



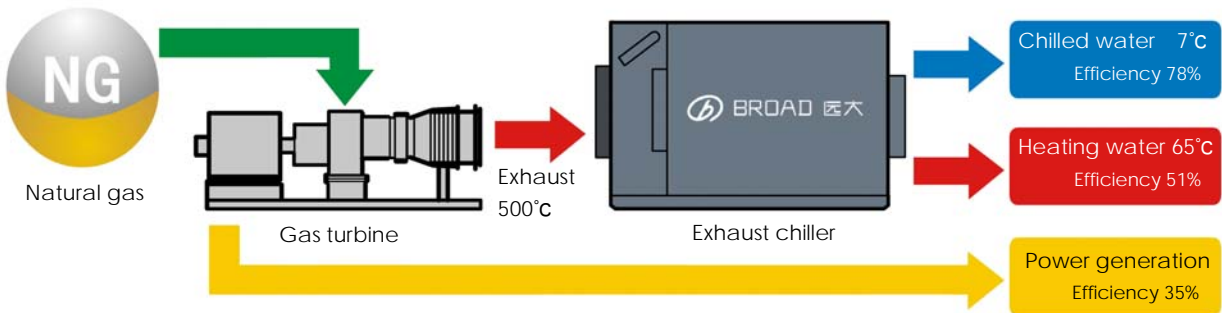
The Climate Crisis—Photo in North Pole by BROAD Chairman on May 28, 2009

BROAD CHP (Distributed Energy) Case Studies

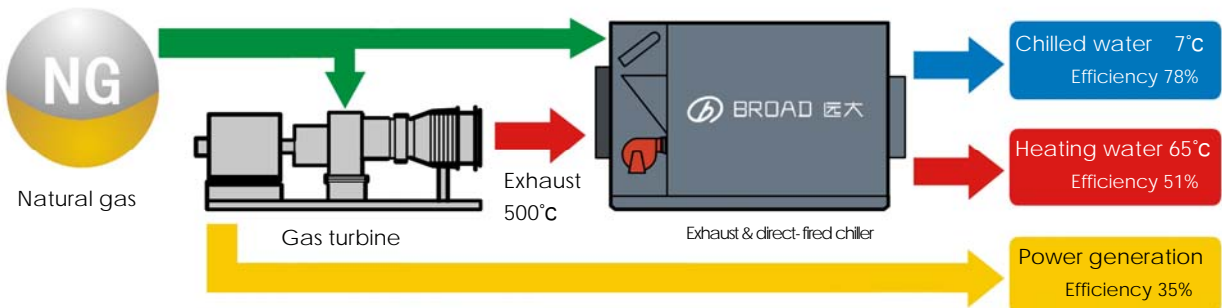
September, 2009

CHP Modes

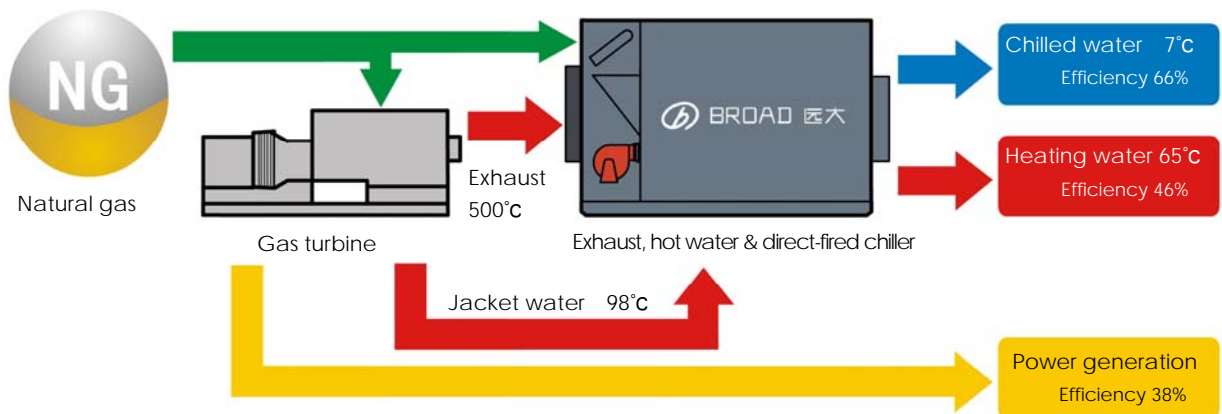
Mode 1: Exhaust type Energy efficiency: Electricity + cooling 113% Electricity + heating 86%



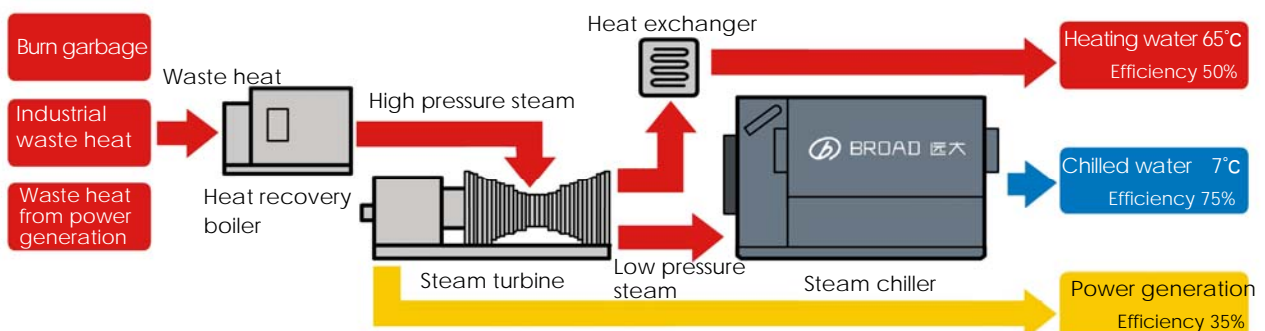
Mode 2: Exhaust & direct-fired type Energy efficiency: Electricity + cooling 113% Electricity + heating 86%



Mode 3: Exhaust, hot water & direct-fired type Energy efficiency: Electricity + cooling 104% Electricity + heating 84%



Mode 4: Steam type Energy efficiency: Electricity + cooling 110% Electricity + heating 85%



Beijing Gas (Exhaust, hot water & direct-fired type)**Office Building**

The generators produce electricity for buildings, and BROAD non-electric chillers make full use of waste heat from exhaust and jacket water to supply free cooling and heating. The backup burner can provide cooling/heating during generators' idle time or partial load.

