Biomass market opportunities

Thailand

1. General country information
2. Economic indicators
3. Biomass availability
4. Energy profile
5. Energy & biomass policies
6. Funding opportunities
7. Business Climate
8. Important contacts

Colophon

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This study was carried out in the framework of the Netherlands Programmes Sustainable Biomass by

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Although this report has been put together with the greatest possible care, NL Enterprise Agency does not accept liability for possible errors.

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This document

This document is part of a series of 16, providing information on biomass markets in:

<table>
<thead>
<tr>
<th>Region</th>
<th>Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>Germany, France, United Kingdom, Spain and Finland</td>
</tr>
<tr>
<td>EU/Asia</td>
<td>Russia and Latvia</td>
</tr>
<tr>
<td>Asia:</td>
<td>China, India and Thailand</td>
</tr>
<tr>
<td>North- and South-America</td>
<td>United States of America, Canada and Brazil</td>
</tr>
<tr>
<td>Africa:</td>
<td>South-Africa and Ghana</td>
</tr>
<tr>
<td>Australia</td>
<td>Australia</td>
</tr>
</tbody>
</table>

The selection of countries is done in close cooperation with NL Enterprise Agency. The objectives of the country documents are:
- To provide companies a first impression of doing businesses in a country;
- To provide sources and contacts for more detailed information;
- To sketch opportunities how companies can be further supported when doing business in a country.
Thailand was among the first countries in Asia to introduce incentive policies for the generation of electricity from renewable energy sources. The Thai Government is now adapting its policies to take account of recent technological progress and market growth, continuing to offer an enabling environment for RE investments. Apart from a greener environment, sustainable development is necessary since Thailand is dependent on energy imports and electricity needs are continuously growing.

1. GENERAL COUNTRY INFORMATION

- Im- and export figures can be found at the International Trade Centre Databank: [http://www.rvo.nl/onderwerpen/internationaal-ondernemen/landenoverzicht/marktvergelijkingen/trademap](http://www.rvo.nl/onderwerpen/internationaal-ondernemen/landenoverzicht/marktvergelijkingen/trademap)

2. ECONOMIC INDICATORS

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (current billion US$)</td>
<td>263.71</td>
<td>318.91</td>
<td>345.67</td>
<td>365.97</td>
</tr>
<tr>
<td>GDP growth (annual %)</td>
<td>-2.3</td>
<td>7.8</td>
<td>0.1</td>
<td>6.5</td>
</tr>
<tr>
<td>GDP per capita (current US$)</td>
<td>3,978.9</td>
<td>4,802.7</td>
<td>5,192.1</td>
<td>5,479.8</td>
</tr>
<tr>
<td>Population (Total, million)</td>
<td>66.28</td>
<td>66.40</td>
<td>66.58</td>
<td>66.79</td>
</tr>
</tbody>
</table>


AON Risk Rating 2013

AON’s risk rating combines market, political and security risks, allowing you to make informed decisions regarding your operations and investments. Used risk Ratings are: VH= Very High, H=High, MH=Medium High, M=Medium, ML=Medium Low, L=Low and NR=Not Rated.

<table>
<thead>
<tr>
<th>Risk type</th>
<th>Rating</th>
<th>Risk type</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exchange transfer</td>
<td>M</td>
<td>Political violence</td>
<td>H</td>
</tr>
<tr>
<td>Sovereign non-payment</td>
<td>M</td>
<td>Risk of doing business</td>
<td>ML</td>
</tr>
<tr>
<td>Political interference</td>
<td>M</td>
<td>Banking sector vulnerability</td>
<td>MH</td>
</tr>
<tr>
<td>Supply chain disruption</td>
<td>M</td>
<td>Inability of government to provide stimulus</td>
<td>ML</td>
</tr>
<tr>
<td>Legal &amp; regulatory risks</td>
<td>MH</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Overall risk rating MH

Source: AON political Risk Map, Q3 2013, http://www.riskmap.aon.co.uk/Political_Risk_Map.aspx

