The Introduction of CCHP Projects in Beijing

Beijing Energy – Net DE, Ltd.

May 2006
Profile of Beijing Energy-Net DE, Ltd.

- 1st Domestic CCHP & DE technology and comprehensive Services Provider
- Established in 2002, invested by Beijing Gas Group & others
- Excellent engineering and marketing team for
  - CCHP project development, investment, construction management, and O&M
  - CCHP technology provider and system integrator
- Developing a series of CCHP projects in Beijing with total investment more than RMB 2 billion RMB
- Technology provider, construction & testing management and O&M for the CCHP project of Beijing Gas Building
Energy Conservation Layout

The 11st “Five-Year Plan”: The energy consumption / GDP Unit will be reduced for 20% by the end of the plan.

Emphases industry, transportation, commercial & civil construction are regarded as the major three energy conservation sectors according to 《Long-term & Medium-term Layout for Energy conservation》.

- Booming development of CHP, CCHP, and other cogeneration related technologies
- Optimize power supply layout, explore the market for small-scale DE project
- Encourage cool& heat storage and CCHP technologies to facilitate 65% energy-conservation strategy. (ie. Beijing, Tianjin)
Energy Status in Beijing

Energy-conservation is extremely crucial for Beijing, since it is a large energy consumption city.

(1) Lower energy utilization efficiency

(2) Industry manufacture’s energy consumption: 55.5%
    (Developed countries: 30% - 40%)

(3) Grave pollution caused by coal, the major fuel

(4) Energy supply pressure

(5) Power supply tension & lower utilization rate of NG during summer
The Monthly Electricity & NG Load Curve
(Beijing, 2002)

- Electricity Load: Peak-to-valley ratio
- 2002 - Summer Peak load: 8240 MW
  Winter Peak load: 5800 MW
- 2003 - Peak load: 8330 MW
- 2004 - Peak load: 9430 MW
- 2005 - Peak load: 10700 MW
Beijing NG Status

2000—2004 NG Consumption Curve

Unit: 10k m³
Beijing NG Status

2005 NG Consumption Layout

- **Heating**: 58.49%
- **Cooling**: 1.58%
- **Others**: 1.49%
- **Industry**: 3.86%
- **Home**: 19.40%
- **Civil Services**: 15.19%
Energy Consumption Target, 2008 Beijing

- **Environment**

  City environmental index will close to corresponding index of WHO or developed countries.

- **Energy consumption target**

  Energy consumption / GDP unit - 0.865 ton coal / 10K RMB

  Energy consumption / person – 3.318 ton coal / person

- **Energy adjustment**

  To the year 2008, 80% of increasing part of energy consumption will be high quality energy (80%), rest 20% will be coal and coke. The total coal and coke proportion will be controlled under 48%.

- **Energy Supply**

  Clear energy will be efficiently promoted.
Nature Gas Supply to Beijing

ShanJing Gas Line

ShanJing 1st Gas Line
✓ Built in 1997
✓ Capacity: 3.3 billion m³ / year
✓ Offers 2.4 billion m³ to Beijing

ShanJing 2nd Gas Line
✓ Total capacity: 12 billion m³ / year
✓ Offering 5.8 billion m³ to Beijing
✓ Completion on Sep, 2005
The total Capacity of 8.2 billion m³ / year. offer to Beijing.

LNG terminal project: Phase1, completion in 2008, total designed capacity: 3 million ton annually.
Nature Gas Development plan in Beijing

2003-2008 NG Annual Consumption
(One Hundred Million m³ / year)

Prosperous Future of NG

2008 annual NG supply capability to Beijing is 8.2 billion m³
Development of DE Technology

CCHP is a best option for NG utilization to figure out insufficient NG storage issue in China.

