



Thailand

## Integrating waste management and renewable energy planning

Activity	Thailand's Alternative Energy Development Plan (AEDP) and its integration with waste management policy framework at national and sub-national level
Country	Thailand
Sector(s) involved	Energy; Waste
Time frame	2012–2021

**Case summary**

Driven by concerns of energy security high dependence on imported fuels and environmental pollution due to improper waste disposal, Thailand has placed increasing emphasis on waste-to-energy options through its 10-year Renewable and Alternative Energy Development Plan (AEDP 2012-21). The plan presents a target of a 25 % contribution of renewable and alternative energy sources by 2021, of which 30% is to come from bioenergy and municipal solid waste, representing an important step in the transition to a low-carbon economy.

The focus on waste and agricultural residues in the AEDP is a good example of policy coordination and alignment with decentralised implementation. The AEDP objectives are aligned with those of the National Economic and Social Development Plan (NESDP) as well as laws for municipal level governance. As part of the strategy, pilot implementation targets city level actions aimed at scaling up capacity building and replication with increased efficiency in other cities within and outside of Thailand. The strategy is highly integrated at various levels of governance in terms of its strategic goals and its mode of implementation. Its linkages with national goals of energy security, climate change and export promotion are notable and demonstrate clear political direction and leadership.



Landfill, Thailand

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LOW EMISSION  
CAPACITY BUILDING  
PROGRAMME

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### Background

The energy sector of Thailand is the highest GHG emitting sector, accounting for approximately 70% of Thailand's total GHG emissions (ONEP, 2010). Thailand is highly dependent on imports to meet its energy needs. In 2011, imports accounted for 60% of total primary commercial energy demand. Power generation accounted for more than 26% of imported natural gas. In 2012, the total energy import value increased by 16.7% (Budnard, 2014). It is estimated that the demand for energy in Thailand will increase 39% from 71,728 ktoe in 2011 to 99,838 ktoe in 2021.

In this context, Thailand announced the Renewable and Alternative Energy Development Plan (AEDP 2012–2021) with the target of renewable and alternative sources contributing to at least 25% of the energy mix. This was also seen as an initial point to step into the Low Carbon Society and be exemplary for the world society to cite Thailand as the country with strong intent in using renewable energy towards contributing to mitigation efforts. The AEDP provides “framework and direction of Thailand’s renewable energy development” (Ministry of Energy 2012). The Plan identifies solar, wind, bio-energy (including waste) and nuclear as important alternative energy sources. In its first phase (2012–2016), it intends to develop alternative energy technology industry, to encourage alternative energy R&D – especially regarding new technologies for biofuels production – to achieve economic viability, and to introduce a model for Green Cities to ensure the sustainable economic development of communities. In the second part (2017–2022), the focus will be on enhancing utilisation of new available alternative energy technologies, the extension of green city models throughout Thai communities and establishing Thailand as a hub of biofuel and alternative energy technology exports in the ASEAN region.

The 11<sup>th</sup> National Economic and Social Development Plan (NESDP 2012–16) aims at restructuring the country’s production and consumption behaviour in order to prepare for a transition toward a low-carbon and environmentally sustainable economy (NESDB 2012). In this context, waste management in Thailand offers an important link between the NESDP and AEDP. More than 64% of waste produced in Thailand is improperly disposed and only 22% is recycled, whereas the potential stands at more than 93% (Jiaranai-khajorn, 2008). Accordingly, waste management is high on priority policy areas as reflected in the number of legislations already passed: Public Health Act (1992), Enhancement and Conservation of National Environmental Quality Act (1992), Decentralization to LAO Act (1999), Determining Planning and Staging of Decentralization Act (1999), Factory Act (1992), and Industrial Estates Act (1992).

