Control panel and high voltage panel



Control system



Water treatment system

The wet limestone-gypsum process uses a wet scrubber to remove SO_x from flue gas. Limestone or slaked lime is used as sorbent. As the sorbent reacts with SO_x, gypsum is generated as a byproduct. The discharged gypsum is recycled to make gypsum board or cement.

[Dangjin Thermal Power Plant]



[Cheongju Local Heating Public Cooperation]



[Samcheonpo Thermal Power Plant]



[Jeju Thermal Power Plant]



[Hadong Thermal Power Plant]



[Daegu Thermal Power Plant]



❖ Flue Gas System

❖ Absorber & Auxiliary system

❖ Limestone Preparation System

❖ Gypsum Dewatering System

❖ Waste Water Treatment System

The main removed method of NO_x gas, that is created by Fuel burning processes, is using a reducing agent. This process converts NO_x into harmless gases, N₂ and H₂O. The reducing agents usually are Anhydrous Ammonia, Aqueous Ammonia, Urea Solution. The injection amount and position are decided based on the De-NO_x method and removal efficiency.

Dangjin Thermal Power Plant



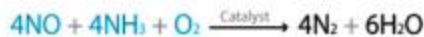
TaiShan Power Plant in China



Hybrid System (SCR + SNCR)

❖ Selective Catalytic Reduction System

SCR technology enables reduction of nitrogen oxide even with low activation energy by passing flue gas through a catalyst layer after mixing a reducing agent. The SCR process uses a catalyst that selectively reacts with nitrogen oxide in flue gas. It has the highest removal efficiency among de-NO_x technologies and stable operation.



❖ Selective Non-Catalytic Reduction System

SNCR technology is used to remove nitrogen oxide in a high temperature range (850 °C~1050 °C) by directly injecting a reducing agent into the sidewall or duct of a furnace. The required NO_x removal efficiency can be obtained through precise injection within an appropriate temperature range. A key design factor for performance is the location of the injection nozzle for the reducing agent.



Power plants and incinerators in Korea have installed the SCR system to reduce nitrogen oxide emissions. A key element of this system is the catalyst, which is a costly product. While domestic products are sometimes used, majority of the catalysts are imported. The Catalyst needs to be replaced periodically(4-5 years) depending on the operating conditions and hours after four years or 24,000 hours of use. This implies a significant burden in terms of operating cost. However through the stable and highly efficient ex-silu process, it is possible to regenerate catalysts that have the same NOx removal efficiency as new catalysts at a far lower cost.

Lower costs with longer lifetime

Prevent site contamination by using own factory

Recover over 90% of activity

Secure a larger scale of the equipment

Enable regeneration all existing catalyst types

Reduce the costs of landfill of used and spent catalyst

Complete removal of catalyst poison and pollution material by ultrasonic cleaning



Honeycomb type



Plate type



Corrugated type

❖ GSA Technology (Fluidized Technology)

In a GSA system, dust particles from flue gas, reaction products, and alkaline chemicals fed into the system and floating inside the reactor. They get in contact with flue gas to remove various pollutants with high efficiency.



**GSA-Reactor &
Cyclone in Chong Qing**



❖ Rotary atomizer System

High speed rotating wheel (10,000~20,000RPM) inside Rotary Atomizer sprays chemicals and coolants in the form of fine droplets to enhance reactivity. Fine particle size increases reaction efficiency, while circular spraying at high RPM facilitates contact with acid gases (HCl, HF, SO₂).



Gwang Yang Rotary atomizer

❖ Atomizing Spray Dryer System

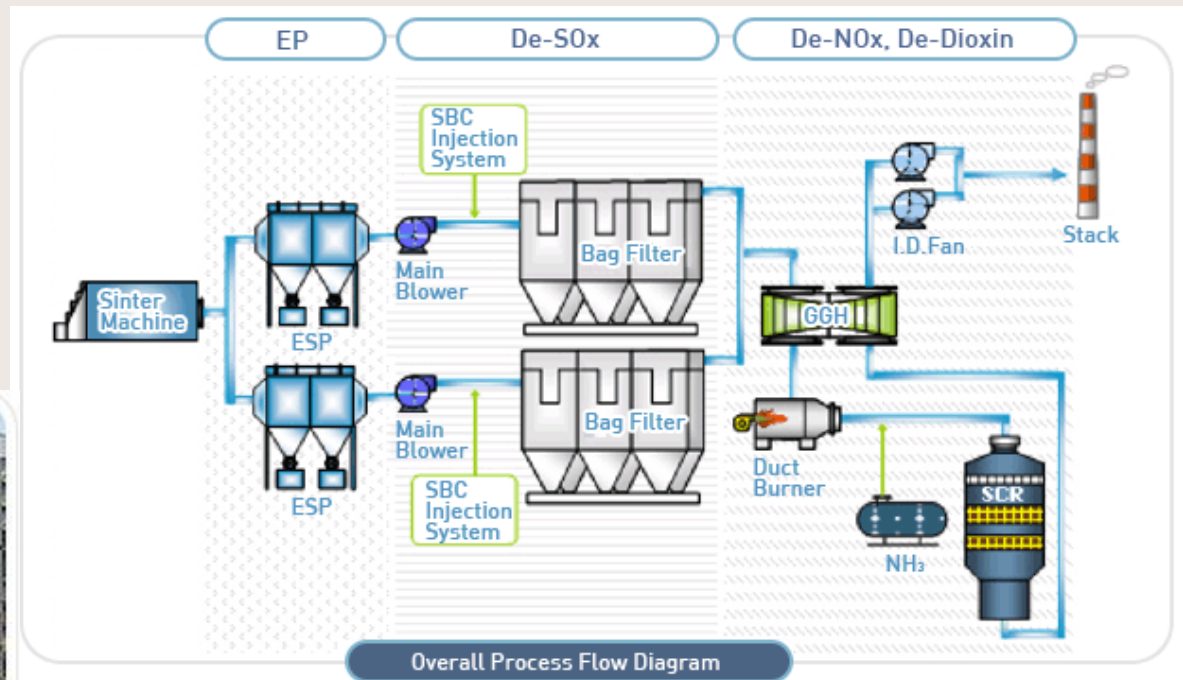
In designing a semi-dry reactor featuring a dual fluid nozzle, the most important point is to maintain consistent gas flow inside the reactor and to evenly inject sorbent into the gas flow. The dual fluid nozzle, which plays a key role in boosting removal efficiency, has superior spraying performance than the one fluid nozzle. In addition, the droplets sprayed have uniform particle size.