3. BIOMASS AVAILABILITY

Land Use Parameters

<table>
<thead>
<tr>
<th>Country</th>
<th>Land area (km²)</th>
<th>Agricultural area (km²)</th>
<th>Arable land (km²)</th>
<th>Permanent crops (km²)</th>
<th>Forestry area (km²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand per 1000 capita</td>
<td>510,890.00</td>
<td>210,486.68</td>
<td>157,354.12</td>
<td>44,958.32</td>
<td>190,051.08</td>
</tr>
</tbody>
</table>

Agricultural and Forest Production

<table>
<thead>
<tr>
<th>Country</th>
<th>Forest production (m³) 2012</th>
<th>Agricultural production (1000 kg) 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thailand</td>
<td>24,926,488</td>
<td>176,984,231</td>
</tr>
</tbody>
</table>

Biomass Resources

Agriculture sector is the base of Thailand’s economy and accounts for about 60% of the labor forces. So biomass has a high potential to be utilized for the production of renewable energy. The main agriculture residues consist of rice husk, straw, bagasse, palm oil waste, wood waste etc. The major biomass resources in Thailand include the following:
- Woody biomass residues from forest plantations
- Agricultural residues (rice husk, bagasse, corn cobs, etc.)
- Wood residues from wood and furniture industries (bark, sawdust, etc.)
- Biomass for ethanol production (cassava, sugar cane, etc.)
- Biomass for biodiesel production (palm oil, jatropha oil, etc.)
- Industrial wastewater from agro-industry
- Livestock manure
- Municipal solid wastes and sewage

According to the residue potential in 2001 from 10 main agriculture products assessment, 22 million tons out of 66 million tons were used as fuel and small amount for other purposes. Whereas about 44 million tons of agriculture residues were unused and equivalent to 612.89 PJ (Pica joule) of energy.

4. ENERGY PROFILE

National Energy Profile

- Total Primary Energy Supply: 4,492.4 PJ - Of which renewables: 892.5 PJ (19.9%)
- Energy self-sufficiency: 60.2%
- Fuel imports: 31.7 billion USD (17.4% of total imports)
- Electricity generation: 148.4 TWh - Of which renewables: 10.2 TWh (6.9%)
- Electricity use per capita: 2,045 kWh
- Electrical capacity: 47.4 GW - Of which renewables: 4,299 MW (9.1%)
- Electricity access rate: 99.3%
- Share of population using solid fuels (2010): 26%

**Figure 3: Total Primary Energy Supply** in 2000 and 2009

2000: 3,016.4 PJ
2009: 4,489.3 PJ

*excluding electricity trade

Biomass Related Projects

**BNEF-Database**
- Around 1,100 million liters of bioethanol per year capacity addition announced (9 projects)
- More than 830 MW of biomass-fired capacity addition announced

*Source: IRENA Renewable Energy Country Profiles 2013:
http://www.irena.org/DocumentDownloads/Publications/_AsiaComplete.pdf*

**Other Projects**
- Climate & Development Knowledge Network, World Resources Insitute – Inside stories on climate compatible development in Thailand, May 2013
Energy Sources and Forecast

Figure THA2: BAU Final Energy Demand

Source: APERC Analysis (2012)

Table 2: Renewable energy potential, 2008 capacity and 2021 Alternative Energy Development Plan targets.

<table>
<thead>
<tr>
<th>RE Technology</th>
<th>Technical Potential (MW)</th>
<th>2008 Capacity (MW)</th>
<th>2021 Target (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>50,000</td>
<td>32</td>
<td>2,000</td>
</tr>
<tr>
<td>Wind</td>
<td>1,600</td>
<td>1</td>
<td>1,200</td>
</tr>
<tr>
<td>Small/micro hydro</td>
<td>700</td>
<td>56</td>
<td>324</td>
</tr>
<tr>
<td>Biomass</td>
<td>4,400</td>
<td>1,610</td>
<td>3,630</td>
</tr>
<tr>
<td>Biogas</td>
<td>190</td>
<td>46</td>
<td>600</td>
</tr>
<tr>
<td>Municipal solid waste</td>
<td>400</td>
<td>5</td>
<td>160</td>
</tr>
<tr>
<td>Geothermal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tidal wave</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Tongsupit and Greacen 2012; DEDE 2012c.
5. ENERGY & BIOMASS POLICIES