- Improve energy utilization efficiency
- Balance peak-to-valley difference for NG & electricity
- Enhance security of energy supply
- Cost effective
- Environmental friendly
Beijing Gas Group Control Center CCHP

- The headquarter of BGG and Operating Center of gas pipeline network, monitoring the entire network in Beijing.
- The 12-floor building with totals area of 32,800m²
- The CCHP system satisfies the building overall loads of heating, cooling and electric power.
- Designed maximum electricity load 1,640kW, cooling load 3,148.8kW and heat load 2,296kW.
Beijing Gas Group Building CCHP Project

Broad Exhaust Heat DFA

Caterpillar Power Generator
Beijing Gas Group Building CCHP Project

Mayor of Beijing’s visiting in BGG
Beijing Gas Group Control Center

Gas Engine:
G3508: 480 kW x 1
G3512: 725 kW x 1

Exhaust Heat DFA:
100 x 10^4 kcal/h x 1
200 x 10^4 kcal/h x 1

Generator (480kW + 720kW)

Exhaust heat DFA(100 x 10^4 + 200 x 10^4 Kcal/h)

Cooling

Heating

Electricity
720 + 480 kW

462°C smoke
99°C jacket water

Beijing Energy-net De Co., Ltd
北京恩耐特分布能源技术有限公司
Ciqu Gas Pump Station

- Microturbine + DFA
- Microturbine: 80KW
- Exhaust heat DFA:
  200,000Kcal
CCHP Projects under Construction in Beijing

ZhongGuanCun Software Park

A Center for Software Marketers in Beijing

Generation Unit:
1210kw gas turbine

Air conditioning Unit:
3 million Kcal. Exhaust Heat DFA
3 million Kcal. Standard DFA
Booming CCHP Market in Beijing

Energy-Net has already developed a series of profitable CCHP projects including ZhongGuanCun Medicine Park, Phase III CWTC, ShangDi Information Center, etc. with more than 2 billion RMB total investment. Above-mentioned projects are supposed to offer cooling, heating & power to 6 million m² site area.
CCHP projects over 10000 kw : launched or under construction
Other projects (lump sum investment over 2.8 billion RMB) : under development

<table>
<thead>
<tr>
<th>N</th>
<th>Project</th>
<th>Capacity ( kw )</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Irrigation Works Hospital</td>
<td>115</td>
<td>Under construction</td>
</tr>
<tr>
<td>2</td>
<td>Peixin Office Building</td>
<td>180</td>
<td>Under construction</td>
</tr>
<tr>
<td>3</td>
<td>Tsinghua Wenjin Apartment Block</td>
<td>2,400</td>
<td>Under construction</td>
</tr>
<tr>
<td>4</td>
<td>ZhongGuanCun Software Park</td>
<td>1,200</td>
<td>Under construction</td>
</tr>
<tr>
<td>5</td>
<td>ZhongGuanCun Shopping Mall</td>
<td>4,300</td>
<td>Under construction</td>
</tr>
<tr>
<td>6</td>
<td>Baoneng Thermal Power Firm</td>
<td>1,200</td>
<td>Under construction</td>
</tr>
<tr>
<td>7</td>
<td>Control Center Building of BGG</td>
<td>1,200</td>
<td>Operating</td>
</tr>
<tr>
<td>8</td>
<td>Ciqu Pump Station</td>
<td>80</td>
<td>Operating</td>
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<tr>
<td></td>
<td>Total</td>
<td>10,675</td>
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## CCHP Projects under Planning (1)

<table>
<thead>
<tr>
<th>S/N</th>
<th>Project</th>
<th>Capacity (kw)</th>
<th>Total Investment (10K RMB)</th>
<th>Investor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Northern Area of Beijing Airport</td>
<td>22000</td>
<td>20000</td>
<td>Energy-Net / BGG</td>
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<tr>
<td>2</td>
<td>ZhongGuanChun Life Science Park</td>
<td>12000</td>
<td>26923</td>
<td>Energy-Net / BGG</td>
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<td>3</td>
<td>CWTC, Phase III</td>
<td>9200</td>
<td>10,000</td>
<td>Energy-Net / China Gas Group</td>
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<tr>
<td>4</td>
<td>Electronic Park</td>
<td>2832</td>
<td>4428</td>
<td>Energy-Net / BGG</td>
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<tr>
<td>5</td>
<td>Olympic Underground Shopping Mall</td>
<td>20000</td>
<td>22000</td>
<td>Energy-Net</td>
</tr>
<tr>
<td>6</td>
<td>Harvard International Hospital</td>
<td>25000</td>
<td>30000</td>
<td>Energy-Net</td>
</tr>
<tr>
<td>7</td>
<td>World Clothes R&amp;D Center</td>
<td>20000</td>
<td>22000</td>
<td>Energy-Net</td>
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<tr>
<td>8</td>
<td>TongZhou Technology Building</td>
<td>2000</td>
<td>3400</td>
<td>Energy-Net</td>
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<tr>
<td>9</td>
<td>Beijing International Automobile Exposition Center</td>
<td>24000</td>
<td>25000</td>
<td>Energy-Net / BGG</td>
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### CCHP Projects under Planning (2)