Flue gas discharged from sintering plants contains pollutant such as Sox, Nox, dioxin, and heavy metals. The discharged gas shows sharp fluctuations in flux and temperature. Pollutant concentration levels also fluctuate widely.

DISEC (Dry-based Sintering Emission Control) system is a optimal treatment facility that takes into account the flue gas treatment system's emission characteristics. DISEC system is a state of the art flue gas cleaning system to remove SOx, NOx and Dioxins

- It can operate across a wide temperature range without decrease efficiency.
- Simple control of chemical agent injection
- Safe from corrosion occurred from high acid dew point

POSCO Gwangyang DISEC



* Korea Patent No. : 10-0660234

- Bottom Ash Handling System: Slag and ash falling from the furnace are temporarily stored in the bottom ash silo. They are then sent to the ash pond using a hydro ejector. Alternatively, they are sent back to the bottom ash silo to be recycled after going through a submerged drag chain conveyor or dry ash extraction conveyor.
- Fly Ash Handling System: Air pressure from the blower or air compressor is used to transport ash to the ash silo via appropriately sized pipes.

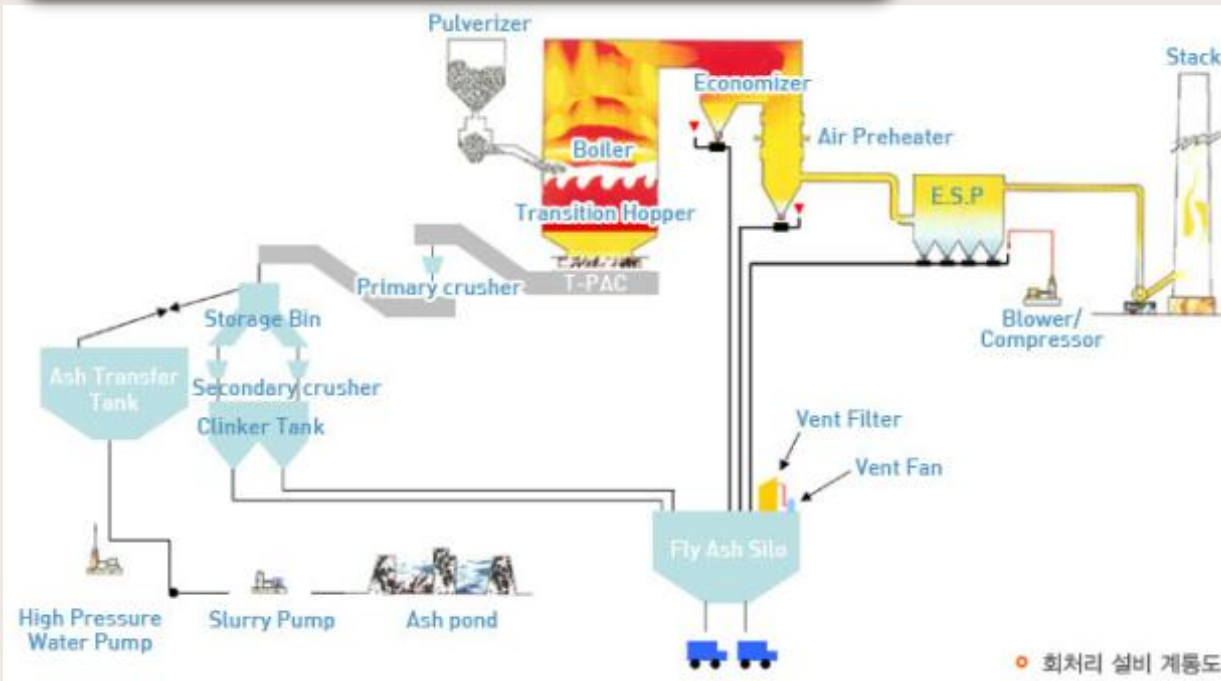
Bottom Ash Handling System

Pyrites/Mill Reject System

Economizer & Air Preheater Ash Handling System

ESP Fly Ash Handling System

Ash Disposal System



○ Dry Ash Conveyor 제작전경

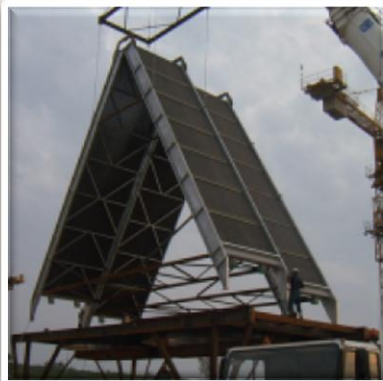
○ 보령화력 Dry-Type Bottom Ash System



Main Item of KC Cottrell – Air Cooled Heat Exchanger & Pressure Vessels

❖ Air Cooled Heat Exchanger

Heat exchanger is device that transfers heat between liquids. It is indispensable in petrochemical plants, oil refining plants, and power plants. KC Cottrell produces an air-cooled heat exchanger (ACHE). The ACHE is an environmentally friendly device that resolves problems associated with water-cooled heat exchanger, which include erosion, water supply needs, and ocean warming (when seawater is used for cooling). It is particularly well suited for arid regions such as the Middle East where there is a shortage of industrial use water.



❖ Pressure Vessels

Pressure vessels are designed to enable gas, liquid or a mixture to withstand pressure that is lower or higher than atmospheric pressure generated during storage, reaction or separation processes.

CVD Reactor



UN Vessel



Gas Scrubber



From small-scale generators for the home to MW-level systems for industrial use. KC Cottrell has been maximizing customer profits with its differentiated planning, building, operating, and management capabilities. Turning natural resources into energy is an important business for global environmental specialist KC Cottrell, as it not only functions as an alternative energy source but also prevent pollution.



