



**SUNPOWER GROUP LTD**

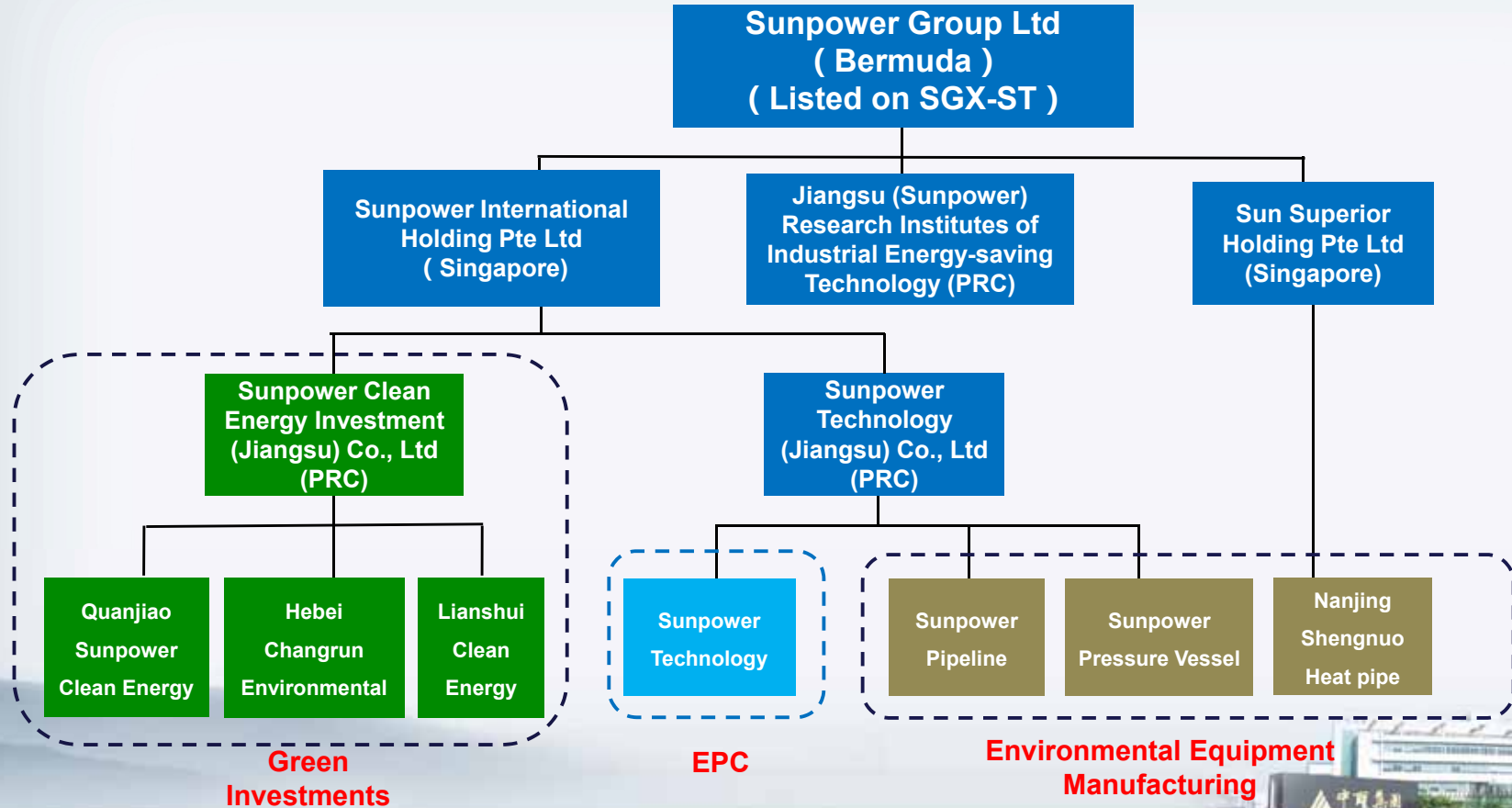
**Corporate Presentation  
April 2016**

# 20 Years of Proven Track Record

- Established since 1997, with 20 years of proven track record in the energy-saving and environmental protection sector
- Listed on SESDAQ in 2005 and was subsequently upgraded to the Mainboard in 2007
- 3 Core Segments
  - (a) Green Investments
  - (b) EPC Integrated Solutions
  - (c) Environmental Equipment Manufacturing



