



Green buildings ? Overview of China's heating technology market



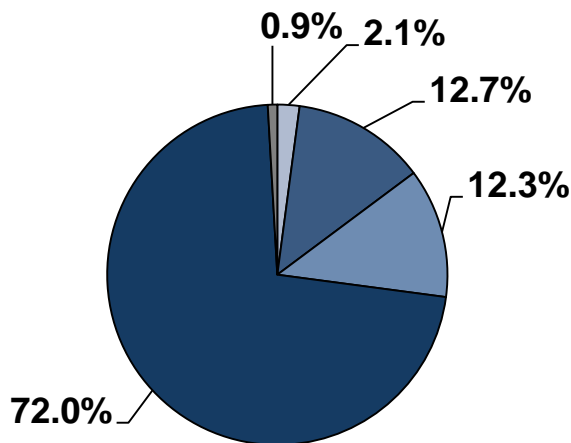


Market Situation – Existing Housing – Residential

Total Number of Homes – 404.2 million

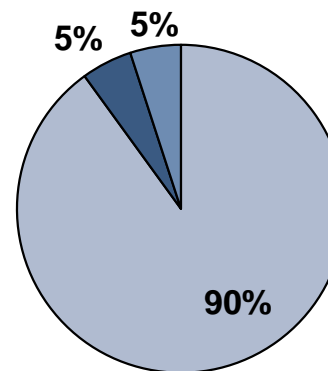
% Primary energy consumption (including heating)

% Ownership structure



- Towngas
- Natural Gas
- LNG
- Electricity
- Others

Source: CN statistic annual book 2014



- Private Owned
- Private Rented
- Social Housing

Source: CN city status report 2014

Electric energy consumption and social housing structures dominate the market



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Ownership structure:

- In China the available land belongs to “the people”. Investors can’t buy “land” but can only buy “land using rights”.
- Other than in western countries Chinese people don’t buy “single family houses” but affordable apartments. Chinese don’t consider “my home is my castle”.
- The average Chinese apartment is simply equipped when it comes to heating appliances, the northern region is dominantly heated by district heating still with a dominant use of coal.
- In China’s south the use of electrical heaters (split units) is still the largest share with an increasing number of retrofitted gas wall hung boilers





General data about China residential housing market

Market Segmentation	2014 No. of boilers installed (m units)	Trend 2015	Trend 2016	Trend 2017	Trend 2018
New housing	0.6	↗	↗	↗	↗
Social housing	0.15	↗	↗	↗	↗
First time Installation	0.1	↗	↗	↗	↗
Non housing	0.07	→	→	→	→
Replacement	0.04	↗	↗	↗	↗
Total	0.95	-	-	-	-

Discrepancy in the number of installed boilers compared to number of residential buildings - why is that?

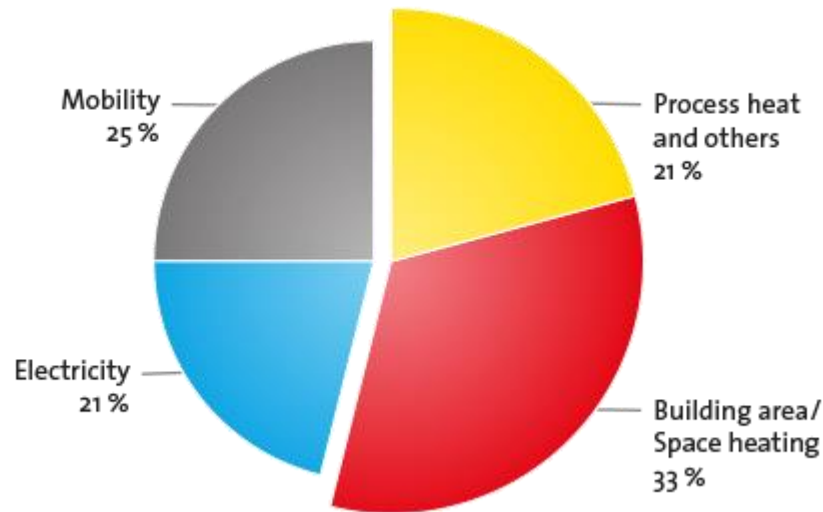


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Comparison to the German market

Heating market: Europe's largest energy consumption sector

One-third of the final energy consumption of Europe can be attributed to heating of rooms and domestic hot water heating. Considering the industrial / process heating, the share of the heating market in the final energy consumption in Germany is significantly more than 50%.