○ 김해명동정수장 1.5MWp



○ 영흥화력 1MWp



○ 밀양축사 0.2MWp



○ 이천개인주택 3Kw

❖ Inspection and Diagnosis

As a company specialized in Environment, provide Inspection and Diagnosis to the customers with 40 years of experience.

Provide future plan for operation and maintenance with technical report.



❖ System Efficiency Improvements

Provide system Efficiency Improvement service to decrepit facilities and to meet government regulations.



❖ Maintenance and Repair Service Contract

Provide system to maintaining regular and periodic replacement of the parts.

Provide effective management system by managing the equipment from the beginning.

KC Cottrell (China) Co.,Ltd (KCCN)

C E O Cha, Sun Geun

Founded on June 20th 2002

Address No.9576 Donghuancheng Rd., Changchun City,
Jilin Province, 130033, P.R.China

Website www.cckc.com.cn

KC Cottrell(China)('KCCN') founded in Changchun City is total environmental pollution control company.

KCCN has been not only expanding business competency and continuous growing in Chinese market with the recognition of its outstanding clean environmental pollution control technology.

KCCN is closely working with our network of companies including KC Cottrell, KC Cottrell Vietnam, Lodge Cottrell, ETC.

Business Content

- ✦ Electrostatic Precipitators, Bag Filters
- ✦ De-SO_x System (FGD, GSA SYSTEMS)
- ✦ De-NO_x System
- ✦ Water Treatment System
- ✦ Waste Incineration System

Office Building



In Meeting



Environmental Facility at Chongqing

Lodge Cottrell Ltd. (LCUK)

C E O KEVIN BRIDGEWATER

Founded on 1913 (Acquired in march 2005)

A d d r e s s Trinity Point East Halesowen B63 3HY
United Kingdom

W e b s i t e www.lodgecottrell.com

Lodge Cottrell Ltd(LCUK) founded in 1913 was the first to develop and apply EP.

LCUK has Provided 4,500 air pollution control units across the world in the last 100 years.

It is an environmental specialist which has supplied leading air pollution control technology worldwide.



Business Content

- + Electrostatic Precipitators, Bag Filters
- + De-SOx System (FGD, GSA SYSTEMS)
- + De-NOx System
- + Ash Handling System
- + Environmental Machinery
- + Technical Consulting

KC Cottrell Inc. (KCUS)

C E O Mr Richard C. Staehle

Founded on April 12th, 2006

A d d r e s s 2319 Timberloch Place, suite E, The Woodlands, TX 77380, USA

W e b s i t e www.lodge-cottrell.us

KC Cottrell Inc.(KCUS) is the U.S. subsidiary established by KC Green Holdings to secure a bridgehead into the U.S. environmental facilities market.

KCUS started off as an aftermarket service provider for environmental facilities in North America. Currently it is in charge of KC's North and South American operations, and is expanding its business scope to the South and Central American market, including Mexico.