## ➤ Group Structure



## ➤ **Two-pronged Income Strategy**

Capitalizing on the Group's proprietary pipe insulation and highly efficient heat-transfer technologies, the Group further developed clean coal technology and long-distance steam distribution pipelines with heat insulation.

With the combination of technology and capital, the Group invested in centralized heating project.

### **Contract Revenue**

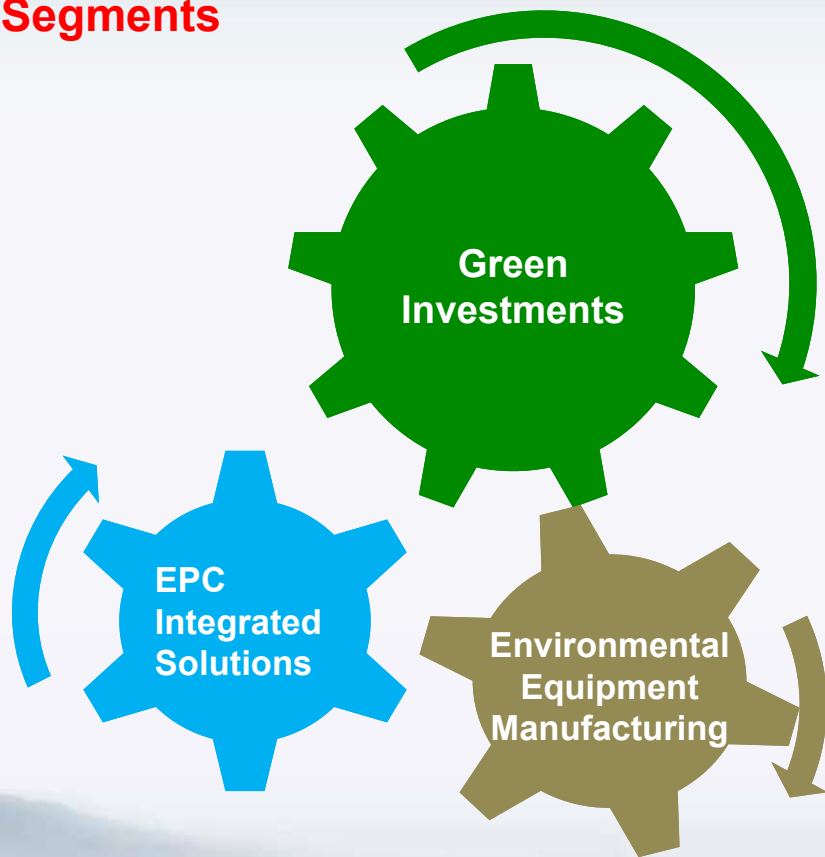
- **EPC revenue from BOT/BOO/TOT projects in Green Investments**
- **EPC revenue from supply of energy related solutions and products to both domestic and international customers**

### **Recurring Income**

**Achieve recurring income through BOT/ BOO/TOT projects over long term concessions, supplying centralized steam and electricity to customers**



## ➤ 3 Business Segments



# Green Investments



# Smog

**Highly polluting coal-fired boiler contributes to the pollution, emitting dust, sulphur dioxide and nitrogen oxides, which accounted for 33%, 27% and 9% of the total emission per annum in the country respectively. In recent years, China has been shrouded with serious smog, which is closely related to the extensive usage of coal-fired boilers which have unlimited emissions**

## ➤ China's Environmental Strategies



### • Smog Governance (雾霾治理)

- One of key culprits for China's SMOG & air pollution: inefficient small coal-fired boilers in industrial parks
- Closure of small coal-fired boilers with hourly production of 35 tons or less by the end 2017



### Circular Economy (循环经济)

- A sustainable strategy based on concept of Reduce, Reuse and Recycle
- One of the key measures in the Action Plan places emphasis on the development of Circular Economy through acceleration of industrial technology transformation and improvement in innovation capability.