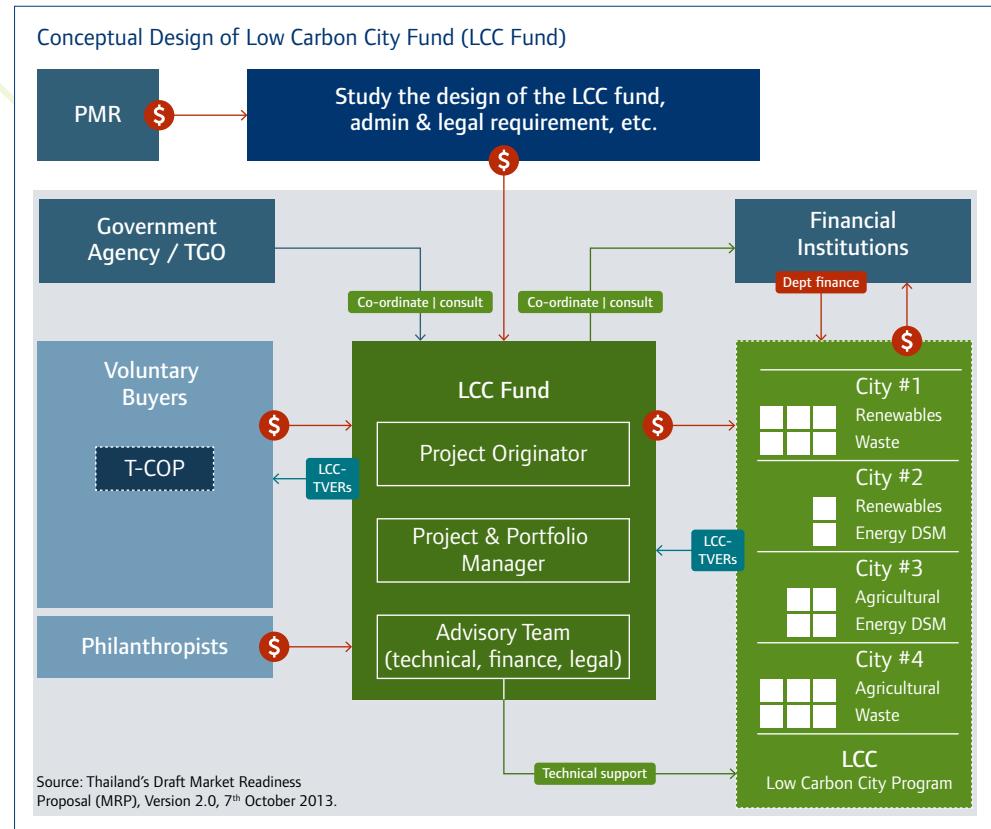
Waste-to-energy not only offers options for alternative energy but also addresses an environmental pollution problem. This link is further emphasised through government policy which focuses on resource efficiency, development of eco-industrial towns, renewable and alternative energy sources and energy efficiency. Waste management is also an integral part of the Low Carbon City initiative. Moreover, these policy directions and goals continue the directions provided in the National Strategic Plan on Climate Change 2008–2012 and the draft Thailand Climate Change Master Plan up to 2050.

### Activities

- » **Target setting:** The 10-year Alternative Energy Development Plan (AEDP) aims to increase the share of alternative energy to 25% by 2021, through a multi-sector approach. A significant emphasis is placed on Biomass (especially crop residues from sugar cane, cassava and palm) and agricultural, industrial and municipal solid waste (MSW). The policies for Biomass have a 2021 target of 3,630 MW, which compares to a current total capacity of 1,750 MW. The policies for Energy from Municipal Solid Waste (MSW) have a 2021 target of 160 MW, compared to a current total capacity of 1.45 MW. It is important to note that the AEDP (2012–21) is a modification over an earlier AEDP (2008–2022) based on the lessons and experience during 2008–11. An important modification is that the target for energy from MSW has been raised from 120 MW to 160 MW, whereas the target for biofuels has been reduced from a 20% contribution to 10%. Overall, the target for renewable and alternative energy has been raised from 20.3% to 25% (Ministry of Energy 2011).

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- » **Financial support and incentives:** The policy focuses on increased government funding for research and development (R&D) activities and encouraging private sector led investments. In doing so, various support schemes have been put in place including: Energy feed-in premiums additional to the standard tariff; Board of investments tax incentive scheme (8yr Tax Holiday); Direct subsidy on biogas, municipal solid waste, solar water heater projects; and soft loans for renewable energy investments.
- » **Implementing a Low Carbon Cities Programme (LCC):** The LCC is a crediting mechanism based on tradable voluntary emission reductions by municipalities and local communities. Renewable energy, waste and agriculture are among the six eligible types of the project under the scheme. There are 2,383 municipalities in Thailand in addition to numerous possible local communities. The World Bank's Partnership for Market Readiness (PMR) programme has targeted 32 municipalities for assistance through a pilot programme. Pilot projects have been carried out in three cities and one special municipality including Khonkaen (Khonkaen province), Klang (Rayong province) and Samui (Surat Thani province) and Bangkok Metropolitan Administration (BMA). The approach of the LCC is a framework of integrated policies and action plans relating to climate change, with a strong focus on stakeholder participation and capacity building. These include:
  - » **Strategies specific to promoting energy generation from municipal solid waste:** Local action by the medium and small scale local administration organisations as well small community institutions such as schools, temples, communities, and local organisations.