KCUS is also a member of the WPCA which addresses the improvement of air pollution control technologies



Business Content

- + Electrostatic Precipitators, Bag Filters
- + De-SOx System (FGD, GSA SYSTEMS)
- + De-NOx System
- + Ash Handling System

KC Cottrell Vietnam Co.,Ltd (KCVN)

C E O Oh, In Seok

Founded on November 28th, 2008

A d d r e s s 6F.,VINAFCO Building, 36 Pham Hung Street, Tu
Liem District, Hanoi, Vietnam

W e b s i t e www.kc-cottrell.com.vn

KC Cottrell Vietnam is the first specialized environmental company in Vietnam. It executes EPC Base Projects, and Provides after-market service for existing facility technical and related issues thereby, providing a total solution for environment related issues.

In Vietnam with fast economic growth potential, the company focuses on pollution control equipment for water and air pollution.

Business Content

- ✦ Electrostatic Precipitators, Bag Filters
- ✦ De-SOx System (FGD, GSA SYSTEMS)
- ✦ De-NOx System
- ✦ Ash Handling System
- ✦ Environmental Machinery



Lodge Cottrell India Pvt.Ltd (LCIN)

C E O Lee, Tae Jun

Founded on November 19th, 2008

A d d r e s s Spazedge Tower-B 5F, Suite No 502-504, Sec-47,
Gurgaon, Haryana-122002, India

W e b s i t e www.lodgecottrellpvt.com

Lodge Cottrell India is expanding into the India's environmental market after being awarded India's electrostatic precipitator project from POSCO E&C for Blast furnace complex In IISCO steel plant.

Lodge Cottrell India is developing business focused on the power market and the steel market.

Business Content

- ✦ Electrostatic Precipitators, Bag Filters
- ✦ De-SOx System (FGD, GSA SYSTEMS)
- ✦ De-NOx System
- ✦ Ash Handling System
- ✦ Environmental Machinery



■ NOL-TEC Systems, Inc. (NTS)

C E O Mr. Wayne Johnson

Founded on 1983 (Acquired in August 2010)

A d d r e s s 425 Apollo Drive Lino Lakes, MN 55014, USA

W e b s i t e www.nol-tec.com

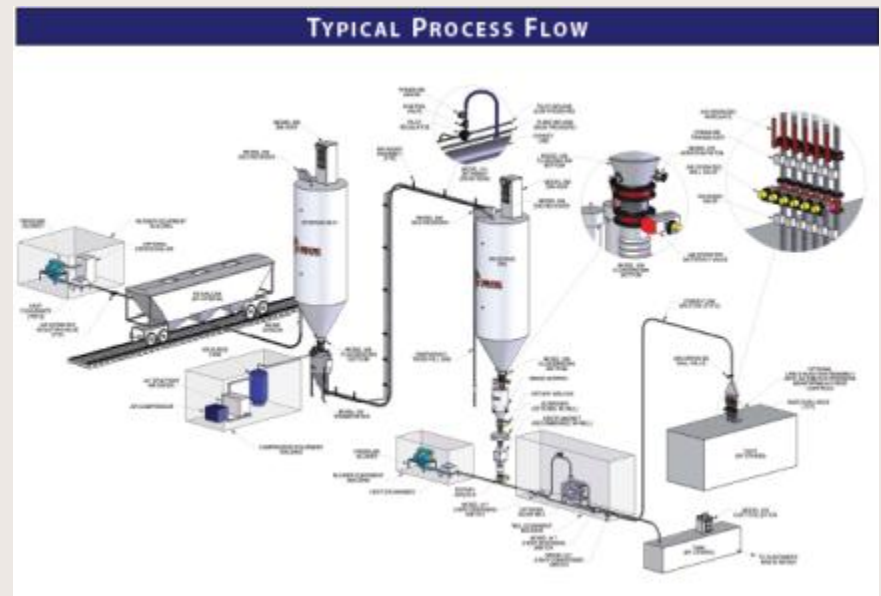
NOL-TEC Systems Inc.(NTS) was established in 1983 and designs manufactures and supplies material Handling Systems.

NTS is an international company that provides comprehensive facilities related to conveying, loading and unloading, and mixing powdered and granular materials for virtually all types of industries, including foods, chemicals, metals, ceramics, and glass, etc.

Since 2005, NTS has produced the ‘Sorb-N-Ject’ system, a technology with existing EP and Bag filter technology.

Business Content

- ✦ Pneumatic conveying system
- ✦ Pneumatic mixing system
- ✦ Pneumatic truck loading and unloading
- ✦ Dry Sorbent injection



[Sorbent Injection Flow Diagram]

KC Cottrell Taiwan Co.,Ltd

C E O Choe Hui Gyu

Founded on 2012-01-19

A d d r e s s Rm. 5, 14F., No.77, Sec. 1, Xintai 5th Rd., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)

W e b s i t e -

KC Taiwan newly established in January 2012, limited to no relevant experience, can not participate in the tender case. Therefore, KC Taiwan in recent years the goal will focus on providing consulting service and after-sale service and maintenance service to expand the customer market.

We believe that the customers' trust and preferences can be made by the good quality of service and professional technology, and KC Taiwan can made its name in not only Taiwan but also in whole Southeast Asia.

Business Content

- + Electrostatic Precipitators, Bag Filters
- + De-SOx System (FGD, GSA SYSTEMS)
- + De-NOx System
- + Ash Handling System
- + Environmental Machinery

KC Air Filter Tech Co.,Ltd.