### Energy Conservation & Emissions Reduction (节能减排)

- the Chinese government targets to increase the consumption of non-fossil energy from 7.4% to 20% out of total energy consumption between 2005 and 2030.





## ➤ **Some of Regulatory Policies in China**

**Air Pollution Prevention Action Plan 《大气污染防治行动计划》 (2013)**

**Air Pollution Prevention Plan in Hebei Baoding 《河北保定市大气污染防治总体工作方案》  
Implementation and Operation of Coal-Fired Boilers in Hebei 《河北省燃煤锅炉治理实施方案》**

**Following the policies, the Group has established a centralised steam and electricity facility in Hebei, Gaoyang  
公司紧跟政策，在河北高阳建立长润集中供热及余热发电项目**

**Law of the People's Republic of China on the Prevention and Control of  
Atmospheric Pollution 《中华人民共和国大气污染防治法》 (2015)**



## ➤ Eliminate Small Coal-Fired Boilers



### Disadvantage of Small Coal-Fired Boilers

- Low capacity
- Low coal quality
- Combustion inefficiency
- Produce energy waste
- No control of emission
- High pollution emission



## ➤ Market Value for Replacing Obsolete Coal-fired Boilers : S\$108B

### Estimation by tonnes per hour

Information statistics from the Boiler Action Plan:

- Total Capacity in 2012: approx. 1,800,000 tonnes/hour
- To eliminate obsolete coal-fired boilers with total capacity of 400,000 tonnes of steam production per hour by the end of 2018

Estimated Steam Revenue for 1 tonne/hour = RMB 1,250,000

(Source : Company's estimates)

Estimated Market Value for replacement of obsolete coal-fired boilers in China:

$400,000\text{t/h} \times \text{RMB } 1,250,000 = \text{RMB } 500,000,000,000 = \text{S\$108 Billion}$

(Source : Company's estimates)



# Sunpower Centralised Heating

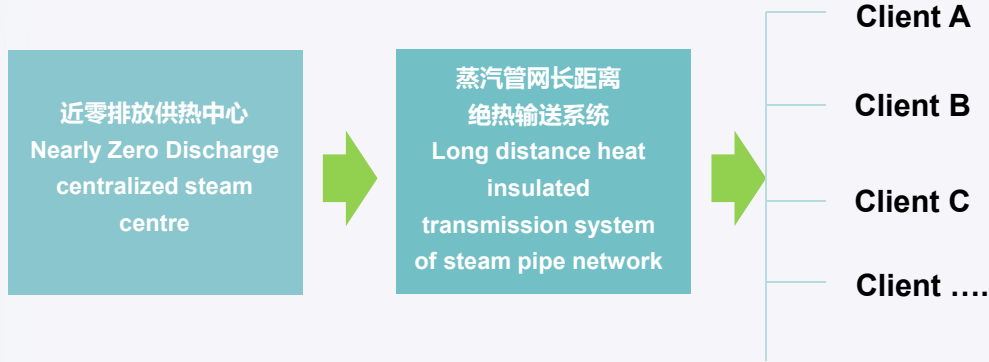
Leveraging on the centralised heating system with the use of clean coal

Same or even lower emission standard & competitive pricing  
compared to Natural Gas

Achieve “environmental protection through energy efficiency”



## ➤ Centralised Steam & Electricity Plant



1. Clean and high efficient use of coal
2. Long distance heat insulated steam distribution pipelines
  - Nearly 20 years of track record
  - Own proprietary technology
  - Pipelines distance up to 20-30km
  - Minimal temperature and pressure loss