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- » **Legal and regulatory amendments to remove barriers to renewable energy development:** For example, the amendment of the Joint Venture Act, which allows the private sector to implement (jointly or independently) with government enterprises to mobilise private investments with local administrative organisations, particularly in RDF (Refuse-Derived Fuel), such as producing oil derived from plastic waste.
- » **Building capacity and improving public relations in targeted areas:** For example, through education campaigns on waste management for energy and environment at the local level.
- » **Knowledge building through promoting research and learning:** Specific areas of need include RDF management, knowledge for domestic production of incinerators, and small waste-to-energy systems with capacity up to 50 t/day.
- » **Institution and product development:** Such as standards and appliances for producing oil from plastic waste.

<b>Institutions involved</b>	Pollution control department; Ministry of Energy; Ministry of Interior; Ministry of Natural Resources and Environment; Thailand Greenhouse Gas Management Organization (TGO)
<b>Cooperation with</b>	World Bank's Partnership for Market Readiness (PMR); UNDP-LECBP; Global Environment Facility
<b>Finance</b>	<p>A Low Carbon City Fund is being established to finance the LCC program (see figure). The LCC Fund mobilises resources through philanthropic contributions as well as voluntary buyers of the VERs through the Thailand Carbon Offset Program (T-COP). Financial requirements to develop core components of the preparation phase of LCC (2014-16) have been estimated to be USD 3.08 million.</p> <p>Government co-investing scheme (ESCO fund) with initial volume of USD 17 million. Revolving Funds to stimulate and leverage commercial investment through familiarising commercial banks with EE, RE lending market and opportunities. Participating banks include the Bangkok Bank (BBL), Bank of Ayudhya (BAY), Bank Thai (BT), Thai Military Bank (TMB), Siam City Bank (SCIB), Siam Commercial Bank (SCB), Thai Farmers Bank (TFB), Exim Bank (Exim), Krung Thai Bank (KTB), SME Bank (SME). The initial size of the fund was USD 125 Million. Further international support through GEF and UNDP's LECB program. The UNDP-LECB program is jointly funded by the European Commission; the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) and the Australian Government.</p>
<b>Impact of activities</b>	<ul style="list-style-type: none"> <li>» <b>Increasing targets:</b> the approach to waste management and its integration into the AEDP has had positive results. Success to date can be measured by the regular upgrading of the target of energy from MSW. From 120 MW electricity target set in 2008, it was revised to 160 MW in 2012 and to 400 MW electricity plus 200 MW heat in 2013 (Budnard, 2014).</li> <li>» <b>Pilot Projects:</b> Overall, relevant ministries and municipalities are responsible for implementing the various GHG mitigation activities as part of Thailand's low carbon strategy. For example, low carbon city pilot projects were recently undertaken in three cities and one special municipality including: Khonkaen (Khonkaen province); Klaeng (Rayong province); Samui (Surat Thani province) and Bangkok Metropolitan Administration (PMR 2014).</li> <li>» <b>Model Facility:</b> The waste to energy facility at Klaeng is considered a model solution compared to other municipalities and hence sets a national benchmark. The facility was an initiative of the Mayor of Klaeng, and it operates in a self-sufficient way, generating enough income to cover operational costs.</li> </ul>
<b>Why is it good practice</b>	<ul style="list-style-type: none"> <li>» It enables deeper, more comprehensive coordination and consultation among stakeholders as well as government agencies, involving technical as well as political aspects. This has helped align local governance objectives with national and international policy priorities.</li> </ul>

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- » The decentralised implementation builds local leadership as well as encouraging the participation of the private sector at the local level. The approach of the LCC ensures wider stakeholder participation, peer-to-peer learning, and balancing of various policy areas at local level including developing information systems, technological choice and use.

- » From the financing perspective, the combined approach of revolving funds, Energy Service Companies (ESCOs) and LCC Fund Thailand has [linked national government with many financial institutions](#), local governments, technical institutions and individuals. The collaborations resulting from individual cases are not only mobilising finance but also [building capabilities](#), trust and understanding among various stakeholders.

