



20 a 22 de Junho de 2016 - São Paulo/SP

Sinoma
中国中材

中材节能股份有限公司
Sinoma Energy Conservation Ltd.

Professional WHR Solution Provider

Transforming Waste into Value

Realização



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1 Who We Are?

- Cement Production Energy Saving Solution Provider

➤ Background of Sinoma Group

■ **China National Materials Group Corporation**

- Owned by Chinese central government
- Leading Position in three industries: non-metallic material manufacturing industry; Non-metallic materials technological equipping and engineering industry; Non-metallic mining industry
- Directly holding 73 sub-companies, with 8 of them listed in Chinese stock market, and 1 of them listed in Hongkong stock market.
- Total Asset of Sinoma Energy Conservation Ltd. is 1 Billion USD, and annual revenue of 300 Million USD (up to end of 2014)

State-owned Assets Supervision and Administration Commission of the State Council

Sinoma Group
(Holding 73 listed companies)

Sinoma International Engineering Ltd.

TCMRI

NCDRI

CBMI

Sinoma TEC Group (24 of Subsidiary)

CDI

The production of non-metallic materials

Glass fiber
Sinoma Science Tech

Cement (capacity of 100 million t / y)

Ceramics

Artificial crystal

New Energy Material

SINOMA-EC
(industry for comprehensive utilization of resources, And energy-saving)

Head Office in Tianjin

Wuhan Building Material R&D

Nantong Wanda Boiler

14 of Sinoma-EC WHR power station

Branch in Turkey, the UAE, Malaysia

Non-metallic mining
34 geological survey center

Hebei

Gaungdong

Fujian

Shandong

... ..

national institutions

13 national research and design institutes

9 of the National Standardization Technical Committee

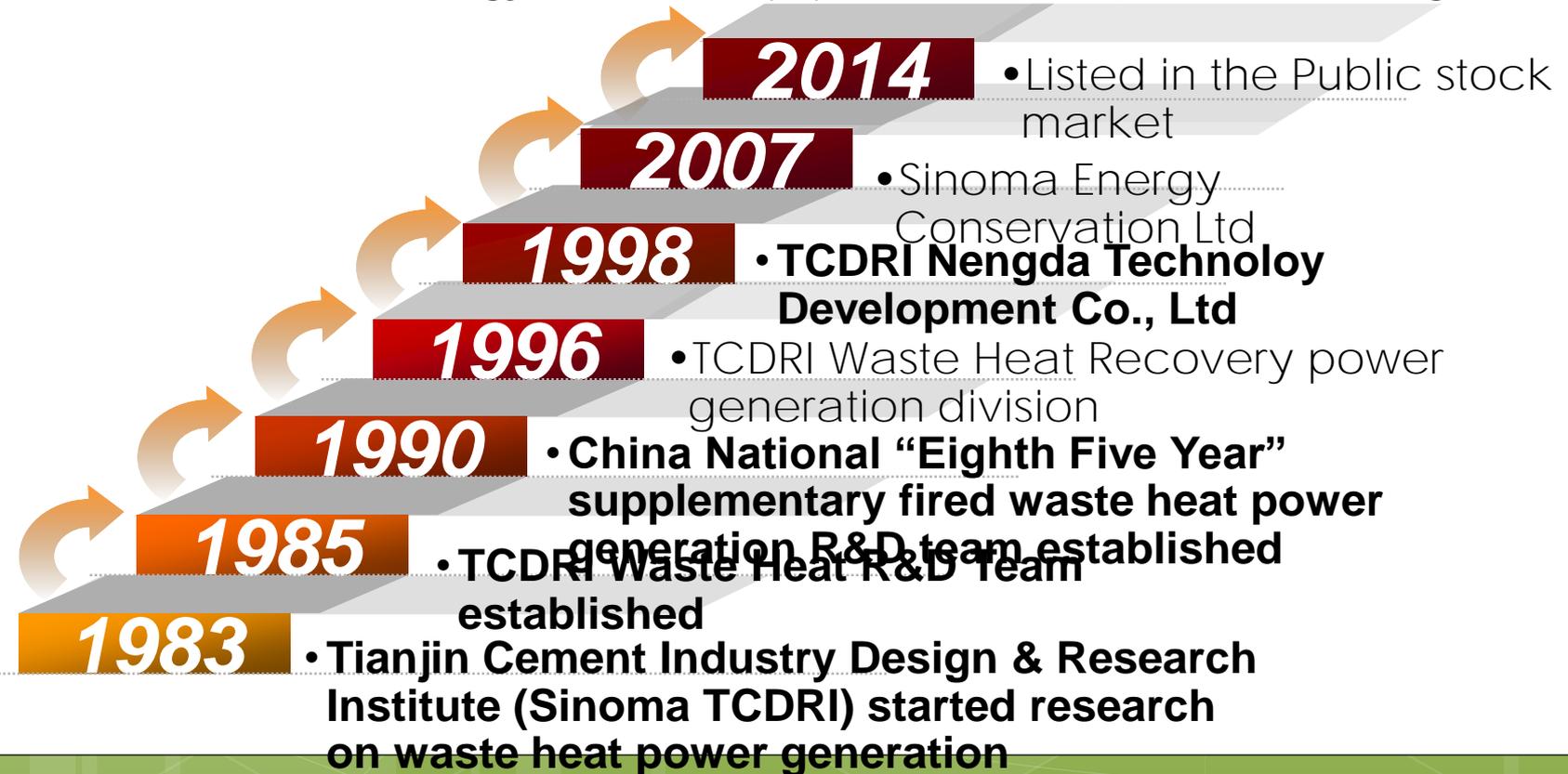
8 of National Product Quality Inspection Center

5 of national engineering research center

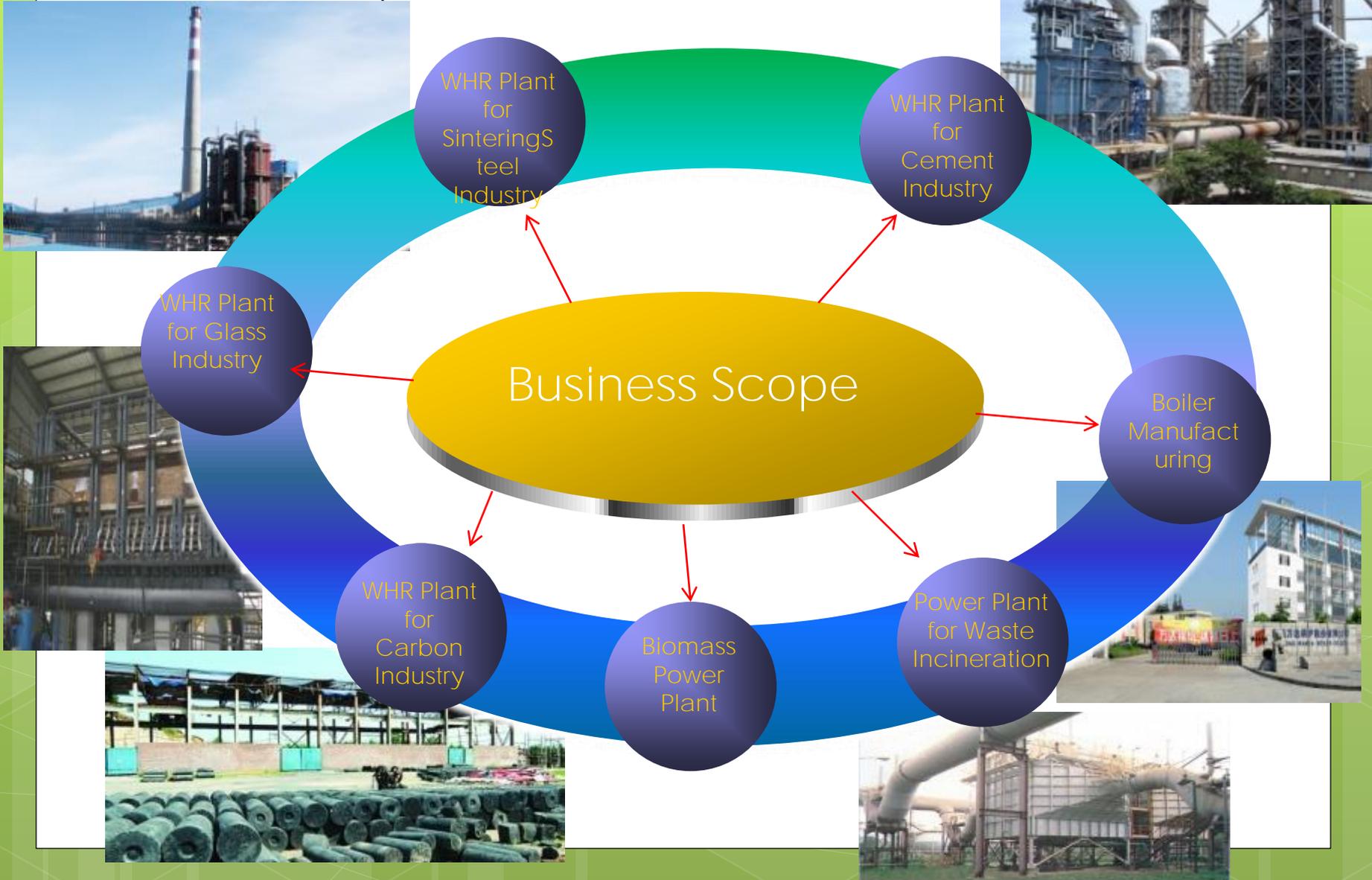
2 of UNDP-funded center

➤ Company History and Strong points

- Focusing on only one subject—Energy Saving during the 30 years history.
- Beginning from the cement industry, with the pyro process deposit and assistance from sister companies such as Sinoma international.
- The first and the biggest company to do WHR in China;
- Own the core technology and core equipment—Boiler (Sinoma Nantong Boiler)



➤ Business scope



➤ References (in Cement Industry)

- With dozens of patents and licenses, Sinoma EC has built 253 WHR power plants for more than 330 cement lines within China and at abroad.