Cooling capacity: 1000 Rt/3.5 MW
 Energy input: Exhaust, hot water & natural gas (2 units)
 Electricity output: 1.2 MW (gas engine, 2 units)
 Energy efficiency 104% (including cooling and electricity),
 84% (including heating and electricity)
 Electricity efficiency 38%

Energy saving yearly: USD 250,000
 Payback period: 3.7 years
 yearly CO₂ cutting: 2000 ton
 Equivalent of planting 100,000 trees.



Officials visiting the machine room

China's first CHP system

China World Trade Center Tower III (Steam type)**Hotel**

Steam turbine generators adopt high pressure steam to produce electricity for public grid. Low pressure steam after generators can be utilized by BROAD steam chiller.

Cooling capacity: 3307 Rt/ 11.63 MW
 Energy input: Steam (2 units)
 Cooling COP: 141%

Energy saving yearly: USD 338,000
 Pay-back period: 3.7 years
 CO₂ cutting yearly: 9,100 ton
 Equivalent of planting 500,000 trees.



The tallest building in Beijing

Costanera Center (Exhaust, hot water & back-up burner), Chile Comprehensive Building



The tallest buildings in South America

Power generators produce electricity for buildings, multi-energy chillers recycle exhaust and hot water to supply cooling & heating. Natural gas burner is for back-up during no power generation or less.

Cooling capacity: 8,570 Rt / 30 MW
Energy input: exhaust, hot water, diesel/gas (5 units)
Power generator: 14MW (6 units)
Energy efficiency 104% (cooling + power) 84% (heating + power)
Power generation efficiency: 38%

Yearly energy saving cost: USD 6.3 million
Payback period: 13 years
Yearly CO₂ cutting: 25000 ton
Equivalent of planting 1.37 million trees



Goteborg District Cooling, Sweden (Hot water)

City



Thermoelectricity plant produces electricity and supplies it to the city; hot water from power generation is supplied to hot water chillers for cooling, no need of any other energy sources.

Cooling capacity: 3430 Rt /12 MW
Energy input: hot water (3 units)
Cooling COP: 78%

Yearly energy saving cost: USD 630,000
Payback period: 2.1 years
Yearly CO₂ cutting: 10,000 Ton
Equivalent of planting 0.55 million trees



The world's northernmost district air conditioning

DLF(Exhaust, hot water & back-up burner), India
Real Estate Developer


Engines supply electricity to buildings; BROAD chillers recycle the exhaust and jacket water to supply cooling & heating. Natural gas/diesel burner is for back-up during no power generation or less.

Cooling capacity: 90,000 Rt /513MW
 Energy input: exhaust, hot water, diesel /gas (53 units).
 Energy efficiency: 104% (electricity +cooling)
 84% (electricity +heating)
 Power generation efficiency: 38%

Yearly energy saving cost: USD 78 million
 Payback period: 1.2 years
 Yearly CO₂ cutting : 780,000 ton
 Equivalent of planting 43 million trees



The world's largest real estate developer

Qualcomm HQ, USA (Exhaust)
IT Center


Power generator produces electricity and supplies to buildings or Power Grid, BROAD chiller recycles exhaust for cooling & heating, no fuel input.

Cooling capacity: 1323 Rt /4.65 MW
 Energy input: exhaust
 Power generator: 4.5 MW
 Energy efficiency 113% (electricity +cooling)
 Power generation efficiency 35%

Yearly energy saving cost: USD 0.78 million
 Payback period: 1.7 year
 Yearly CO₂ cutting: 7,000 ton
 Equivalent of planting 0.38 million trees



CDMA holder
 Mr. Irwin Mark Jacobs,
 Chairman of
 Qualcomm,
 taking part in the
 Ribbon-cutting
 Ceremony

Fort Bragg Airforce Base, USA (Exhaust)

Military Base



Power generator produces electricity and supplies to buildings or Power Grid, BROAD chiller recycles exhaust for cooling & heating, no fuel input.

Cooling capacity: 992 Rt/3.5 MW
 Energy input: exhaust
 Power generator: 5.2 MW
 Energy efficiency: 113% (electricity + cooling)
 Power generation efficiency: 35%

Yearly energy saving cost: USD 0.27 million
 Payback period: 4 years
 Yearly CO₂ cutting: 2,500 ton
 Equivalent of planting 0.14 million trees



US military base of the 82nd Airborne Division



Madrid New Airport, Spain (Hot water)

Airport



Generators supply electricity to buildings, waste heat from power generation is converted into hot water for cooling, no fuel input.

Cooling capacity: 5715 Rt / 20MW
 Energy input: hot water (6 units)
 Power generator: 33MW (6 units)
 Energy efficiency: 80%(electricity + cooling) Power generation efficiency: 41%

Yearly energy saving cost: Euros 2.15 million
 Payback period: 1 year
 Yearly CO₂ cutting: 17,500 ton
 Equivalent of planting 0.95 million trees



The largest airport in Europe