C E O Shin, Young Man

Founded on 2013-05-22

A d d r e s s 3rd Floor, 183, Ojeong-ro, Ojeong-gu, Bucheon-si, Gyeonggi-do, Republic of Korea

W e b s i t e -

After the acquisition, the sales direction is (1) to secure competitiveness, (2) to obtain the manufacturing base for future maintenance business, and (3) to enter the small and medium scaled EPC area.

This is the time when the market is conversed from High initial cost EPC Market to low initial cost Bag Filter market. And this Bag Filter market size is estimated 800 ~ 1,000 billion.

Bag Filter market (1) is low initial investment market, (2) can easily enter without special skills, (3) is fierce in competition due to small size, (4) is low revenue industry.

Competitors are (1) Micro-one, (2) Cho-il industry Co.,Ltd. (3) EWF Korea, (4) Sam-Jung trade, (5) AFT etc which is small sized manufacturers

Business Content

- + Bag Filter
- + Bag Cage
- + Ventury
- + Diaphragm Valve

Nol-tec Korea Co.,Ltd.

C E O Choe, Young Hee

Founded on 2013-06-05 (acquired)

A d d r e s s 33-3, Geonji-ro 97beon-gil, Seo-gu, Incheon,
Republic of Korea.

W e b s i t e -

The main Competitors are DongYang P&F, BHD, Halla Industrial Development, etc.

Ash handling system is designed and manufactured by customer's order

Nol-tec Korea Co.,Ltd is developing the overseas market.

Business Content

- ✦ ASH HANDLING SYSTEM for POWER PLANT GENERAL
- ✦ Pneumatic Conveying
- ✦ ASH HANDLING FLOW DIAGRAM (TYP.)
- ✦ Dense Conveying System
- ✦ Dilute Conveying System
- ✦ Vacuum Conveying System
- ✦ Pilot Plant for Dense Conveying System
- ✦ Fly Ash Refinery System
- ✦ Air Leak & Durability Test for Air Lock Feeder

KC Enviro Services Co.,Ltd. (KCES)

C E O Lee, Jae Young

Founded on July 1st, 2000

A d d r e s s 310-73, Jindallae-gil, Yeosu-si, Jeollanam-do,
Republic of Korea

W e b s i t e www.kc-enviro.com

KC Enviro Services Co.,Ltd. Is located in the Yeosu national industrial complex, and is a total environmental specialist company, contributing to the production of green energy and environmental friendly industrial treatment, offering safe waste industrial treatment services, waste catalyst regeneration, and odour stabilization and recycling of Landfills.

Business Content

- ✦ Waste Treatment (incineration)
- ✦ Waste Heat (Steam) Supply
- ✦ Waste Catalyst regeneration
- ✦ Odour stabilization and recycling of landfills