Targets
- 1,200 MW of wind capacity by 2022
- 2,000 MW of solar capacity by 2022
- 1,608 MW of small hydro capacity by 2022
- 3,630 MW of biomass-fired capacity by 2022
- 600 MW of biogas-fired capacity by 2022

POLICIES IN PLACE TO PROMOTE RENEWABLE ENERGY SINCE THE RIO CONFERENCE OF 1992

Feed-in Tariff
Thailand was one of the first Asian countries with active feed-in tariff programs. This table contains FiTs that were set during 2010, but were still in force until at least January 2013.
The first renewable energy (RE) plan in Thailand was the 15-year Renewable Energy Development Plan (REDP 2008-2022) which aimed to make 20% of the total energy consumption in 2020 renewable. In 2011 the Alternative Energy Development Plan (AEDP 2012-2021) replaced the former REDP. AEDP aims to increase the share of RE to 25% of final energy consumption using all types of RE. The table shows many short-term plans for the original REDP plan.


6. FUNDING OPPORTUNITIES

- State Oil Fund


- Partners for International Business, subsidy for organizations aiming to enter international markets as a group / in a partnership: http://www.dienst-regelingen.nl/subsidies-regelingen/partners-international-business-pib.
7. BUSINESS CLIMATE

Overall Rating
World Bank Ease of Doing Business index 2013 (Ranking out of 189 countries). In comparison, the Netherlands is ranked 28 (2014) and 30 (2013). On this website information about necessary permits, administration time, specific laws et cetera is present.

<table>
<thead>
<tr>
<th>Topic</th>
<th>DOING BUSINESS 2014</th>
<th>DOING BUSINESS 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total rating</strong></td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Starting a Business</td>
<td>91</td>
<td>86</td>
</tr>
<tr>
<td>Dealing with Construction Permits</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>Getting Electricity</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Registering Property</td>
<td>29</td>
<td>26</td>
</tr>
<tr>
<td>Getting Credit</td>
<td>73</td>
<td>71</td>
</tr>
<tr>
<td>Protecting Investors</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Paying Taxes</td>
<td>70</td>
<td>97</td>
</tr>
<tr>
<td>Trading Across Borders</td>
<td>24</td>
<td>25</td>
</tr>
<tr>
<td>Enforcing Contracts</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Resolving Insolvency</td>
<td>58</td>
<td>58</td>
</tr>
</tbody>
</table>

Source: [http://www.doingbusiness.org/data/exploreeconomies/thailand](http://www.doingbusiness.org/data/exploreeconomies/thailand)

Logistics and Infrastructure
Based on a worldwide survey of operators on the ground, such as global freight forwarders and express carriers, the Logistics Performance Index (LPI) measures the logistics "friendliness" of 155 countries. Ranking of Thailand is place 38, scored 69.6% of highest performer (Singapore).


Culture and Education
The UNDP Human Development Index (HDI) is a composite statistic of life expectancy, education, and income indices, used to rank countries into four tiers of human development: very high, high, medium and low. According to HDI, Thailand belongs to the group of “Medium human Development” and is ranked 103 out of 186.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>103</td>
<td>74.3</td>
<td>6.6</td>
<td>12.3</td>
</tr>
</tbody>
</table>

Source: Human Development Index [https://data.undp.org/dataset/Table-1-Human-Development-Index-and-its-components/wxub-qc5k](https://data.undp.org/dataset/Table-1-Human-Development-Index-and-its-components/wxub-qc5k)
8. IMPORTANT CONTACTS

Dutch Embassy + Consulates
- Embassy of the Kingdom of the Netherlands in Bangkok
- Dutch Consulate in Phuket


Chamber of Commerce
Dutch-Thai Chamber of Commerce. Can help in finding reliable and relevant partners.

Universities and Research Institutes
- Biogas Advisory Unit, Chiang Mai University (BAU-CMU)
- Joint Graduate School of Energy and Environment (JGSEE)
- College of Social Innovation (CSI)
- Rangsit University (CSI)
- The Institute for the Study of Natural Resources and Environmental Management, Mae Fah Luang University

Other Organizations
- Thai Sugar and Bio-energy producers association - [http://thaisugar.org/web/history/](http://thaisugar.org/web/history/)

Existing Agreements
This is a publication of:

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