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<tr>
<th>S/N</th>
<th>Project</th>
<th>Capacity (kw)</th>
<th>Total Investment (10K RMB)</th>
<th>Investor</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>TongZhou XinCheng Administration District</td>
<td>25000</td>
<td>30000</td>
<td>Energy-Net</td>
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<td>11</td>
<td>Shangdi Gas Power Station</td>
<td>150000</td>
<td>67784</td>
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<td>12</td>
<td>The Southern Railway Station</td>
<td>4500</td>
<td>7000</td>
<td>Energy-Net / Railway Dep.</td>
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<td>13</td>
<td>China Development Bank Office Building</td>
<td>3800</td>
<td>5861</td>
<td>Energy-Net / China Development Bank</td>
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<tr>
<td>14</td>
<td>Beijing DiTan Hospital</td>
<td>1650</td>
<td>3700</td>
<td>Energy-Net</td>
</tr>
<tr>
<td>15</td>
<td>Olympic No. 9 Building</td>
<td>1250</td>
<td>3041</td>
<td>Energy-Net/ Beichen Group</td>
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<tr>
<td>16</td>
<td>Beijing Siemens Office Building</td>
<td>1200</td>
<td>3600</td>
<td>Energy-Net / Siemens</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>324432</strong></td>
<td><strong>285320</strong></td>
<td></td>
</tr>
</tbody>
</table>
Tsinghua Wenjin International Apartment Block

- Construction Area: 120,000 m²
- Total capacity: 2400KW
- Total investment: 55 million RMB
CCHP Project under Planning in Beijing

Zhongguancun Medical Park

- Well-integrate medical treatment and medicine industry
- Layout Area: 1.2 million m²
- Heating & Cooling area: 830,000m²
- Total capacity: 13Mw
- Estimated total investment: RMB 27 million
The current CCHP R&D project by Energy-Net

- Study varies building’s energy load and analysis software
- CCHP equipment selection and system integration
- Technology for CCHP electricity generation connecting with grid in China.
- Market survey of CCHP in China
- Model and analysis software for combination of gas CCHP and other DE technology
- Cost analysis of CCHP in China
- Technology and finance analysis of CCHP in China
Barriers & Issues

(1) Policy and Regulation
   - Grid interconnection, electricity sales
   - Lack of referential policies related with energy conservation in taxation, pricing, subsidy, etc.

(2) Technology
   - Insufficient localization for equipment manufacturing
   - Immature experiences in system construction and O&M
   - Lack of technological specification and standards
   - Strict requirement for factory construction condition

(3) Instability of Energy Pricing

(4) Unsatisfied popularization of CCHP technology
The problem of nature gas development strategy in China

CCHP is a best option for NG utilization to figure out insufficient NG storage issue in China

- 1997 CIECC Study Report: 50-70% NG should be used for power generation in China, according to the experiences from developed countries
- SDRC purchase 9F gas turbines, requiring about 5 billion USD
- Building large NG power plants along with the pipeline
- NG shortage, generation of those power plant ???
- Beijing Large NG power plant construction plan???
- Incentive policy issuing slowly because NG shortage
Energy Park Dram for Olympic

Suggested by Energy-Net, associate with 6 Chinese academicians, we proposed an Energy Center Ideal to Olympics in Beijing
Proposed Energy Center in Olympic Park
THANKS
!

Beijing Energy-net De Co., Ltd
北京恩耐特分布式能源技术有限公司