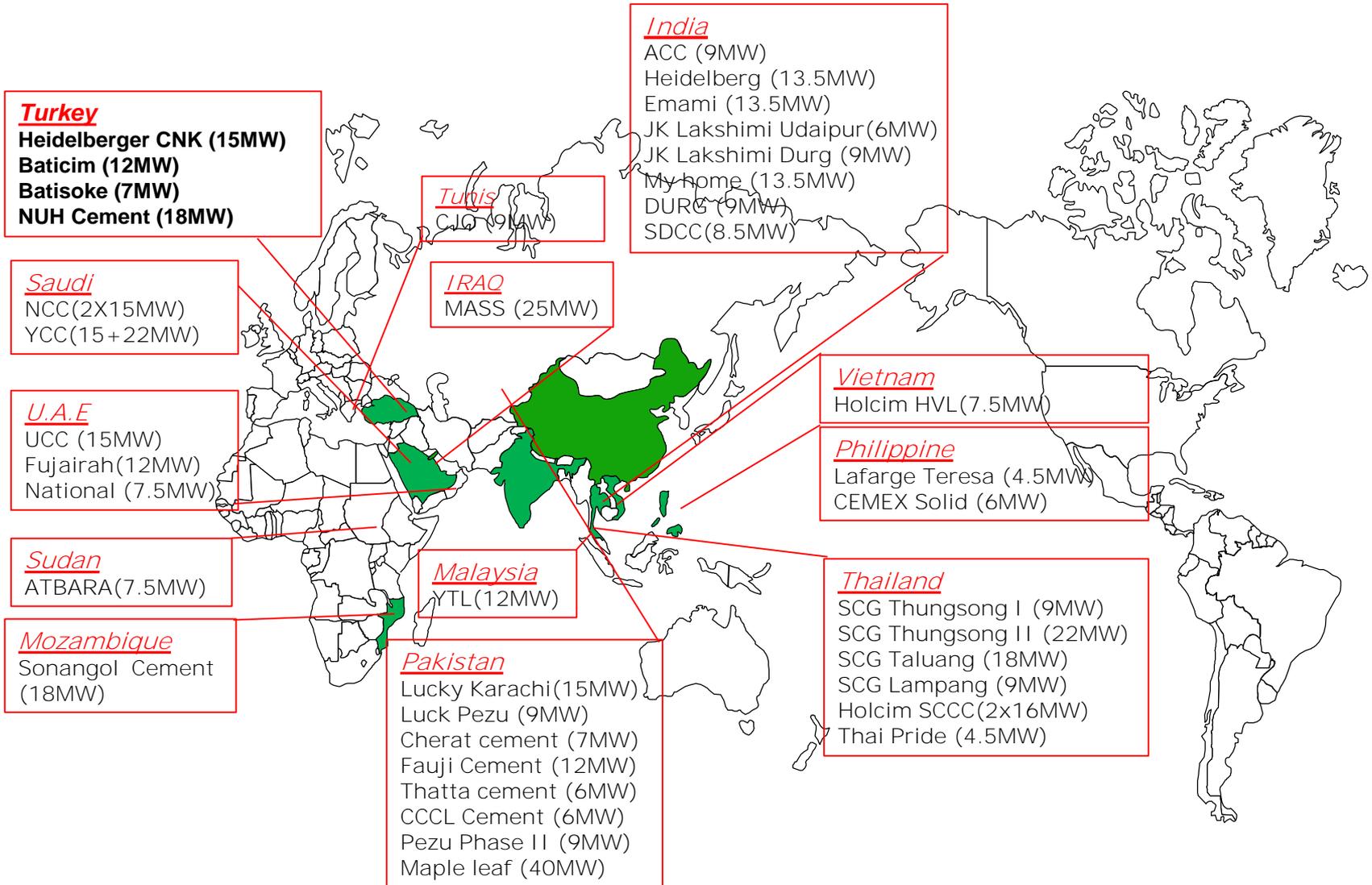
Projects in China: (by the end of 2014)

- Design Only: 108 plants, with total capacity of 797,280kW
- EP and EPC Project: 93 plants, with total capacity of 528,500kW
- BOT Project: 17 plants, with total capacity of 141,000kW

Projects out of China: (by the end of 2015)

EPC & EP Project: 35 plants, with total capacity of 567,000kW

➤ Overseas Reference (In Cement Industry)