Source: BDH Germany 2016



European including German market situation as further comparison to China

- Only around 29 % of the 20.5 million heat generators installed in German buildings reflect the "state-of-the-art" technology.
- Compared to the 8.9 million low temperature or standard gas boilers which are considerably less efficient, there are only 4.2 million condensing boilers.
 - Out of the 6 million oil/gas boilers installed in Germany, only about 600,000 are energy-efficient condensing boilers.
- About 600,000 heat pumps use geo-thermal and ambient heat.
- About 900,000 biomass boilers use wood as renewable energy.
- Only about 9% of the heat generators installed in Germany additionally use renewable solar thermal energy.

Source: BDH Germany 2016



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Other European countries as comparison to China

- UK – market potential gas wall hung boilers appr. 600 T pieces, gas condensing boilers mandatory
- Netherlands – appr. 500 T pieces, dominantly gas condensing boilers
- Germany – appr. 800 T pieces, 80 % condensing boilers
- China - acc. to the statistic figures published for the first quarter of 2016 133 T wall hung boilers were sold. As 1 quarter is traditionally weak due to Chinese New Year impact, the estimated market potential will 2016 be $\leq 1,0$ Mio pcs gas wall hung boilers, max 10 % gas condensing.
- ➔ The three European countries represent appr. 11,5 % of Chinese population, the market potential in China is – still - far below the European markets.
- ➔ Why is there such a difference?



Historical and climatic reasons



- Due to energy shortage prior to the opening of China 1987 the Yangtse River divided China into two heating zones:
 - North of Yangtse river heating was mandatory
 - South of Yangtse river heating was forbidden

- Heating in the urban areas of North-China is dominated by district heating – still - dominantly using coal as fuel source, however, due to severe air pollution in recent years a switch to gas is going on.
- South China doesn't need heating due to climatic condition, however, needs air conditioning.

This situation has an impact on people's mind set but is changing



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Residential market – Bosch wall hung boilers as heating & condensing boilers



Heating Boilers from 16 – 35 KW

Gas Condensing Boilers from 22 – 98 KW



Wall hung boiler combined with solar thermal system



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Geothermal heatpumps market CN

- Bosch Thermotechnology is active in geothermal heatpumps market either and operates a factory for heat pumps (water & air sourced) at Zibo.
- Market perspective for geothermal products is positive due to new laws and limitations to curb air pollution.
- On medium and long term we anticipate a strong growth in that segment