Control Room



Incineration facility



Storage Facility

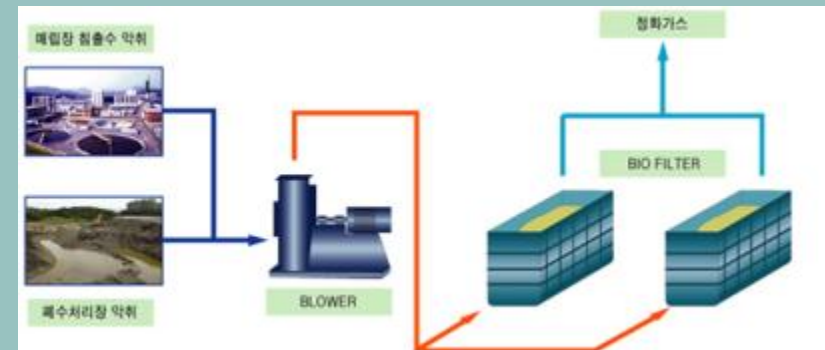


Office building



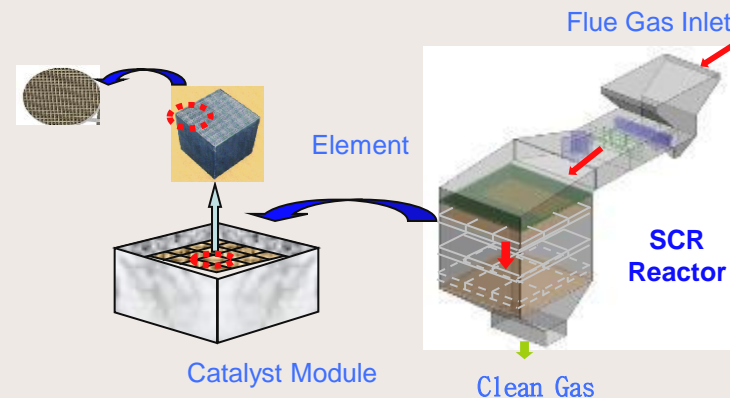
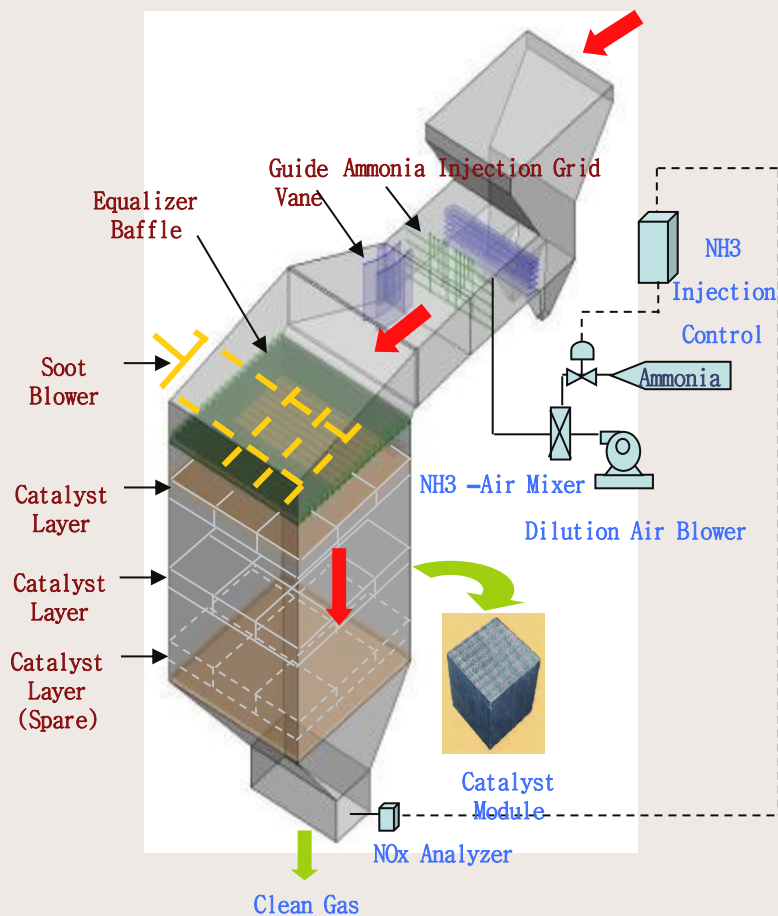
Process of Odour stabilization

Waste catalyst regeneration



SCR Catalyst Recycling

SCR SYSTEM



- Rxn Temp. : 200~450℃
(Depend on Fluegas condition)
- NOx Removal Eff. : Over 90%
- Catalyst Life Time(Operating Hours)
: 24,000 hrs~40,000 hrs
- Catalyst Type
 - : Honeycomb type
 - Corrugated type
 - Plate Type
- Facility
 - Chemicals Storage System
 - Chemical Supply System
 - SCR Reactor
 - Control System

■ KC Landfill Service Co., Ltd. (KCLS)

C E O Lee, Jae Young

Founded on April 14th, 2003

A d d r e s s 607 MetroPlaza Bd, 37-6, Byeongjeom-ro,
Hwaseong-si, Gyeonggi-do, Republic of Korea

W e b s i t e www.kc-enviro.com

KC Landfill Services operates final waste treatment service and is located in the metropolitan area, disposing of the general industrial waste.

Since Commencing operation of the Section 1 landfill in January 2000, through four times landfill expansions, it has reclaimed some 1.5mil.m³ of industrial waste. This has contributed to the proper treatment of industrial and general waste from the Seoul metropolitan area in the long term.

Landfill Site 4-2 has a capacity of 1,350,000m³. The Operation began in Jan 2011.

Business Content

Sanitary landfill of industrial wastes



View of Landfill Site



Office



Weighing Facility



Clean facility

KC Enviro Construction Co., Ltd. (KCEC)

C E O Chae, Su Baek

Founded on October 1st, 2007

A d d r e s s 36, Jochon 4-gil, Gunsan-si, Jeollabuk-do, Republic of Korea

W e b s i t e www.kc-enviro.com

KC Enviro Construction is a waste treatment specialist who collects and disposes construction waste and together with the business of dismantling of scaffolding and deconstruction.

Equipped with certified New Technology and an advanced waste treatment facility, it produces recycled aggregates of different standards, apply techniques for grain shape improvement, and also produces sand through its sand plant facility.

Business Content

- + Collection, conveyance, and intermediate treatment of construction waste
- + Construction (scaffolding and dismantling/earthworks)
- + Disjointing asbestos
- + Production of sand and recyclable waste (Sand Plant)



Index	Equipment
Crusher	Jaw Crusher, Double Crusher, Cone Crusher
Sorting facilities	Mixed Waste Separator, (Wet) foreign matter separator, Screen, Classifier Magnetic Separator, Wind Force Separator
Sand manufacturing facilities	Sand Crusher, V-Screen, Classifier, tri-level Buoyancy force separator
Dehydrator	Sewage disposal facility, Filter Press
Vehicle	Dump Truck, Arm Roll Truck, Motor Sprinkler, Tank lorry
Weighing Facility	
Heavy Equipment	Excavator, Loader

KC Hanmi Environment co.,Ltd. (KCHM)

C E O Lee, Kang Wook

Founded on May 30th, 1992

Address 103, Jayumuyeok 6-gil, Masanhoewon-gu,
Changwon-si, Gyeongsangnam-do, Republic of
Korea

Website www.kc-enviro.com

Located in Section 2 of the Masan Free Trade Zone, it offers a one stop service system with collection, transportation and treatment of industrial waste(general, hazardous), waste water and waste oil.