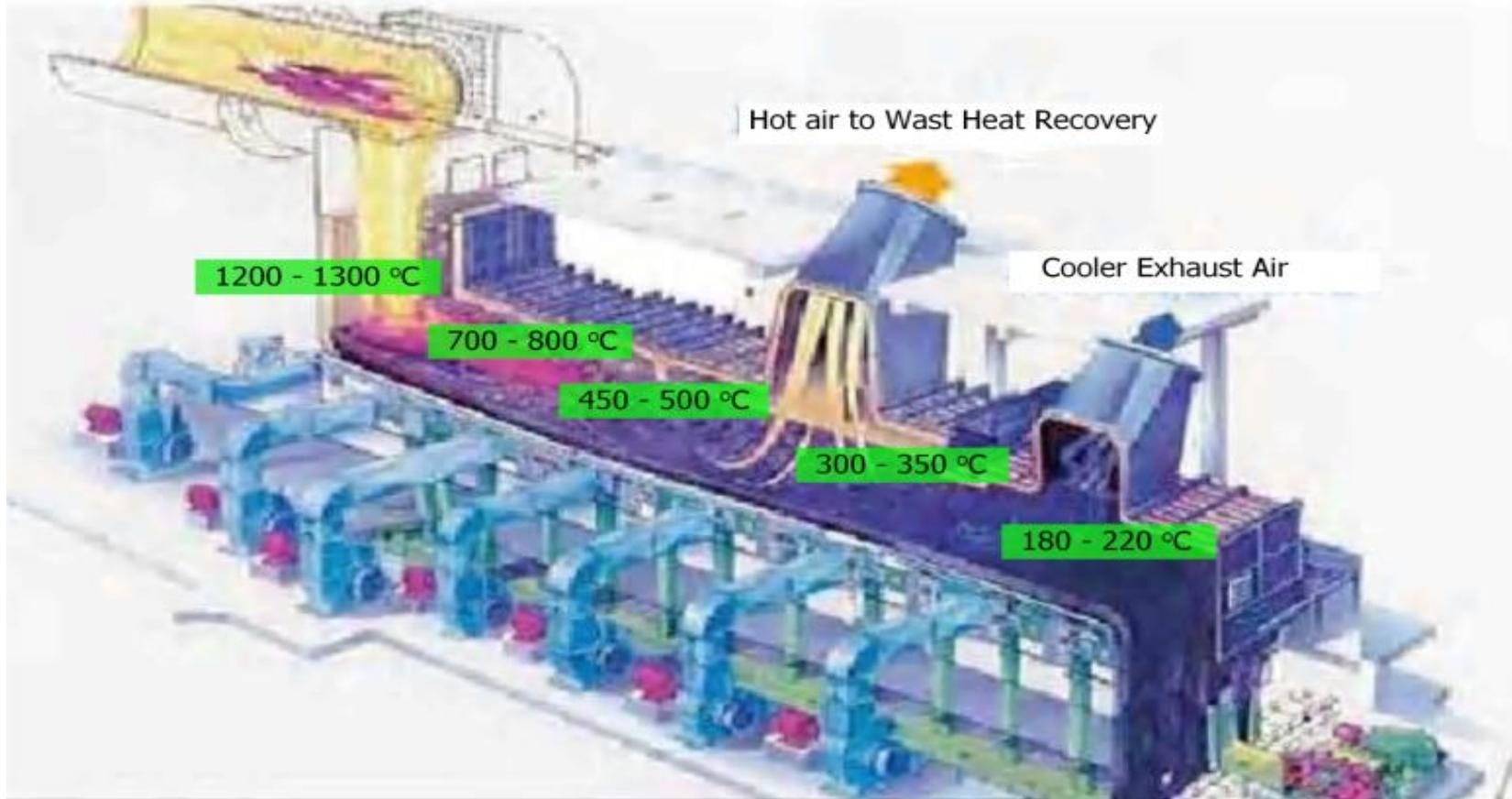
2 WHR System

In Cement Industry

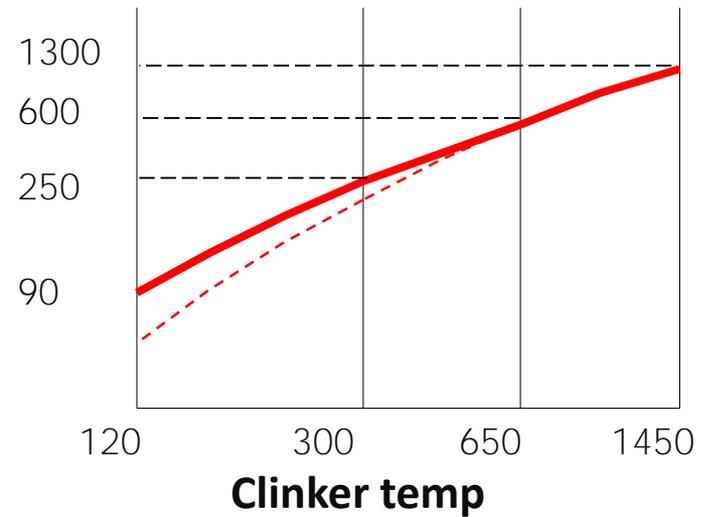
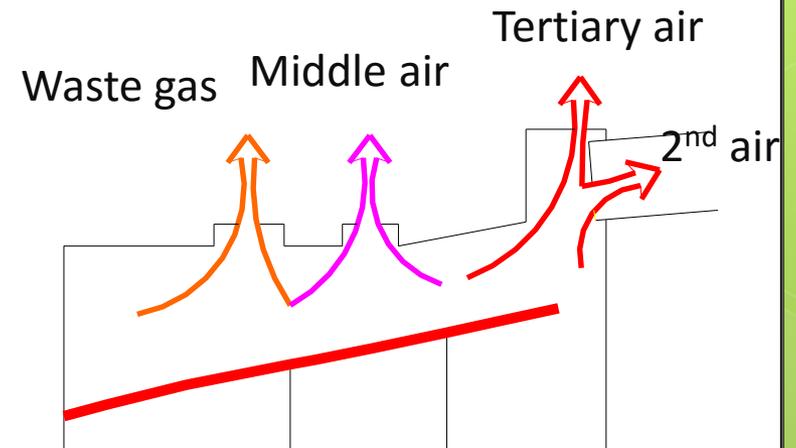
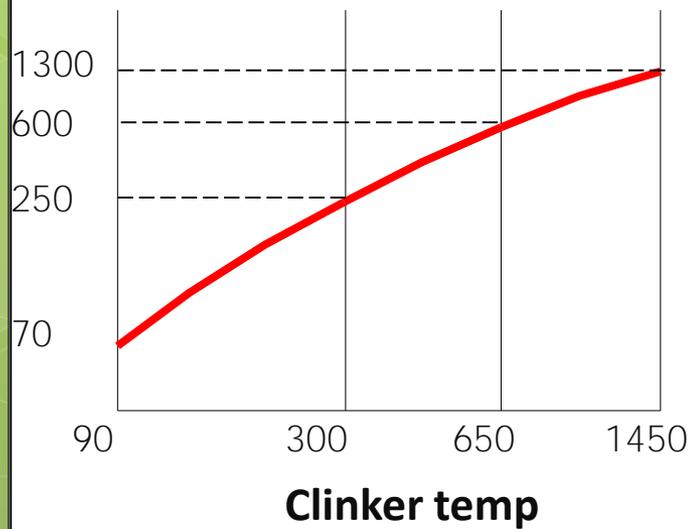
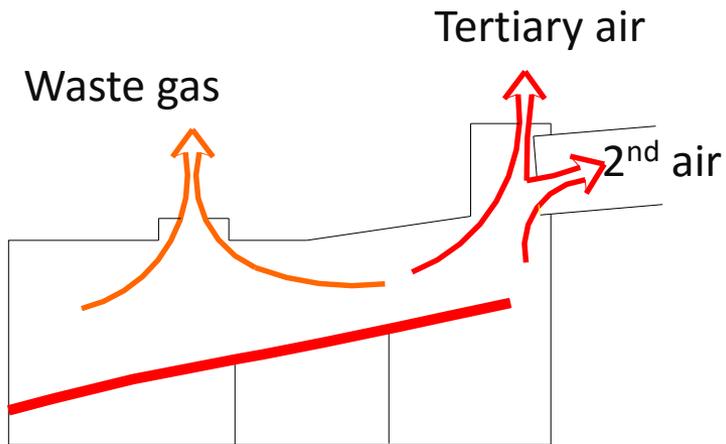
➤ A typical model for Waste Heat Recovery system



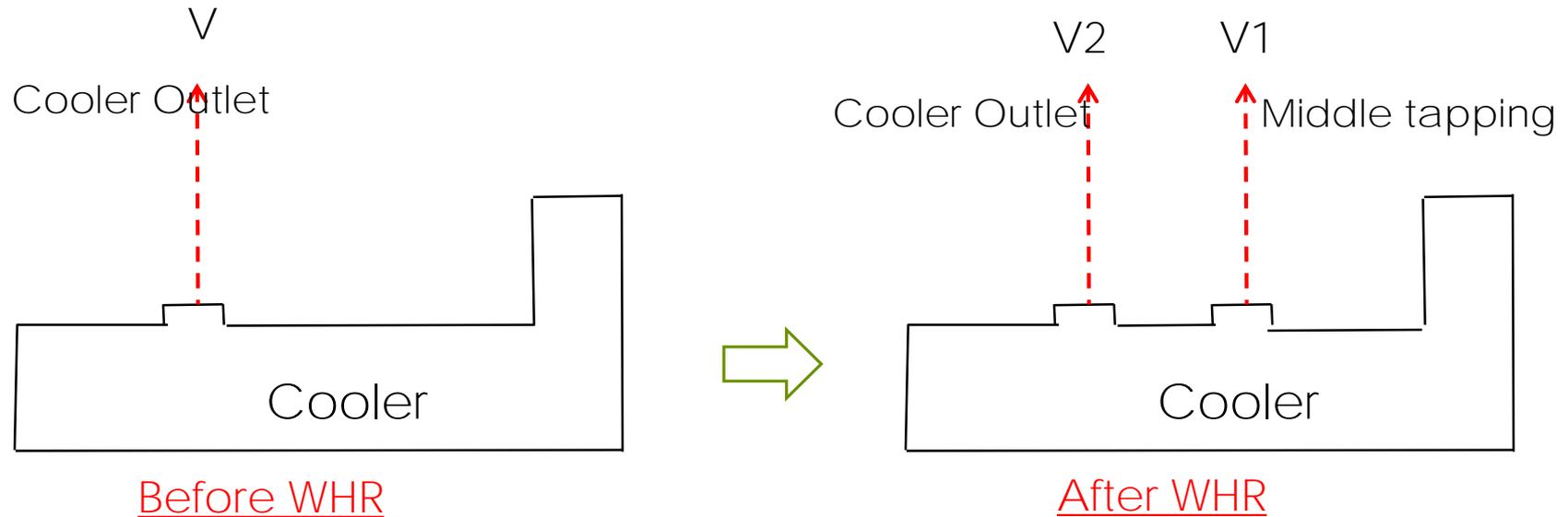
➤ Heat from Cooler



2. Heat Balancing



➤ Heat from Cooler (Middle Tapping)