3. Waste heat reuse
  - High efficient heat transfer
  - GGH- Gas Gas Heater
  - Low temperature water preheater



## ➤ Enclosed pulverized-coal combustion technology



- Reduce storage at coal yards
- Centralised milling
- Enclosed transporting
- Reduce dust pollution
- Use clean coal
- Conduct cleaning in enclosed spaces
- Convenient for transportation
- Safety assurance
- Centralised delivery



## ➤ Long Distance Heat Insulated Steam Distribution Pipelines

**The earliest study on this technology (1996):** The design of pipelines, highly efficient heat insulation pipe support, improve the insulation structure and selection of insulation materials;

**Optimal result with low cost:** material with high quality, optimized structure;

**The best heating effect:** large area coverage, less heat loss, less pressure drop.

Standard	Usual design	SP's long distance pipeline
Reduction in temperature 温降	15 /Km	≤5 /Km
Differential pressure 压降	0.06~0.1MPa/Km	0.02~0.03MPa/Km
Radius transportation 输送半径	8Km	≤30Km



## ➤ Outstanding Emission Control Capability

Emission Type	National Emission Standard for coal-fired boiler	Regional Emission Standard for coal-fired boiler	National Emission Standard for Natural Gas	Emission Standard for State-Targeted Regions	SP Emission Capability
Dust	50mg/m <sup>3</sup>	30mg/m <sup>3</sup>	20mg/m <sup>3</sup>	20mg/m <sup>3</sup>	Less than 5mg/m <sup>3</sup>
SOx	300mg/m <sup>3</sup>	200mg/m <sup>3</sup>	50mg/m <sup>3</sup>	50mg/m <sup>3</sup>	Less than 35mg/m <sup>3</sup>
NOx	300mg/m <sup>3</sup>	200mg/m <sup>3</sup>	200mg/m <sup>3</sup>	150mg/m <sup>3</sup>	Less than 50mg/m <sup>3</sup>

Source: .emission standard of air pollutants for boiler (GB 13271-2014)

As compared to Natural Gas, Sunpower is capable to deliver:

- ✓ Same or even lower emission standard
- ✓ Much more competitive pricing





## ➤ Projects-on-hand

Project Name	Nature	Annual designed capacity	Date Announced	Estimated Investment Size (RMB million)	Target Completion
Hebei Changrun Phase 1 Steam	30 years BOO/BOT of centralised steam plant at industrial park	2*220 t/h	23-Dec-2015	817	1QFY2017
Hebei Changrun Phase 1 Electricity	30 years BOO/BOT of centralised electricity plant at industrial park	2*25mv/h	23-Dec-2015	(Integral part of Steam plant)	1QFY2017
Jiangsu LianShui Steam	Less than 30 years BOT of centralised steam plant at industrial park	2*40 t/h	18-Jan- 2016	95	2 <sup>nd</sup> half FY2016
Anhui Quanjiao Phase 1 Steam	30 years BOT of centralised steam plant at industrial park	1*40 t/h	18-Feb- 2016	54	3QFY2016