It operates an incineration facility(100 tons a day, stoker) and waste water treatment facility(200m3 a day, evaporation enrichment, biological treatment), and treats among liquid and solid wastes and waste water.

It has created the broadest sales network in the Southern region of Korea.

Business Content

- ✦ Waste treatment (incineration)
- ✦ Waste water treatment
- ✦ Waste oil treatment



Incineration facility(STK-1,700, STK-2,000)



Waste oil treatment facility



Waste water treatment facility



Office Building



Collecting and Transporting



Waste oil and water treatment



Laboratory

KC Eco-Energy Co.,Ltd. (KCHN)

C E O Lee, Jae Young

Founded on Feb 20th, 1984

A d d r e s s 77-9, Yangma-ro, Deokjin-gu, Jeonju-si, Jeollabuk-do, Republic of Korea

W e b s i t e

- ✦ Collection, conveyance, and intermediate treatment of construction waste
- ✦ Waste Heat (Steam) Supply
- ✦ Production of sand and recyclable waste



Landscape



Facilities crushing and screening construction waste



Dust Scrubber



Baf Filter



Slot



Control room

■ Veolia ES&KC Ecocycle Co.,Ltd. (EcoCycle)

C E O Gustavo Enrique Migues Tafernaberry

Founded on December 13th, 2006

A d d r e s s 88, Ilsin-ro, Ganam-eup, Yeosu-si, Gyeonggi-do, Republic of Korea

W e b s i t e www.kc-enviro.com

It is a joint venture with Veolia Environmental Services in France and KC Green Holdings Co.,Ltd. And it is an intermediate wastes treatment company.

It Collects combustible waste such as waste plastic, waste vinyl, and waste paper and manufactures solid fuel(Fluff RDF, RPF) via shredding, grinding, sorting, and forming.

Business area  Production of recycled solid fuel

Manufacturing process of RDF/RPF



KC Glass & Materials Co.,Ltd.

C E O Kim, Jeong Wan

Founded on June 9th, 1971(Acquired in September 3rd, 2007)

Address 1105, Seongjin-ro, Ipjang-myeon, Seobuk-gu,
Cheonan-si, Chungcheongnam-do, Republic of
Korea

Website www.kcglass.co.kr

KC Glass & Materials Co., Ltd produces various glass bottles needed for the pharmaceutical industry, food and beverage industry, etc. And it produces and supplies glass products with various colors and qualities on the basis of the accumulated experience and technology

In particular, It, which has achieved high-speed automation through the latest facilities, provides high-quality products and services to customers, and has enabled Ansung Glass to become the most reliable glass bottle manufacturer in Korea

It is also a clean, hygienic and most importantly, recyclable

Factory



Business Content

- ✦ Manufacture and sale of glass bottles
- ✦ Consulting service regarding glass
- ✦ Photovoltaic industry
- ✦ Manufacture and supply of glass material (Galss Frit)

Products



Facilities & Process



Batch Plant



Furnace



Automated Bottles
Forming Machine



Annealing Lehr



Automated Inspector
Machine



Automated
Packing
Machine

KC Envirotech E&C(Fushun) Co.,Ltd. (KCFS)

C E O Yan Lun Jie

Founded on July 22nd, 2005

A d d r e s s ChuagXin Second Road, Fushun City, Liaoning Province, China

KC Envirotech E&C was founded jointly with Handsome Construction in Musun, China, to be a global production center in liaison with KC Green Holdings affiliates.

It manufactures air pollution control facilities, and steel structures and steel segments of various standards, using the outstanding techniques of the KC Green Holdings affiliates

Business Content

- ✦ Electrostatic Precipitators
- ✦ Gas Cleaning Facility
- ✦ Steel Structure/Segment
- ✦ Silo & Storage Tank



Jord KC Co., Ltd. (JDKC)

C E O Park, Ki Suh

Founded on December 17th, 2003

Address(HQ) 151, Yanghwa-ro, Mapo Gu, Seoul Korea

Address(Fac.) 16-180, Seounsingi-gil, Seoun-myeon, Anseong-si, Gyeonggi-do, Republic of Korea

Jord KC was established as a joint venture with Jord International Pty Ltd of Australia and designs and manufactures Air Cooled Heat Exchangers.

The company combines Jord's over 30 years of experience manufacturing and supplying Air Cooled Heat Exchangers used in oil refineries, petrochemical and power facilities.

Business Content

- ✦ Air Cooled Heat Exchangers



Clestra Hauserman Co., Ltd. (CHKR)

C E O	Lee, Tae young/Xavier Pierre Guy Ngir
Founded on	March 27 th ,1985(Acquired in May 12 th , 1997)
A d d r e s s	9 th , Korea Teachers Credit Union Bldg., 50, Yeouinaru-ro, Yeongdeungpo-gu, Seoul, Korea
W e b s i t e	www.clestra.com

Clestra Hauserman was established in U.S. in 1913 for manufacturing partition relocatable and Ceiling. As it Grow, it entered Asia in 1986 by setting up factory in Gumi, KC Green Holdings Co., Ltd., now owns 50% shares from its involvement in 1997.