Divide current gas V into 2 part, V_1 、 V_2 ;

$$V = V_1 + V_2$$

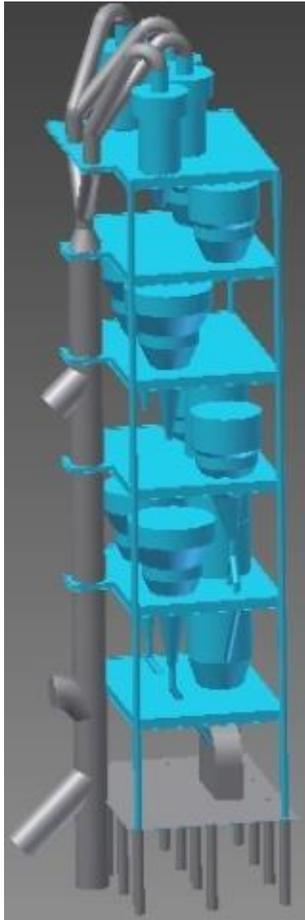
$$V \times c \times t = V_1 \times c_1 \times t_1 + V_2 \times c_2 \times t_2$$

$$V_1 = (V \times c \times t - V_2 \times c_2 \times t_2) / (c_1 \times t_1)$$

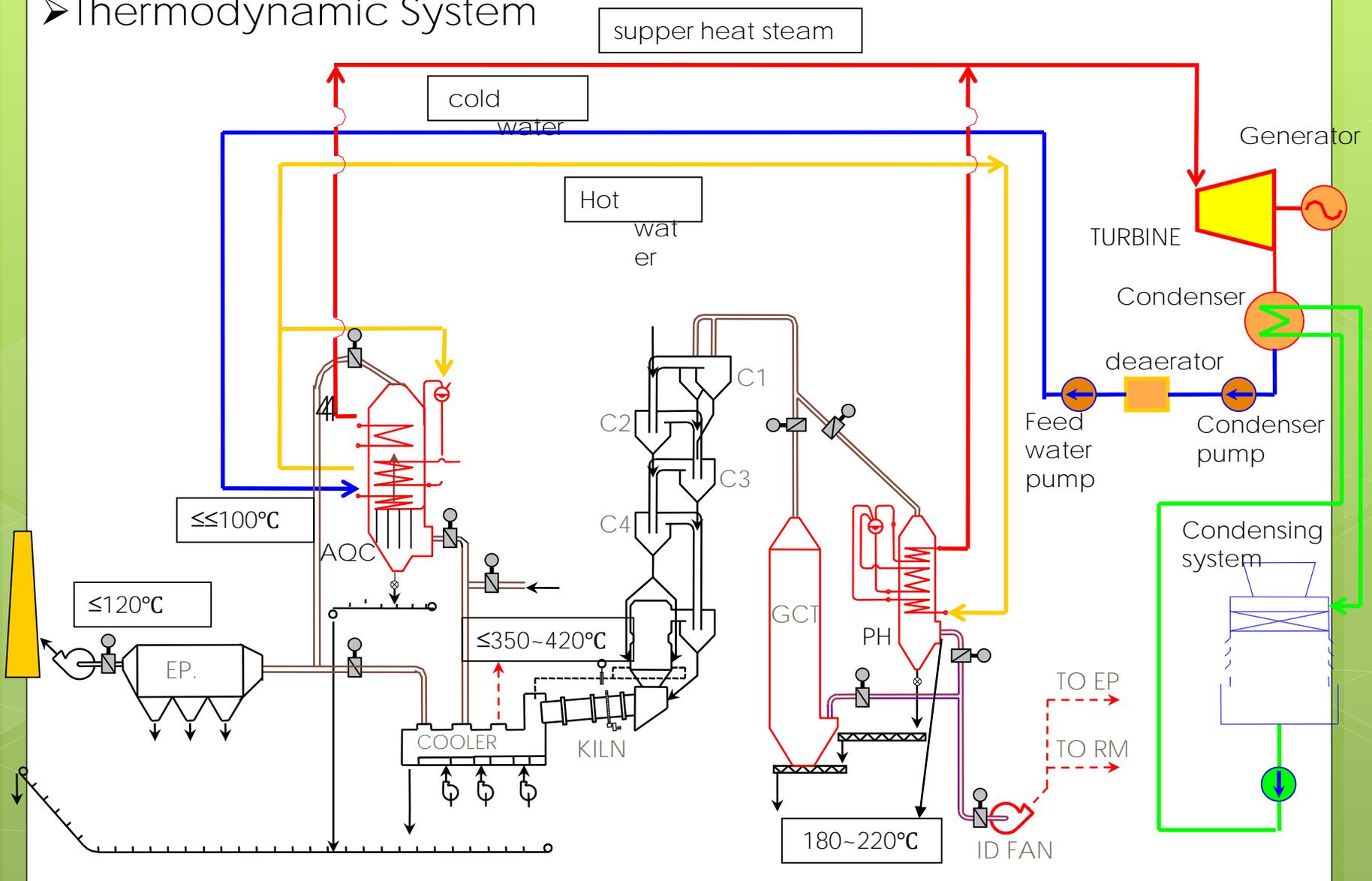
t_2 shall be the clinker temperature + 50~60 Deg C, the clinker temperature shall be ambient temperature + 50~60 Deg C, so the t_2 shall be consider at 150~160 Deg C.

➤ Heat from Preheater

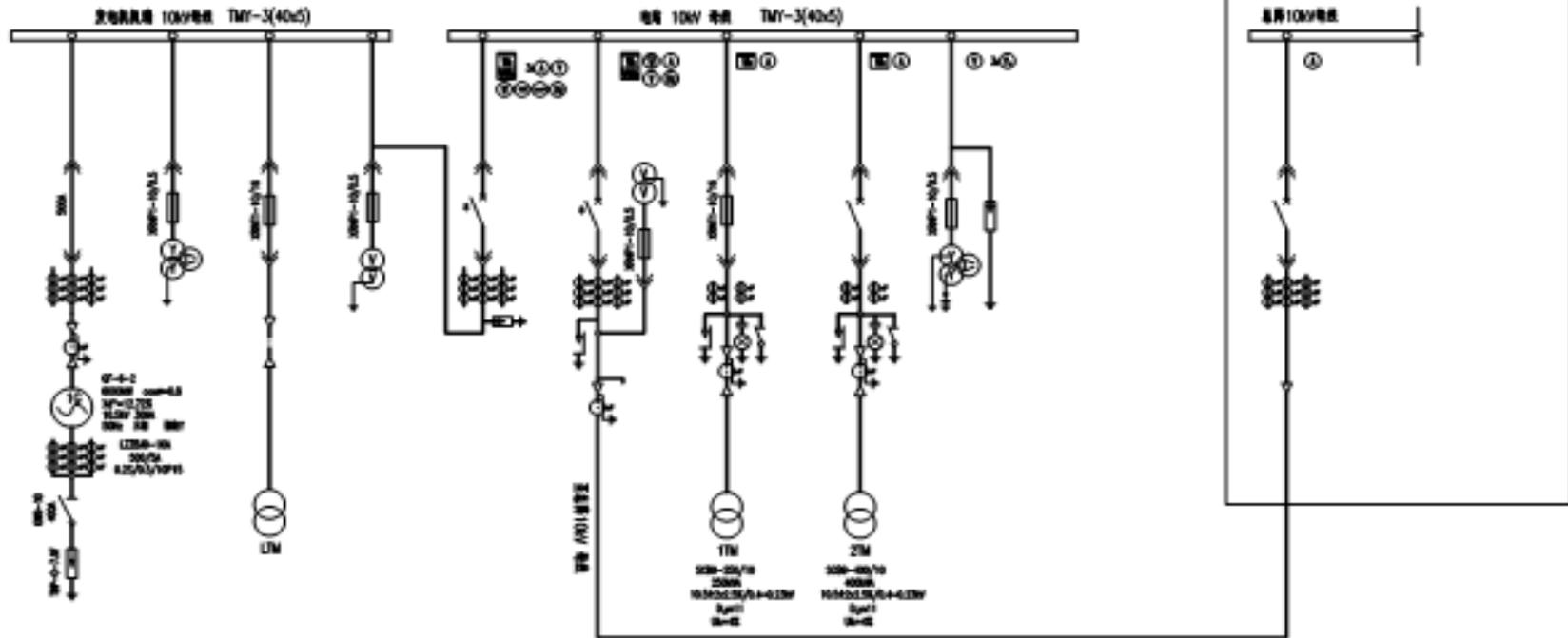
The waste heat gas will be taken from the outlet of Preheater through the duct.