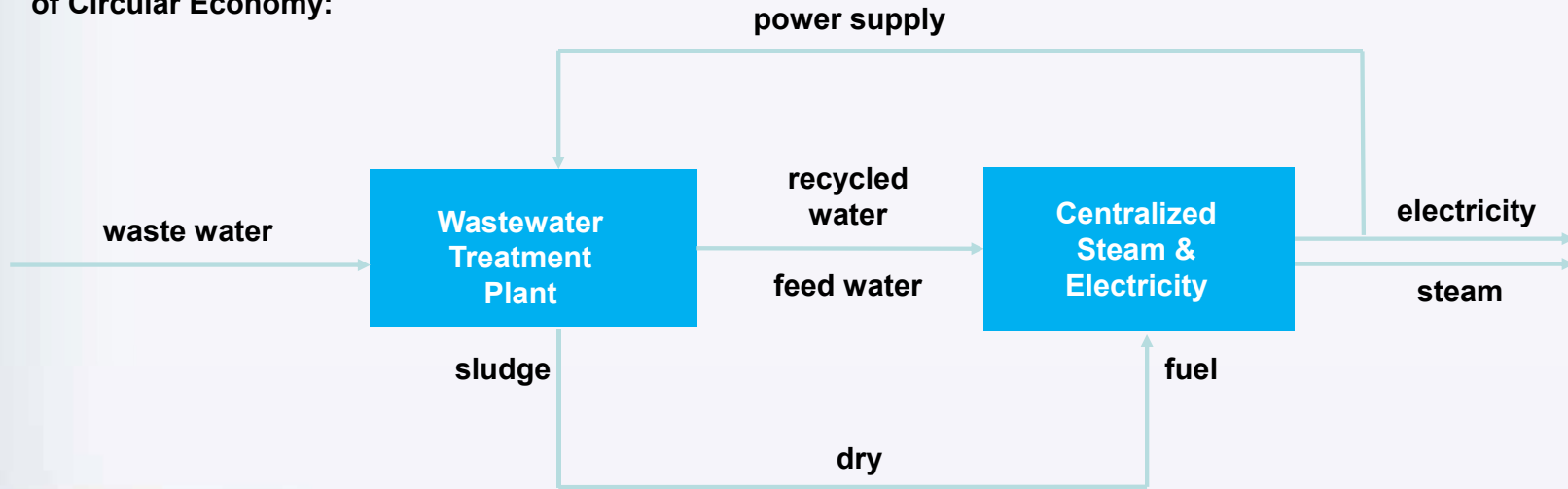
Source: Company's announcements



## ➤ Hebei Baoding Gaoyang ( Changrun ) : How Circular Economy Works

Our Changrun Project is located at Gaoyang Circular Economy Industrial Park which falls into one of the 18 National Circular Economy Demonstration City.

The following diagram is a illustration of the system used in Changrun Project that incorporates the concept of Circular Economy:



Using recycled water as feed water and dried sludge as fuel for centralized steam and electricity center to supply steam and electricity for customers, while part of the electricity are used for wastewater treatment plant.



## ➤ **Hebei Baoding Gaoyang ( Changrun) : Collectivity of Tariffs**

- ✓ **Prior to signing of Changrun project, we conducted detailed in-house due diligence on nature, quality and collectivity of tariffs from end-users**
- ✓ **Nature of Changrun end-users**
  - **Comprise > 90% print and dye companies with proven historical track record of operations**
  - **Products comprise mainly low-priced day-to-day towels**
- ✓ **Steam is an essential input for end-users' operations. End-users risk a cut of steam supply if they do not make payment of tariffs on a timely basis**



# EPC Integrated Solutions

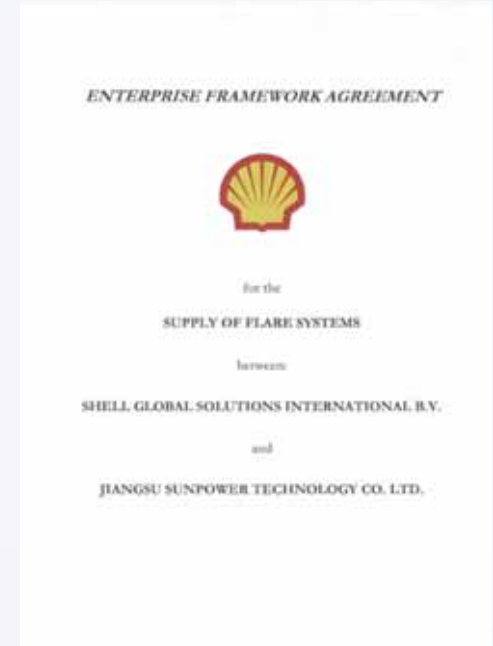


## ➤ Flare-gas & Flare-gas Recovery System

We specialized in flare gas and flare gas recovery system, solving complex problems for different customers. Sunpower design and install flare gas recovery system that can achieve near zero emission of normal flare gas, limiting emissions to only emergency releases. Flare gas can be cycled and then be reused as fuel or chemical materials. Flare gas recycle system makes profits from reducing emissions, which can quickly return on the environmental investment.