- ✦ Partition relocatable
- ✦ Clean Room Business
- ✦ Ceiling
- ✦ Office interiors

Hongkong(20)

Japan(15)

China(54)

Singapore(8)

**CLESTRA
KOREA**

Seoul
Head Office(55)

Gumi
Factory(55)



■ NWL Pacific Co., Ltd. (NWL-P)

C E O Kim, Jung han

Founded on May 12th, 1998

A d d r e s s 89-20, Singiyangchon-gil, Seoun-myeon,
Anseong-si, Gyeonggi-do, Korea

W e b s i t e www.nwlpacific.com

NWL Pacific was founded in 1998 jointly with NWL Transformers in the U.S., specializing in manufacturing transformer rectifier sets.

Its main products are Transformer Rectifier, Transformer Control Panel, Rapper, Rapper Control Panel.

Business Content

- ✦ Transformer Rectifier
- ✦ Control Panel
- ✦ Electrostatic Precipitator control system
- ✦ Power Plus T/R sets
- ✦ Power supply for Plasma



Transformer
Rectifier



Control system



GVC&GRC Panel



Power Plus

■ KC Solar Energy Co., Ltd. (KCSE)

C E O Lee, Tae Young

Founded on May, 2005

Address(Off.) 89-20, Singiyangchon-gil, Seoun-myeon,
Anseong-si, Gyeonggi-do, Korea

Address(Fac.) 630-5, Jeon Gok Ri, SeoShin-Myeon, Hwa Sung Si,
Gyeong Gi Do, Korea

KC Solar Energy constructed 1.0MW solar power plant on a closed landfill site. KC Solar Energy also manages several solar power system including the 1.5MW solar power system.

With expertise in the design, construction and operation of various solar power systems, the company strives to become a leading solar engineering company, covering the whole business from feasibility to construction and operation of solar power plants.

31st March 2011, Changed the company name from KC Solar Power

Hwa Sung 1MWp Solar Power Plant

Business Content

- ✦ Photovoltaic Power Production and Sale
- ✦ Solar Power Plant maintenance and servicing



Busan Shinho 20MWp Solar Power Plant



Yeongheung 1MWp Solar Power Plant

KC Energia Co.,Ltd. (KCEN)

C E O Yoon, Jin A

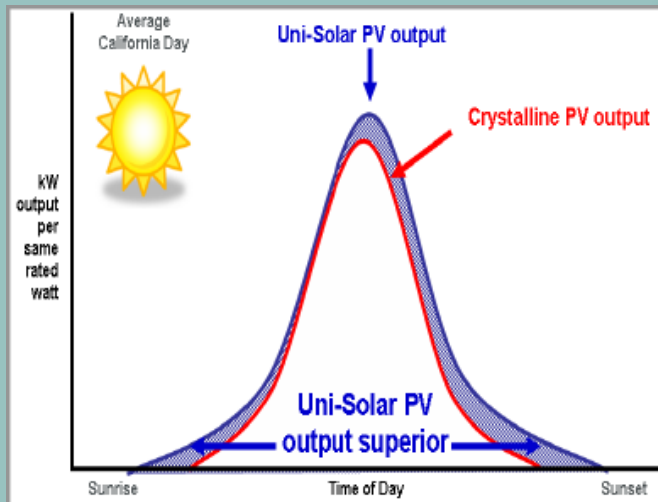
Founded on February 15th, 2007(Acquired : January, 2009)

Address 191, Donggyo-ro, Mapo-gu, Seoul, Korea

Website www.kc-energia.com

KC Energia is a specialist supplying modules, developing projects, and offering consultation and construction for turnkey projects. It started off as a contract of distribution between Uni Solar and Uni-solar Korea.

Business Content



- + Photovoltaic power plants
- + Solar Power
- + hybrid Inverters
- + EV Chargers
- + Electronics

- Each Uni-Solar laminate utilizes unique triple-junction amorphous silicon solar cells, where blue, green and red light of sun is absorbed in different layers of the cell
- It can products solar energy in diffuse light in cloudy, early morning and late evening
- Uni-Solar module produces 5-10% more energy than Crystalline-Si PV Modules in equal capacity and equal site.



KC Green Energy Co., Ltd. (KCGE)

C E O Kang, Tae Il

Founded on March 16th, 2009

A d d r e s s 151, Yanghwa-ro, Mapo Gu, Seoul Korea

B u s i n e s s Wind power system design and consultation

KC Green Energy specializes in wind power development and engineering.

In the future, KC Green Energy will Grow to be a leading specialist in the field of project development and engineering and contribute to the domestic wind power industry.

Consultancy

1

Identification of the business opportunity

2

Project evaluation

Search of suitable partners

Promotion

3

Administrative management

4

Beginning of the promotion

Exploitation

5

Farm construction

Beginning of the exploitation

➤ For each plant/farm is created an operating society



Thank You

A nighttime photograph of a large industrial complex, likely a power plant or refinery, featuring several tall smokestacks and brightly lit buildings. The lights from the facility are reflected in a body of water in the foreground.

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