➤ Thermodynamic System

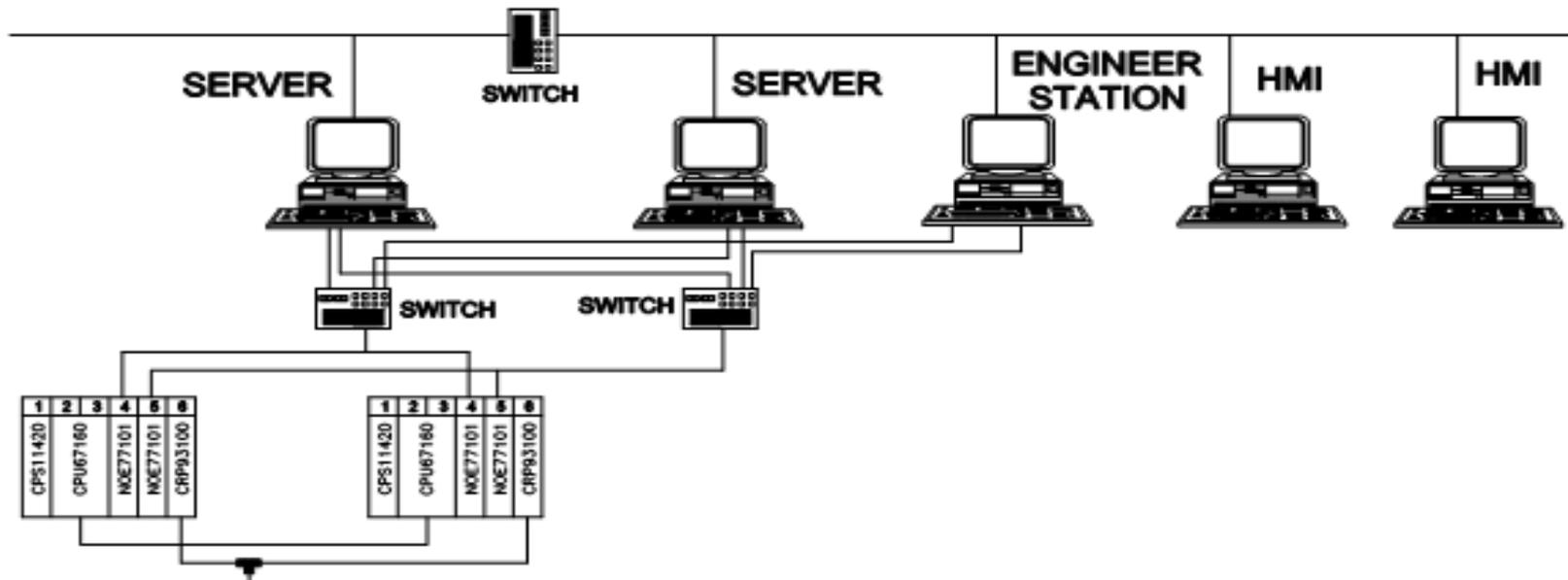


➤ Power connect-in System



The WHR power station and the existing system will be connected with the outside power network.

➤ DCS system



Using The Advanced, Mature Distributed Control System (DCS)

DCS system software main functions: flow chart shows, the control loop display and operation, sound alarm and alarm display, trends, graphs, tables show of data records, online diagnostics, online data storage, the main variables table displays

➤ Boiler Pressure Drop and Leak-in Ratio

Parts	Pressure Drop(Pa)	Leak-in Ratio(%)
AQC Boiler	600	2
Predusting Chamber	100~300	0.5
Duct for AQC boiler	200~300	0.5
Revolving plow reclaimer	-	0.5
Total	900~1200	3.5
PH Boiler	700~800	3
Duct for PH Boiler	200~300	0.5
Revolving plow reclaimer	-	0.5
Total	900~1100	4.0

➤ Plot Area

Clinker output(T/D)	2500~3000	5000~6000	8000~10000
WHR INSTALL CAPACITY(MW)	4.5	7.5/9	16/18
AQC boiler(M*M)	10.8*3.4	17.2*5.6	17.2*7.2
Preheater Boiler(M*M)	7.8*4.4	10*6	Double 8.5*4.6
T/G Building & EE Room(M*M)	27*15	33*15	34*18
Air Cooled Condenser	20*20	28*28	33*33
Cooling tower and pump station(M*M)	2*(9*9)+6	2*(12*12)+6	3*(12*12)+6
Demineralized water treatment & Water Tank(M*M)	18*8+3*(4*3)	18*8+3*(5*3)	18*8+3*(4*3)

➤ Make Up Water

Generally, the water demand for WHR power generation is bigger than coal fired power plant with the same capacity. For each kilowatt, the water consumption is estimated

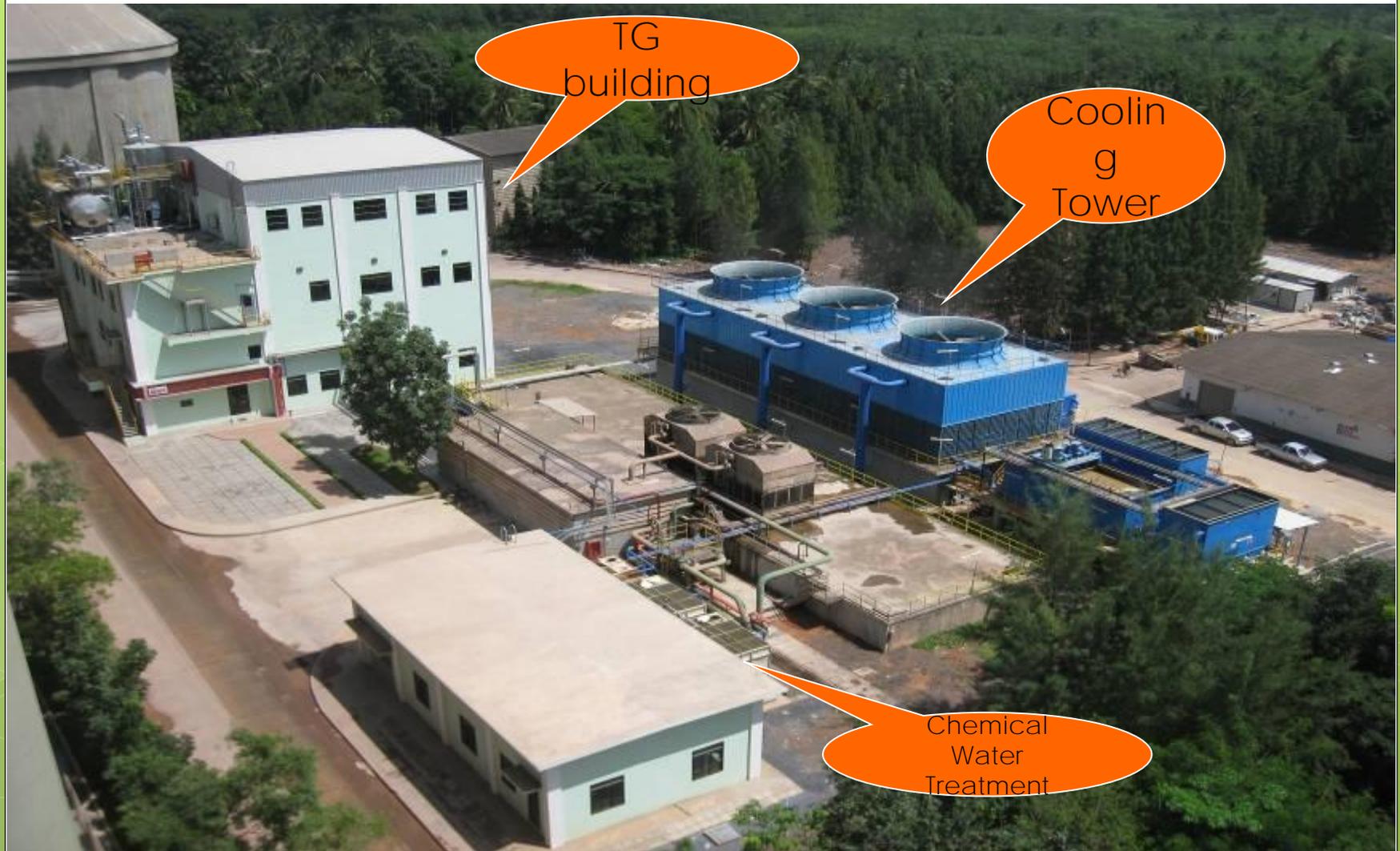
- 7.0kg/kWh (Water cooled condenser),
- 0.7~1kg/kWh (Air cooled condenser, depends on the installed capacity, the bigger capacity, the smaller water consumption)

3 WHR Equipments

➤ A typical model for Waste Heat Recovery system



➤ T& G building, Cooling tower, Chemical Treatment



➤ AQC & SP boiler



AQC
boiler

SP boiler

➤ Turbine & Generator



➤ Turbine & Generator



Module type



Assemble at site

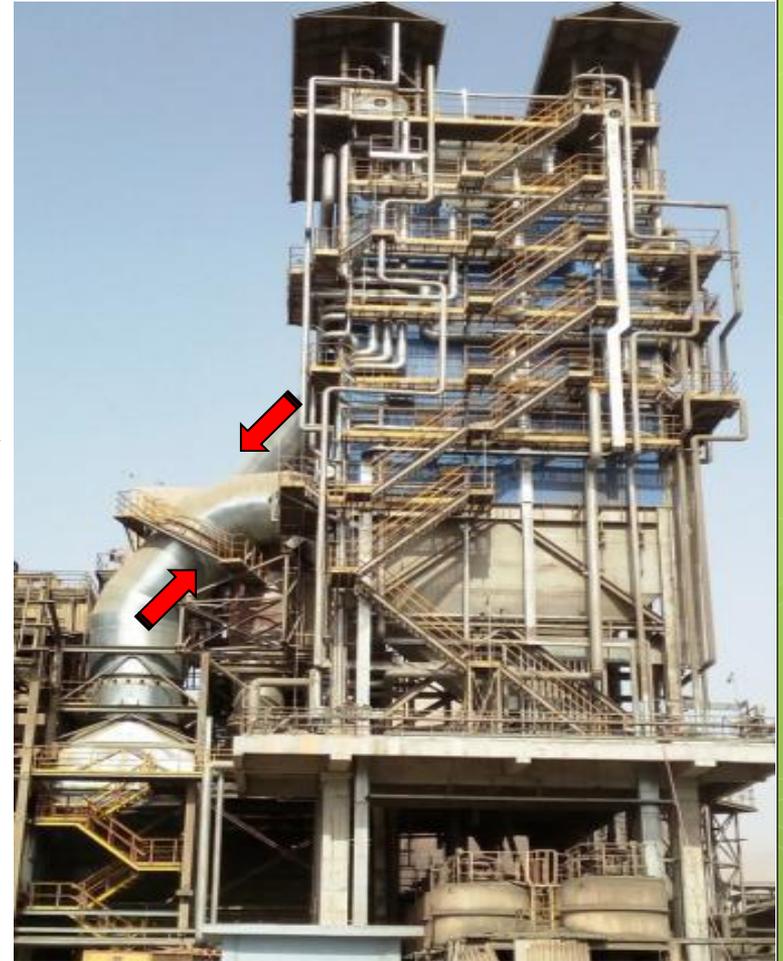
➤ BFP



Waste Heat Recovery Boiler ----AQC Boiler (Air Quenching Cooler)