✓ Enterprise Framework Agreement (EFA) with SHELL

Enterprise Framework Agreement (EFA)



## ➤ Flare Gas & Flare Gas Recovery System



Export to Turkmenistan



Export to Vietnam

National key project: Shenhua coal liquefaction project



## ➤ High Salinity Wastewater Treatment – Zero Liquid Discharge

Since the first installation of Zero Liquid Discharge plant in China, Sunpower has been leading in engineering and construction of waste water evaporation and crystallization system in China. Highly integrated with various pretreatments, Sunpower evaporation and crystallization systems recover valuable salts and by-products, reuse/recycle valuable water resources, and reduce effluent volume to reach Zero Liquid Discharge.

- ✓Own proprietary technology with 10 patents (1 out of 4 in the world, the only one in China)
- ✓Team with a mixed of local and foreign experts
- ✓Experienced and professional EPC services
- ✓Self-developed ZLD system based on low-temperature-energy utilisation (LTE-ZLD) 低温能源利用的ZLD技术
- ✓Self-developed salt recycling system 杂盐分质回收利用系统



## ➤ High Salinity Wastewater Treatment - Zero-Liquid Discharge (LTE- ZLD)

**Core technology:** Recovering waste heat with low-temperature 化工装置低温位余热回收 (Low Temperature Energy, LTE) and converting into heat source for steam system. The energy saving will significantly reduce the operation cost of ZLD system.



Chemical production process generates various form of waste heat, especially low-temperature-energy

高效余热回收技术

Highly efficient  
waste heat  
recovery  
technology



Evaporation system 蒸发系统





## ➤ High Salinity Wastewater Treatment – Zero Liquid Discharge



国内首套（神华煤制油）

The first unit in China ( Shenhua coal liquefaction )



Yulin Shenhua 神华榆林



Sinopec's first unit 中石化首套



## ➤ Photovoltaic Power Generation

We rely on our excellent engineering capabilities and integrated turnkey system to provide comprehensive solutions to the investment, technology, design, construction, commissioning of solar photovoltaic power plants. Reuse solar energy, providing the community with clean, safe, high efficiency and sustainable development of clean energy

- **Sophisticated supply chain management**
- **Experienced in international projects**
- **Experienced EPC management team**
- **Established long-term partnership with GCL, the largest enterprise in photovoltaic industry**



**风光互补**  
**Wind-Solar**  
**Hybrid**



**光伏大棚**  
**Photovoltaic**  
**Greenhouse**



**光伏屋顶**  
**Photovoltaic**  
**Roof**



**山地光伏**  
**Mountain**  
**Photovoltaic**



**鱼光互补**  
**Fishing-Solar**  
**Hybrid**



## ➤ Petrochemical Engineering



Based on our traditional petrochemical experience, Sunpower has been constantly expanding upstream and downstream. We focus on design and construction of the petrochemical plants with special technologies. With such efforts, we have gained specialists on MTO, polyethylene, PTA, polysilicon and sulfur recovery plant etc.

### Our Competitive Advantages:

- ✓ Sophisticated supply chain management
- ✓ Comprehensive solution
- ✓ Experienced EPC management team
- ✓ In-house equipment fabrication with controlled quality and schedule



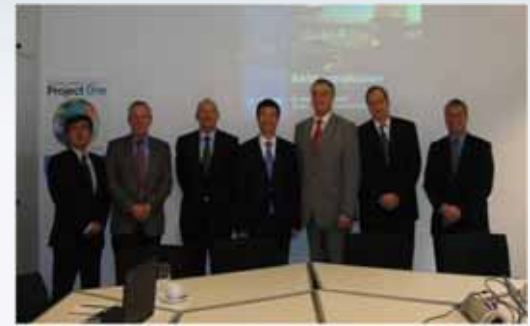
# Environment Equipment Manufacturing

Heat transfer technology with high efficiency, quality materials, high-end clients