- » **Local government and political leaders understanding of issues:** Such as rising energy demands and the challenges of climate change amongst others. The policy framework has therefore looked into his aspect and focused on waste-to-energy in a big way. Moreover, there is political will to do so. The key driver of the policy push was the recognition of co-benefits from waste-to-energy. The efforts involved engagement among communities and experts and involvement of stakeholders.
- » **Continued dialogue:** With communities, experts and the involvement of various stakeholders in the design and implementation built capacities and a sense of ownership.
- » **International cooperation:** Especially from the PMR, GEF funds have proved to be beneficial in the efforts of increasing the waste-to-energy projects. This activity has also been linked with other activities such as sub-national programmes where entities have taken the lead.
- » **Addressing an acknowledged problem:** The issue of high volumes of waste had already been identified as a major domestic environmental challenge, hence action to address it found greater acceptability among various stakeholders. The key driver of the policy push was the recognition of co-benefits from waste-to-energy.

**What were the main barriers/challenges to delivery?**

How were these barriers/challenges overcome?

**Cities lack financial and technical capacities to assess and develop baselines and implementation plans.**  
Cities are supported by national government funding to conduct technical assessments. Further, the LCC fund supports the LCC program through the Thailand Voluntary Emission Reduction (T-VER) process.

**Lack of public and community understanding and capabilities for implementing GHG emission reductions and waste management.**

Enhanced capacity building and provision of technical assistance for municipalities and local communities through the LCC program. Furthermore, the Climate Change International Technical & Training Centre (CITC) is being established.

**Participation and acceptance from local communities requires that people have enough scientific information.**  
A web-based knowledge hub for the Low Carbon City programme is being established.

**Thailand is still at the initial stage of developing the necessary institutional infrastructure to implement the waste management policy integrated with AEDP.**

Working with the World Bank's Partnership for Market Readiness Program (PMR) to develop new mechanisms.

**Regulatory restriction prevents some RE development, particularly the participation of the private sector.**  
The Joint Venture Act has been amended.

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<b>Lessons learned</b>	<ul style="list-style-type: none"> <li>» <b>Assess potential benefits early:</b> Although the institutional infrastructure to implement the linked waste management and AEDP is still evolving, and the targets are being revised regularly in an upward direction, it would have made sense to have conducted a thorough potential assessment of energy generation from municipal waste. This would have been useful for structuring financial allocations more rationally to the waste-to-energy program. Similarly, conducting market readiness assessments at an earlier stage also would have been beneficial.</li> <li>» <b>Leadership at local government units:</b> Encouraging leadership at municipal level plays an important role in building acceptance and support for low carbon policy and helps in better utilizing locally available resources.</li> <li>» <b>Integration with local environmental problems:</b> While implementing any national or international policy objective, integration of solutions which directly address local problems increases public participation and acceptance.</li> </ul>
<b>How to replicate this practice</b>	<ul style="list-style-type: none"> <li>» <b>Identify opportunities specific to the context:</b> Composition of waste produced in a locality plays an important role in deciding how it should be managed and what type of waste-to-energy technologies are most suited. The experience of pilot LCC projects suggests that while experience from other cases is useful, specific details, particularly related to waste sorting must be done on a case by case basis.</li> <li>» <b>Incentives and policy signals:</b> Waste-to-energy has been experimented with for a long time in Thailand, however remarkable success has been achieved only after it was integrated into AEDP, and supporting institutional arrangements such as the LCC Fund and T-VERs were announced. Hence, the incentive structure and long-term policy signals play an important role.</li> <li>» <b>Collaborations for support and mutual learning:</b> Thailand has been building partnerships at multiple levels, including local stakeholders and experts to national institutions and international agencies. As a result, local problems are getting integrated into national policy objectives and the benefits of international experience and support are percolating down to the local communities, building capacities at every level.</li> </ul>
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<b>Further key resources</b>	<ul style="list-style-type: none"> <li>» <a href="http://www.eri.chula.ac.th/eri-web/resources/uploads/2012_06_13_15_26_31.pdf">www.eri.chula.ac.th/eri-web/resources/uploads/2012_06_13_15_26_31.pdf</a></li> </ul>
<b>Website(s)</b>	<ul style="list-style-type: none"> <li>» Cassava Waste to Energy Project <a href="http://www.offsetters.ca/offset-projects/by-country/cassava-waste-to-energy-thailand">www.offsetters.ca/offset-projects/by-country/cassava-waste-to-energy-thailand</a></li> <li>» Office of the National Economic and Social Development Board: <a href="http://eng.nesdb.go.th/">http://eng.nesdb.go.th/</a></li> <li>» <a href="http://weben.dede.go.th/webmax/">http://weben.dede.go.th/webmax/</a></li> </ul>
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