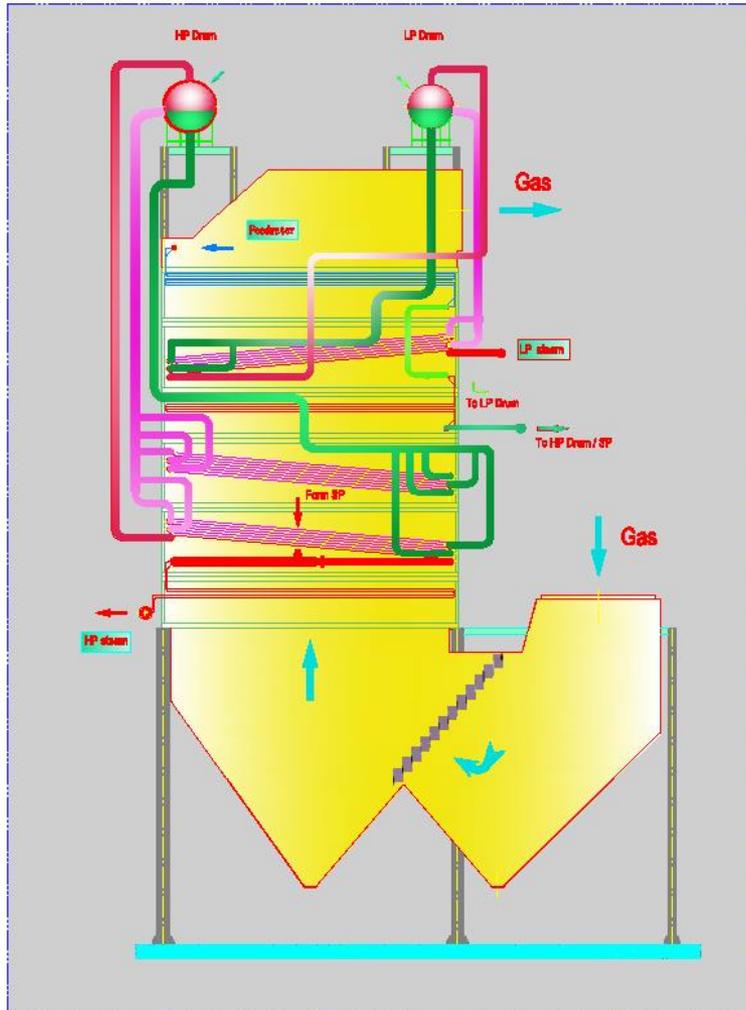


Separate Settling Chamber

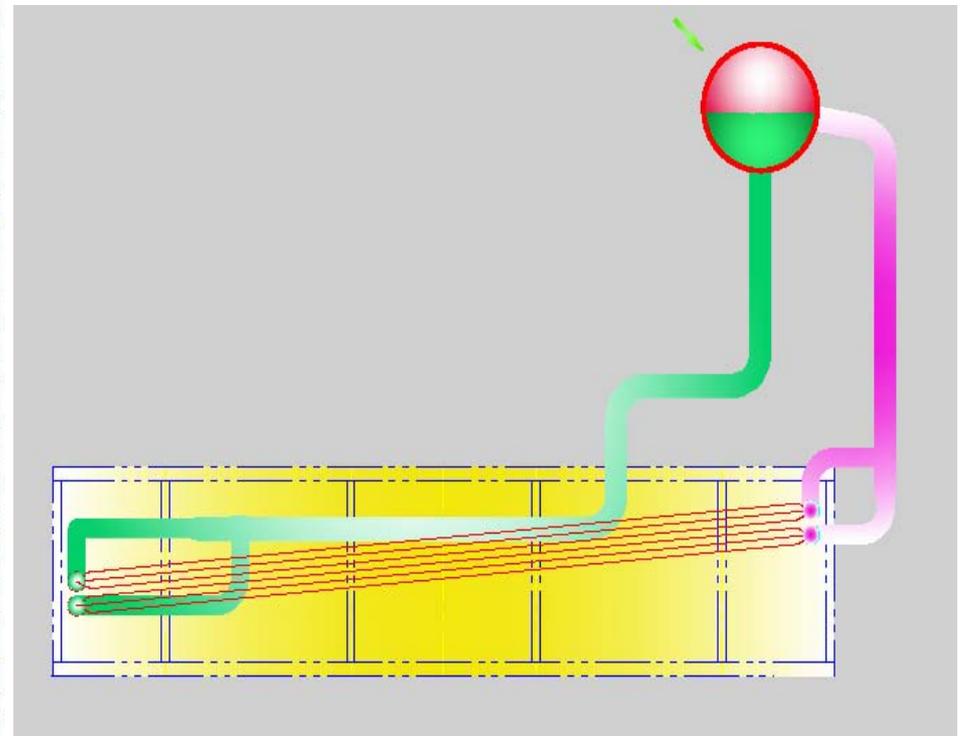


Integral Settling Chamber

Waste Heat Recovery Boiler ----AQC Boiler (Air Quenching Cooler)



- Single pass inclined arrangement is adopted in evaporator with dynamic water circulation
- No stub welding in heat surface at site