## ➤ Environmental Equipment Manufacturing

- International standard, competitive cost, and shorter delivery time
- Suitable for wide range of applications
- Nearly 20 years of track record and brand awareness
- Experienced professional team
- Strong R&D capabilities and energy-saving technology
- World-class clients
- Long-term and stable returns



Global suppliers and strategic partners from BASF  
BASF全球供应战略伙伴



Integrated Alliance Export Agreement with Sinopec  
中石化出口一体化团队



## ➤ Environment Equipment Manufacturing – Energy-saving heat exchanger (Heat transfer technology with high efficiency) 高效传热技术



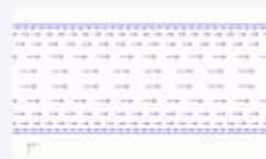
Inner grooved tube  
内凹槽管



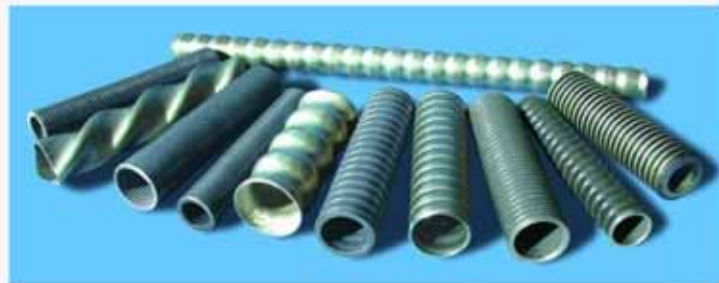
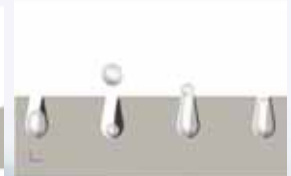
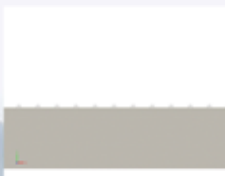
High flux tube  
高通量管



Corrugated pipe  
波纹管



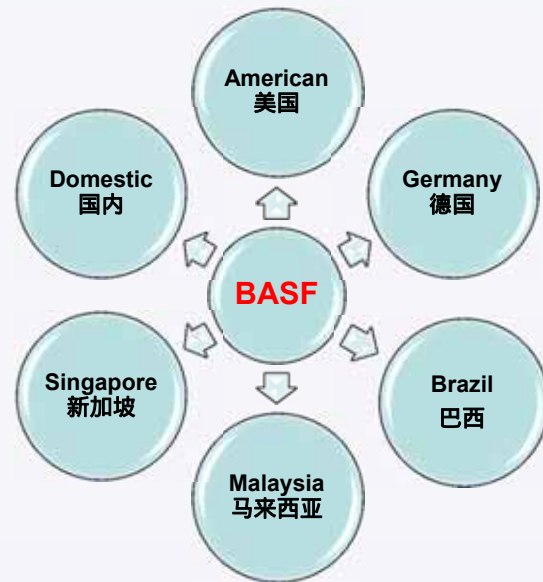
T-slot tube  
T型槽管



- Good in heat transfer, strong anti-fouling ability, long operating cycle
- Saving in metal materials reduces investment in equipment
- 传热系数高，抗结垢能力强，运行周期长。
- 节约大量的金属材料，降低设备投资。



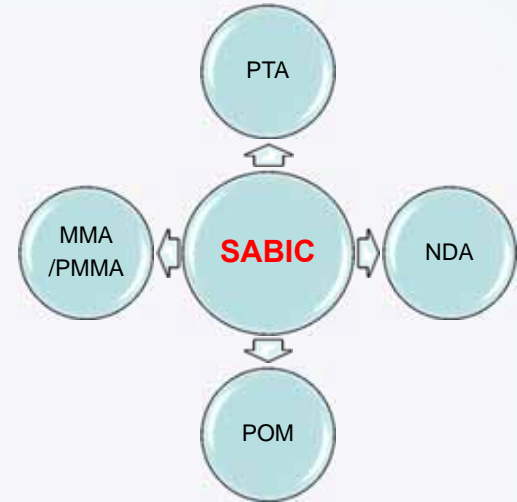
## ➤ Environmental Equipment Manufacturing