Bosch Water cooled screw chiller

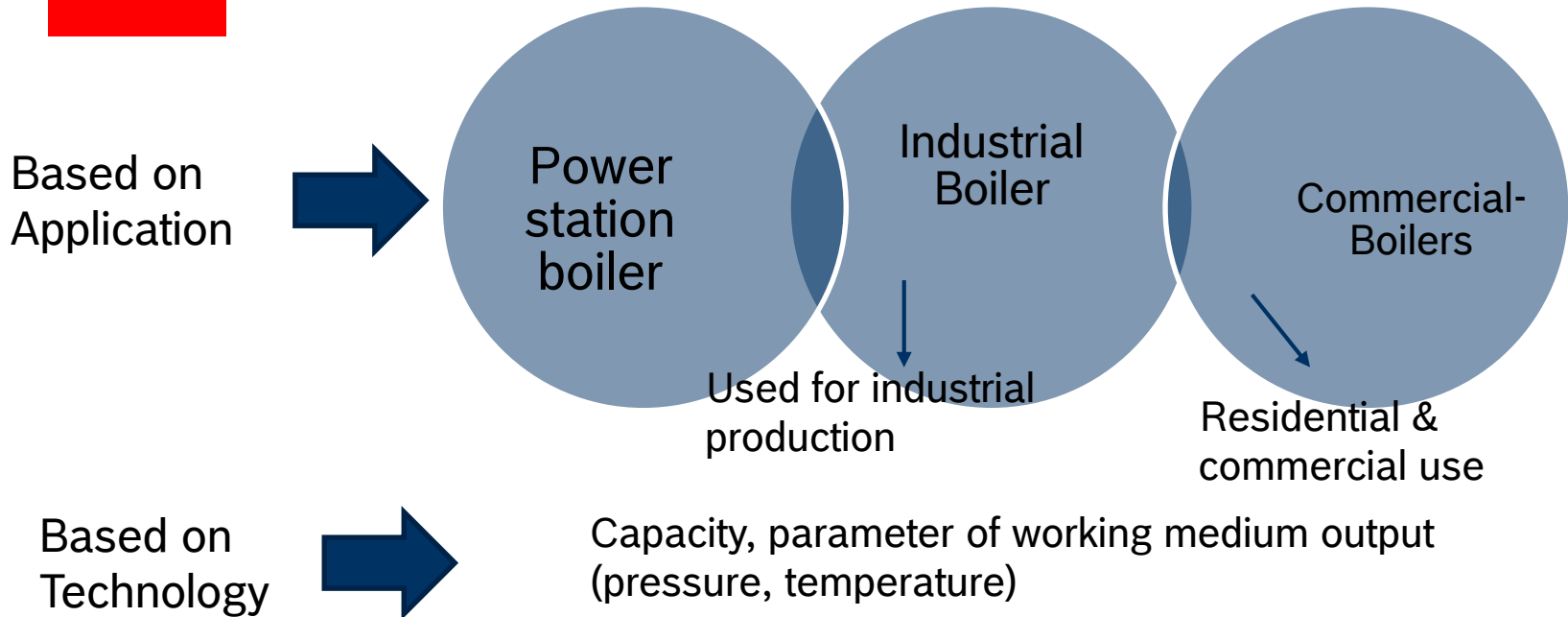


Bosch water Sourced heat pump





Classification Commercial & Industrial Boilers (CCIB)



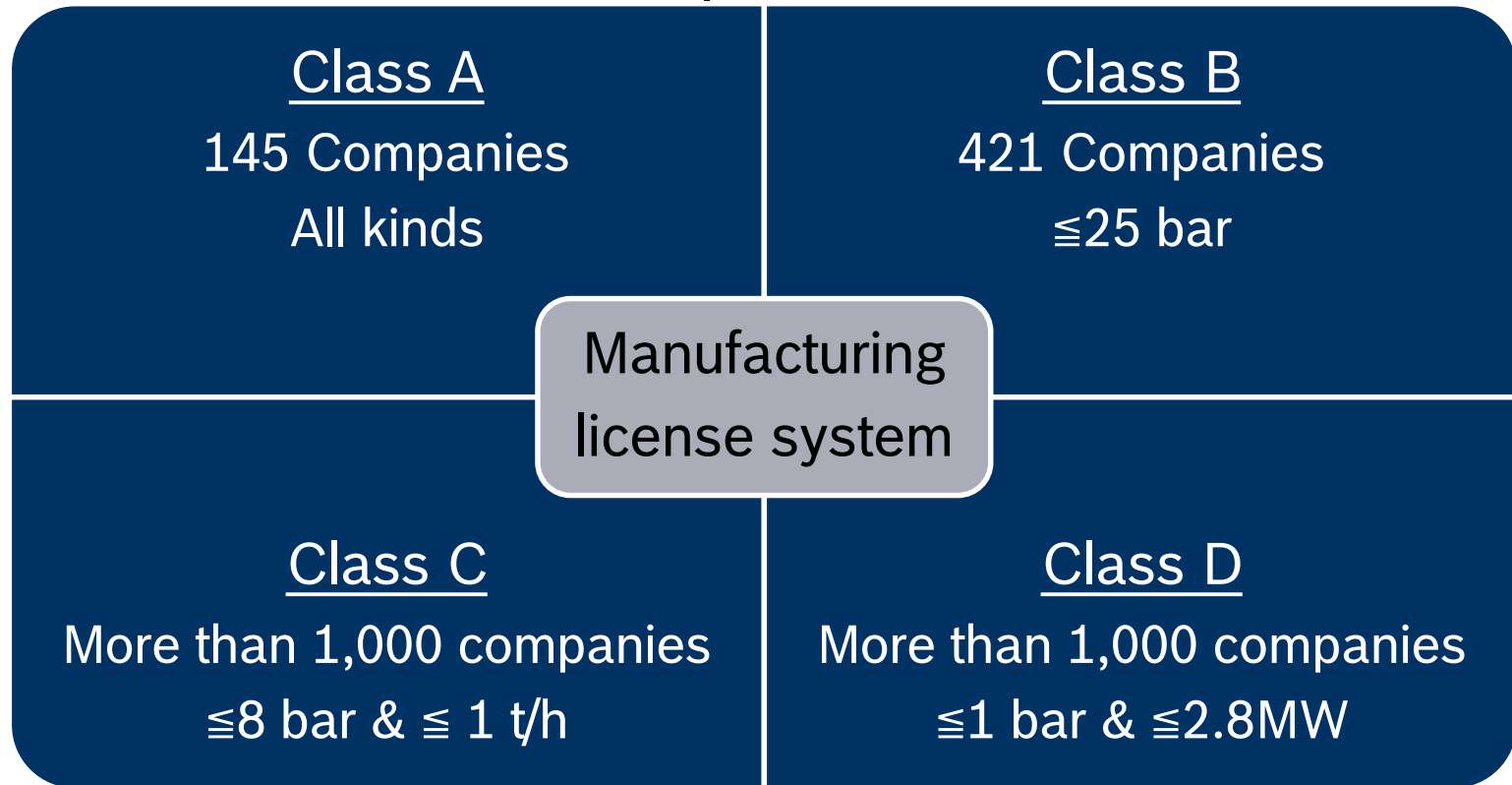
CIB market is more fragmented than residential heating market