Cooler middle tapping point



AQC inlet Duct liner



Damper



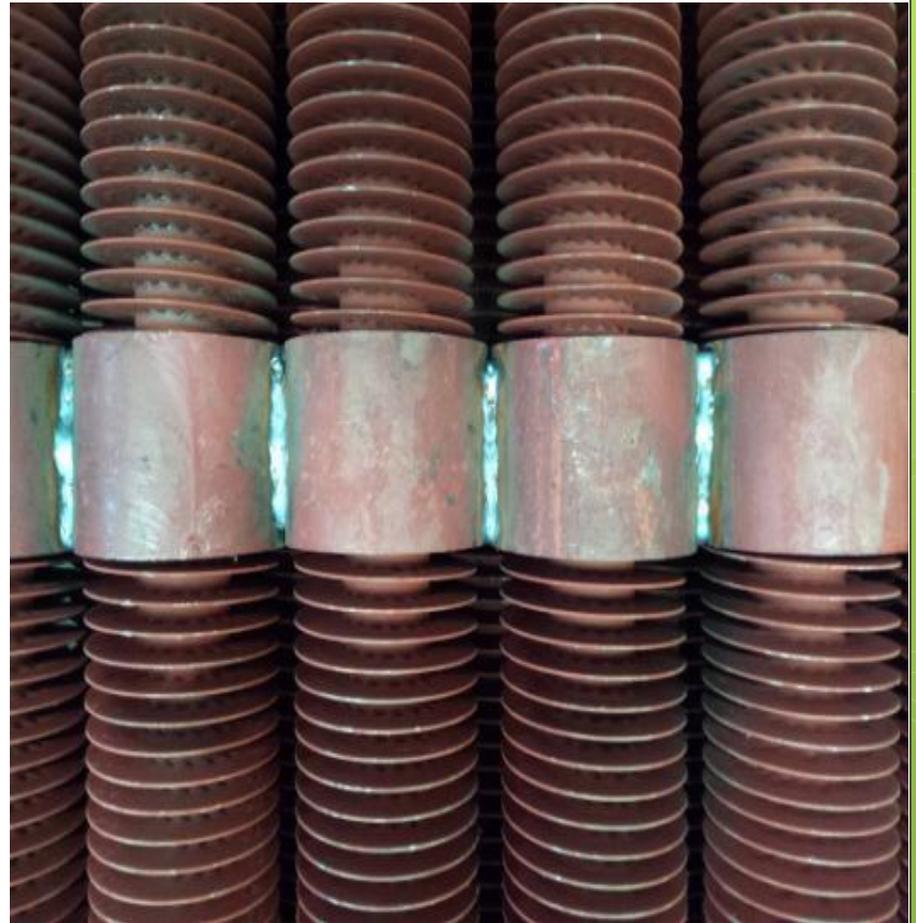
AQC boiler module-in



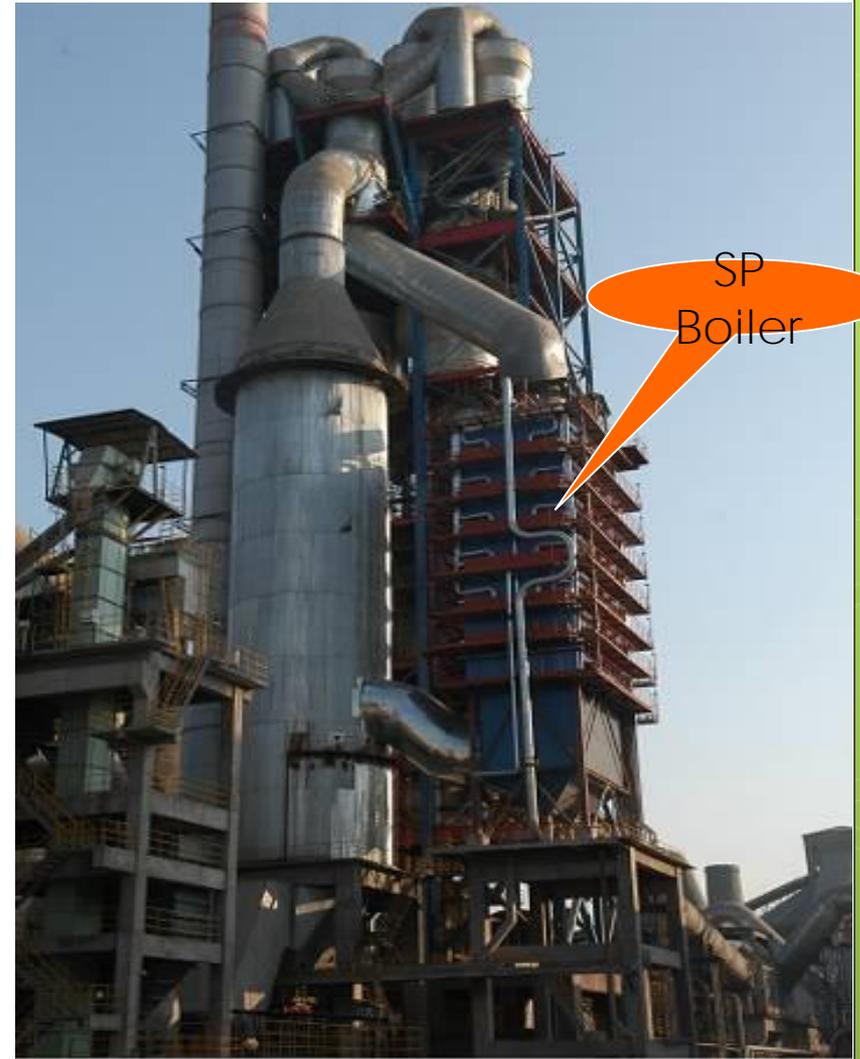
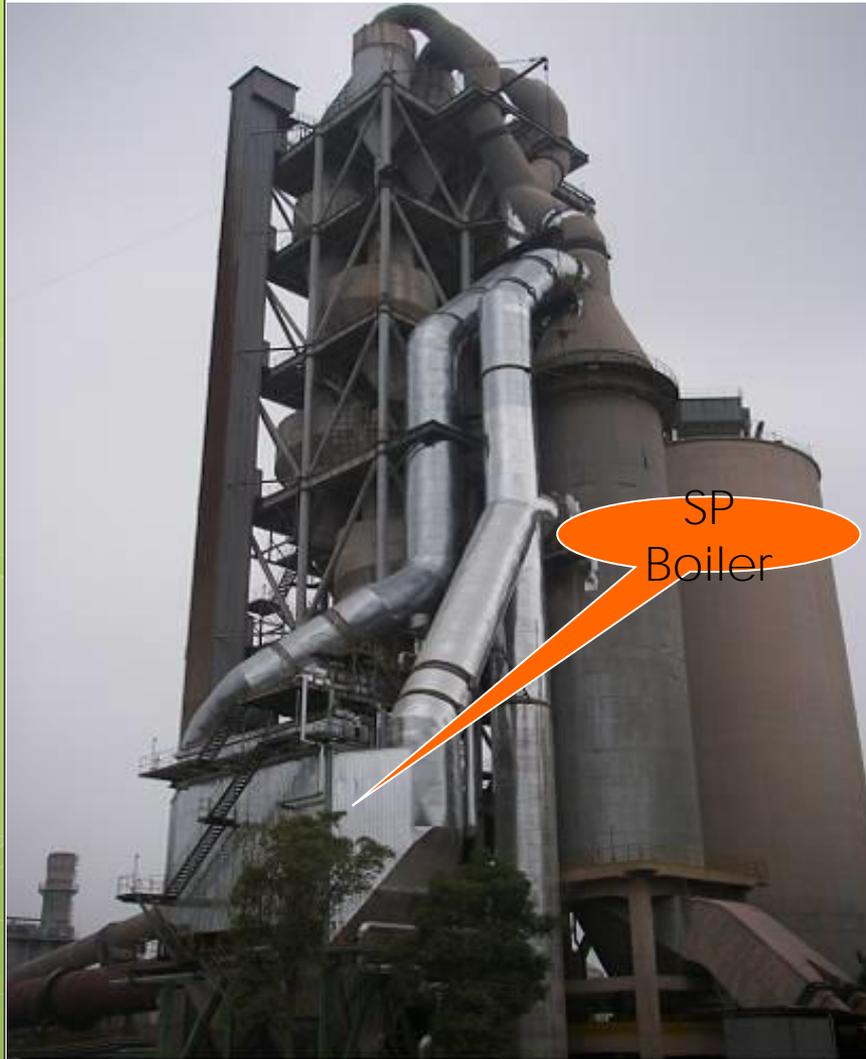
Fin tube-AQC Boiler