Providing complete sets of  
core equipment to BASF



## ➤ Environmental Equipment Manufacturing



- Export complete sets of core equipment to Middle East  
Saudi Arabic Basic Industries Corporation (SABIC)

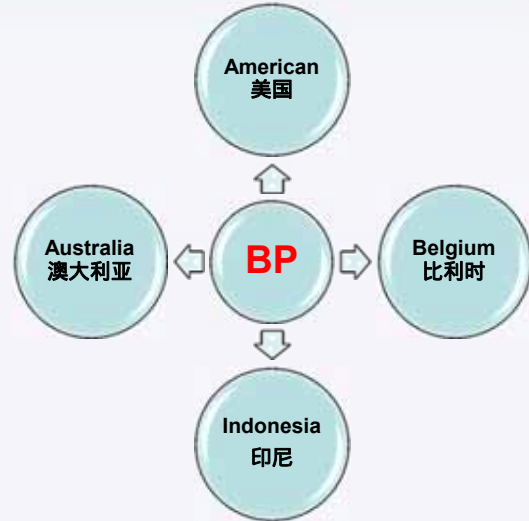




## ➤ Environmental Equipment Manufacturing



## ➤ Environmental Equipment Manufacturing

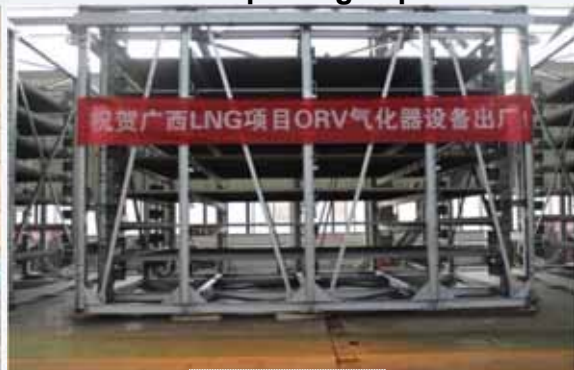


## ➤ LNG Equipment Localisation

Replacing import with “Made in China” products



ORV气化器



ORV气化器



U-tube Heat Exchanger 绕管换热器



IFV气化器



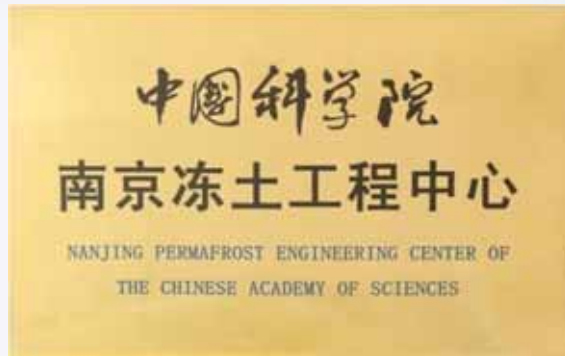
IFV气化器



SCV气化器



## ➤ Research & Development Platforms



**Our products have been exported to Europe, Australia, Southeast Asia, Middle East, etc. including more than 30 countries and regions.**

**Sinopec**

**PetroChina**

**CNOOC**

**Shenhua Group**

**China Railway**

**China Chemical Industry**

.....

**BASF**

**BP**

**SABIC**

**DOW**

**Shell**

**Total**

**Alcoa**

**Arkema**

**DuPont**

**Bayer**

**Exxon Mobil**

**Suncor**

**Husky**

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**Technip**

**FLUOR**

**Worley Parsons**

**Toyo**

**CTCI**

**UHDE**

**GE**

**Intecsa**

**Samsung**

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Q&A