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Industrial Boiler Industry CN

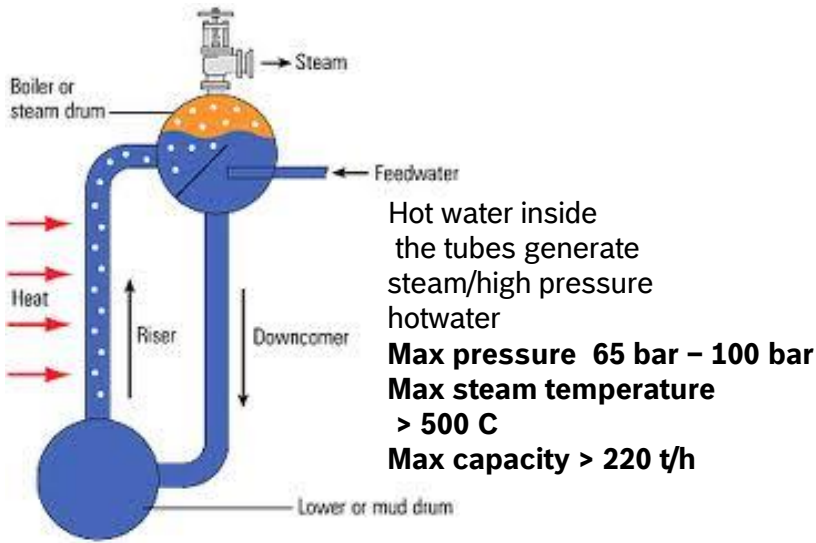


China has 1.700 Boiler producers, from which 60 are member of the Chinese Boilers Association. An extremely fragmented market where a consolidation is needed/will come.





Difference WTB - FTB

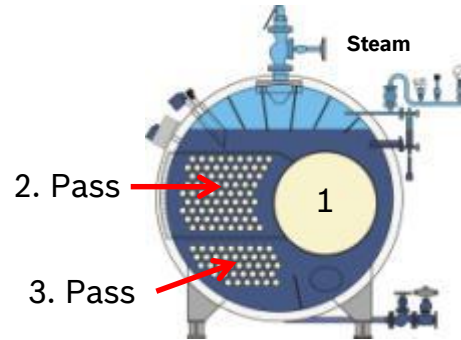


Heat generated by:

Chain Grate
Pulsating Grate

Dominantly utilizing Solid Fuels – **Coal/Biomass**
Oil/Gas possible with yet small share
Solid fuels combustion by grate firing or
Circulized **F**luidized **B**ed combustion - **CFB**

→ FTB – shell boiler design

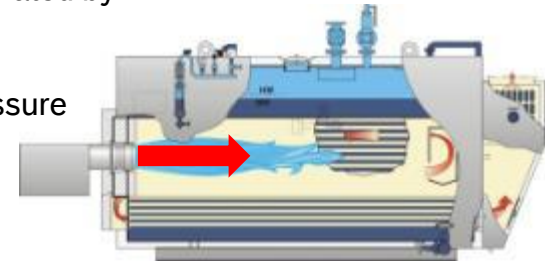


Heat generated by:

Only Oil/Gas
Using Oil/Gas pressure burners

Three pass - wet back design,
Hot flue gases inside the tubes heat up surrounding water in the boiler shell generating steam/ high pressure hotwater

Max pressure 25 bar
Max steam temperature 300 C (dry steam)
Max capacity < 55 t/h



Application: Industrial customers with dry steam temperature > 300 C & solid fuels

Application: Customers with saturated or dry steam < 300 C & oil/gas fuel available





BOSCH Firetube steam- & hotwater boilers



Hotwater / warmwater range

Steam range saturated steam
Superheated steam on request,
Max. steam temp 300°C





BOSCH INB WTB & FTB from Bosch Factory Wuhan/China



„BOSCH“ design gives a clear vision to the market .





Thank you very much!



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