Fin tube

- All fin tube in heating surface of AQC,
- Efficient and anti-abrasiveness



Waste Heat Recovery Boiler ----PH or SP Boiler



Waste Heat Recovery Boiler ----Update SP Boiler --module type



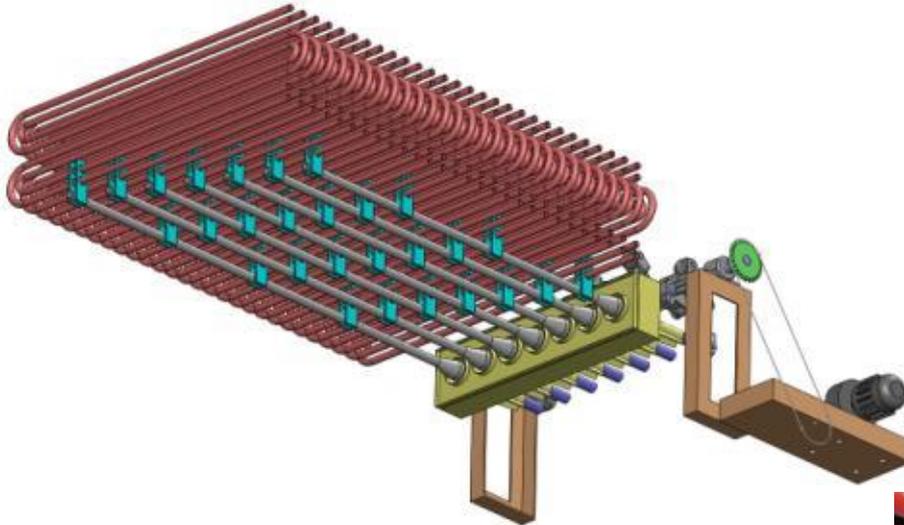
Piece by piece design

Module design

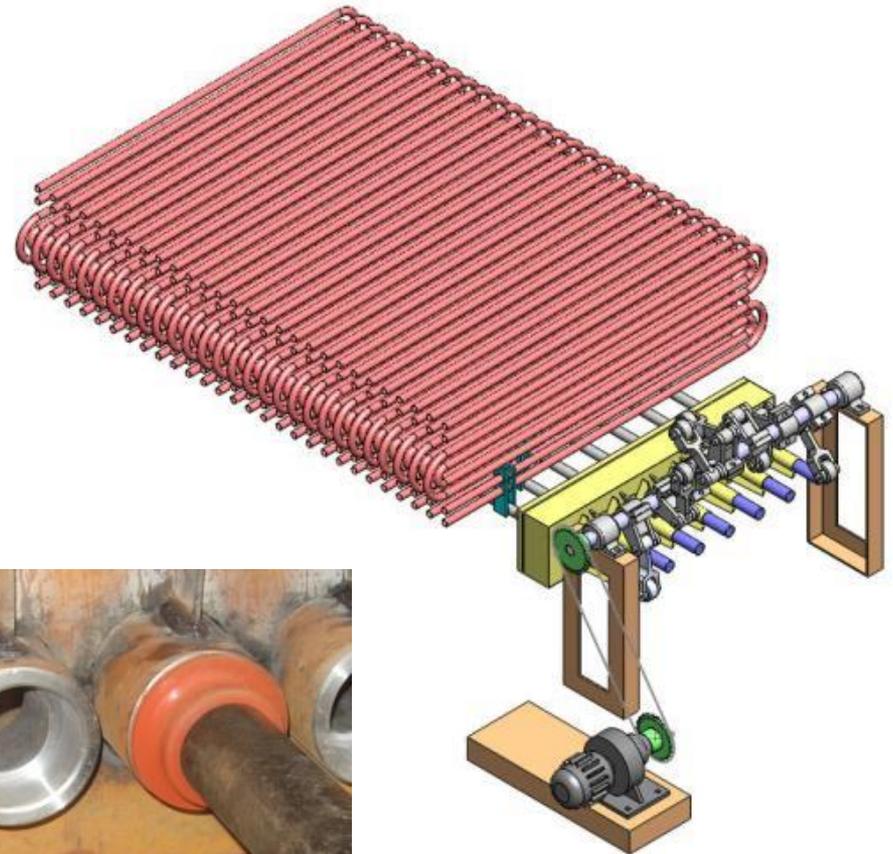
Waste Heat Recovery Boiler ----Update SP Boiler --module type



Vibration bare & heat tube connection



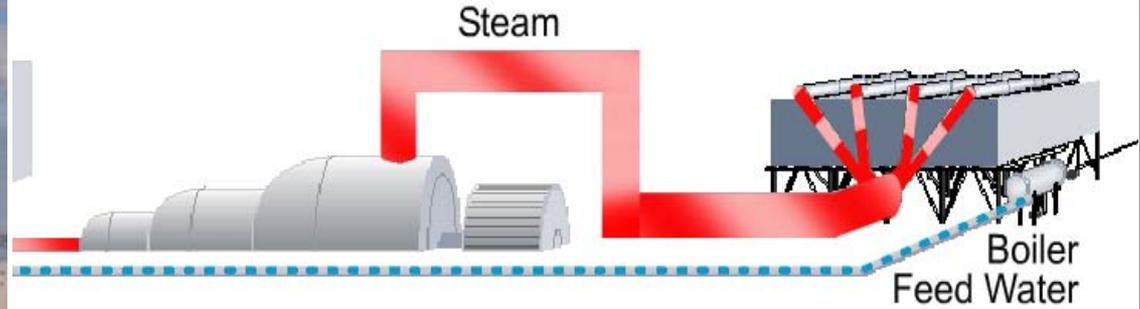
Hammer in operation



Water Cooling tower

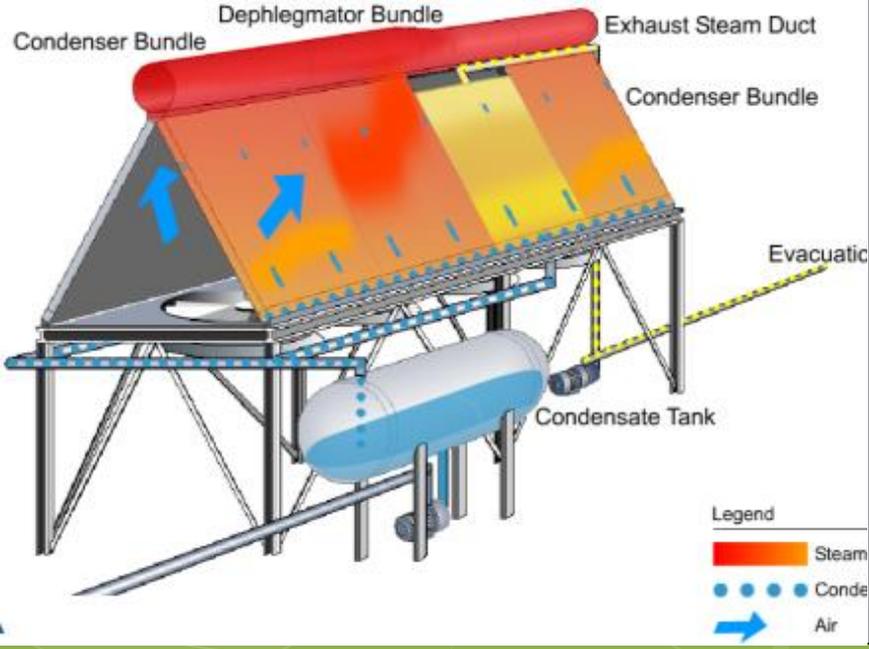
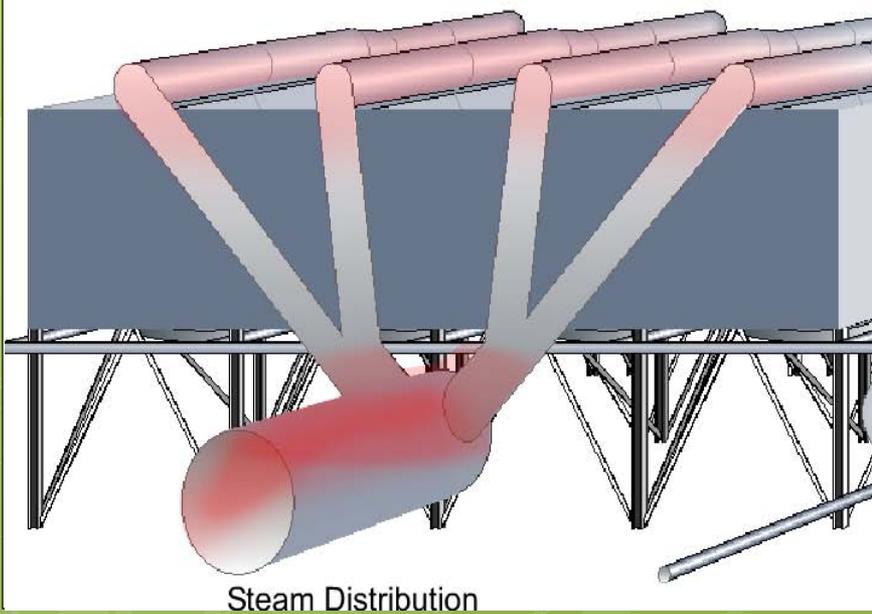


Air Cooled Condenser



Steam Turbine

Air Cooled Condenser



- Legend
- Steam
 - Conde
 - Air

Demi Water Treatment



Switchgear



MV

4 Connection to the Pyro system

Connection to the Pyro System

Hook up point of existing duct

To connect the WHR to Pyro system, normally there are two stops for the pyro system. The following photo shows the first stop work (15~20 days), normally the 15~20days use the annual overhaul of Pyro system.

During the the second stop(3~7 days), the work is to take away the blank plate and connect the duct.

Hook up point in cooler



The hook up of SP boiler

In this picture, the connection part of the duct in the existing downstream duct has been ready. During the overhaul period of the clinker production line, the connection part can be installed with the blank flange. When everything is ready, the blank flange shall be broken to finished the duct connection with the boiler.



5 Total Investment

Total Investment

Due to different culture and different consumable level in different country, the investment in different country is also different from each other, according to sinoma's experience, the investment in the following region shall be following:

Sn	Region	Investment MUSD/MW	Remark
1	East south Asia	1.4~1.6	Thai, Malaysia, Vietnam
2	Philippine	2.2	
3	Malaysia	1.6~1.8	
4	Turkey	1.9	
5	Middle East	2~2.2	Air cooled condenser
6	India	1.3~1.5	

Note:

- MUSD/MW shall be the million USD per installed capacity in MW
- The bigger installed capacity of WHR, the smaller investment

6 O & M (Operational & Maintenance) Cost

Operation & Maintenance Cost

1. Employees' salary
2. The cost for consumables such as chemicals, lubrication oil;
3. Water cost
4. Maintenance spare parts

Employees for Operation (About 50~70% of the total O&M cost)

Sn	Description	Nos	Remark
1	Manager	1	
2	Operators	8	2persons/shift, total 4 shifts

Overhaul

Shall be done one time per two years, the cost shall be estimated around 100,000USD ~120,000USD one time.

Thank You!

For any enquiry, kindly please
contact us at:

Sinoma Energy Conservation Ltd.

Mr. **Qu Tiezheng**

Email: qutiezheng@sinoma-ec.cn

Mobile: 0086-13920054866

 **Dynamis**
energia
www.dynamisenergia.com.br

Darcy Villela Itiberê Neto

Rua Padre Chico, 85 - 1º andar
São Paulo - SP - Brasil - 05008-010

darcy@dynamisenergia.com.br

+55 11 3801-3761 | +55 11 99932 5292