国連ハビタットとアジアの連繋による環境技術専門家会議

United Nations Human Settlements Programme
Fukuoka Office

Geothermal Resource Development

〜アジア太平洋地域における持続可能な環境開発のための技術協力を考える〜

October 28, 2009
ACROS Fukuoka Building, International Conference Hall

West Japan Engineering Consultants, Inc. Geothermal Department
Koichi TAGOMORI
Geothermal Resource is one of renewable energy based on the idea of recycling system of meteoric water.
Steam blowout conditions from Geothermal Production Well

Wellhead Valve of Production Well

Steam Blowout
Geothermal Resources World-wide

<table>
<thead>
<tr>
<th>Country</th>
<th>Potential (MW)</th>
<th>Install (MW)</th>
<th>World Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>163</td>
<td>3,500</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>20,000</td>
<td>535</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>2,544</td>
<td>23,000</td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td>22,000</td>
<td>2,544</td>
<td></td>
</tr>
<tr>
<td>Costa Rica</td>
<td>2,500</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>3,050</td>
<td>3,050</td>
<td></td>
</tr>
<tr>
<td>World Total</td>
<td>2,500,000</td>
<td>8,912</td>
<td></td>
</tr>
</tbody>
</table>
## Geothermal Resource Potential World-wide

<table>
<thead>
<tr>
<th>Region</th>
<th>High-temperature resources suitable for electricity generation</th>
<th>Low-temperature resources suitable for direct use in million TJ/yr of heat (lower limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional technology in TWh/yr of electricity</td>
<td>Conventional and binary technology in TWh/yr of electricity</td>
</tr>
<tr>
<td>Europe</td>
<td>1830</td>
<td>3700</td>
</tr>
<tr>
<td>Asia</td>
<td>2970</td>
<td>5900</td>
</tr>
<tr>
<td>Africa</td>
<td>1220</td>
<td>2400</td>
</tr>
<tr>
<td>North America</td>
<td>1330</td>
<td>2700</td>
</tr>
<tr>
<td>Latin America</td>
<td>2800</td>
<td>5600</td>
</tr>
<tr>
<td>Oceania</td>
<td>1050</td>
<td>2100</td>
</tr>
<tr>
<td>World potential</td>
<td>11 200</td>
<td>22 400</td>
</tr>
</tbody>
</table>

From IGA2001
Technologies and Competitiveness of West IEC for Geothermal Power Projects in Overseas Countries

◊ **Technologies**

- Integrated consulting services from resource study to power generation and transmission
- Various capabilities from geoscientific field to power engineering
- Most advanced 3-D reservoir simulation for reservoir evaluation
- Good partnership with domestic machinery makers having a world market share over 70%

◊ **Competitiveness**

- Sole consulting company in Japan for international geothermal market
- Leading worldwide geothermal consultant having integrated technologies (competitors: e.g., SKM in NZ, ELC in Italy, and GeothermEx in US)
- Overseas business experiences for over 30 years from the mid of 1970s
Significance of Geothermal Energy Development for developing Countries

For developing countries

- Global rise in fuel prices
- Indigenous energy unaffected by the exchange rate fluctuations
- Stable source of energy and supply
- Less environmental pollution energy
- Contribute to local economic development and rural electrification

For Japan

- Earn CO2 emission rights from CDM projects
- Contribute to International cooperation based on high technologies in Japan
Diagram showing various utilization of geothermal energy
Less CO2 emission compared with other energy sources

- No CO2 emission from burning fossil fuel like other thermal power plants
- High capacity factor (Geothermal 70%、Wind 20%、Solar 12%)
- Geothermal power plant with 50MW is equivalent to 170MW of Wind power and 300MW of Photovoltaic power

(Source: Central Research Institute of Electric Power Industry News No. 338)
Indonesia, Flores
Indonesia, Lahendong
Philippines, Northern Negros
Mongolia, Bayankhongor
Thank you....

Geothermal renewable and sustainable energy gift from the earth