Ministry of Finance

Ministry of Natural Resources and Environment

Office of the National Economic and Social Development Board

Bureau of Budget

Thailand

Climate Public Expenditure and Institutional Review

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Abbreviations

BMA	Bangkok Metropolitan Administration
BoB	Bureau of the Budget
BoT	Bank of Thailand
CCF	Climate Fiscal Framework
CCCs	Climate Change Coordinators
CDM	Clean Development Mechanism
CERs	Certified Emission Reductions
CPEIR	Climate Public Expenditure and Institutional Review
DoAE	Department of Agricultural Extension
DEDE	Department of Alternative Energy Development and Efficiency
DIP	Department of Industrial Promotion
DoLA	Department of Local Administration
EE	Energy Efficiency
ENCON	Energy Conservation Promotion Fund
ESCO	Energy Service Company
FPO	Fiscal Policy Office
GAP	Government Administrative plan
GHG	Greenhouse Gases
LDD	Land Development Department
LAO	Local Administrative Organisation
LOA	Letter of Approval (for CDM projects)
MFA	Ministry of Foreign Affairs
MoAC	Ministry of Agriculture and Cooperatives
MoE	Ministry of Energy
MoF	Ministry of Finance
MoI	Ministry of Interior
MoNRE	Ministry of Natural Resources and Environment
MRV	Monitoring, Reporting and Verification (of GHG emissions)
MTEC	National Metal and Material Technology Centre
MTEF	Medium Term Expenditure Framework
NAMA	Nationally Appropriate Mitigation Action
NESDB	National Economic and Social Development Board
NCCC	National Committee on Climate Change
OCCC	Office of Climate Change Coordination
ONEP	Office of Natural Resources and Environmental Policy and Planning
OPDC	Office of the Public Sector Development Commission
PAO	Provincial Administrative Organisation
PTT	Petroleum Authority of Thailand
RE	Renewable Energy
REDP	Renewable Energy Development Plan
RID	Royal Irrigation Department
SCG	Siam Cement Group
SET	The Stock Exchange of Thailand
STI	National Science Technology and Innovation Policy Office
TAO	Tambon Administration Organization
TGO	Thailand Greenhouse Gas Management Organization
TEI	Thailand Environment Institute
UNFCCC	United Nations Framework for Convention on Climate Change

Acknowledgements

Overall guidance for the CPEIR studies has been provided by Thomas Beloe and Paul Steele of the UNDP Asia Pacific Regional Office in Bangkok. Oversight of the Thailand CPEIR was carried out by Sutharin Koonphol of the Environment Unit at UNDP Thailand, who we would like to thank for her consistent support during this research.

The following team of research assistants ably assisted the sub-national work programme aspects of the study: Kridtiyaporn Wongsa, Komsak Swangswai, Thanyatorn Saipanya and Patrawan Boonchan.

Responsibility for the content of this paper rests with the authors alone. In particular, no responsibility for the opinions here expressed should be attributed to UNDP or to the Government of Thailand.

Summary

This climate public expenditure and institutional review (CPEIR) of Thailand represents a first attempt to map government's response to climate change, which is becoming a major theme for public policy. Building on a developing international methodology, the study has carried out new research into the policy, institutional and public expenditure commitments to climate change. This is an emerging field of analysis and this study has no precedent in Thailand. The study has completed original research at both the central government and local government levels.

The CPEIR is exploratory in nature rather than being a statistically rigorous study, although we believe that the broad conclusions and recommendations that arise will hold firm as further studies are carried out and a more in-depth understanding is developed from further research. This CPEIR represents a first analytical exercise into the national response to climate change, which, by its very nature, will remain a major policy concern into the foreseeable future.

A major contribution of the CPEIR is an indicative classification of the entire national budget in terms of climate relevant expenditure. This allows an initial analysis to be made on the linkages between emerging policy positions on climate change and government's implementation programmes funded through the national budget. To achieve this, all national budget expenditure codes were compiled from the relevant budget documents for 2009, 2010, and 2011. This produced a 3-year database that contained 134,341 line items. Each function was then tagged according to whether the purpose and/or the effect of the expenditure was related to climate change, using a framework developed under the CPEIR approach. This resulted in climate change activity being identified within 26,774 line items. Based on this sub-set of activities, all line items were then ranked according to the CPEIR classification on climate relevance. For each line item an estimate was made of the proportion of expenditure considered relevant to climate change on a scale of 0 – 100%, based on project documentation and expert judgement. All line items were then grouped into four categories (high, medium, low and marginal relevance), with the subsequent analysis based on these groupings.

The following sections outline the major conclusions of the study by each of the main elements of the CPEIR, namely the national policy discourse; the institutional arrangements being put in place by government to address climate change; the public finance management and budgetary commitments of public spending; and the delivery of publicly supported programmes at the local government level.

This summary concludes with the study team's recommendations within a suggested action plan.

Policy analysis

The study's climate change policy analysis has drawn on two national master plans. The first is the Thailand Climate Change Master Plan under preparation by ONEP (and now close to completion). The second, the Master Plan on Climate Change for Thailand: energy prices and food security, was prepared by the NESDB. These two reports are consistent with one another and can be used as policy guidance for the NCCC. In short, the proposal of policy, strategies, measures and projects are in accordance with the mandate of the NCCC on adaptation, mitigation, capacity building and technology transfer. These expressions of national policy on climate change are also increasingly recognised within the national development planning process.

The climate change policy in Thailand is well defined in accordance with the UNFCCC goal to keep the world's temperature rise under the 2 degrees Celsius threshold. This reflects a strong engagement with the international policy discourse, which will continue to be a major policy driver for national climate change actions. The proposed long-term economic growth and development path will set a direction towards a low carbon society. Under this growth strategy the economy will grow, consistent with low levels of carbon emissions of not more than ten tons of CO_2e per head by 2050. The Thai economy is expected to grow in terms of gross output at a rate of 5.3% per year on average until 2050 (at constant prices).

The climate change policy in Thailand can therefore move forward with adequate funding. However, this policy theme has not been comprehensively addressed in the national budgetary process to-date, nor through extra-budgetary funds. Climate change-related public finance needs to be well planned within these processes to cope with the recurring risk of damages by climate variability. While most of the mitigation actions are market orientated in nature, suggesting a leading role to be played by the private sector, there are some mitigation activities such as maintaining a carbon sink through forest protection that will require considerable public funding. Responding to the need to adapt to a changing climate will also be a significant component of government's development spending for years to come.

Institutional analysis

The institutional arrangements to address climate change are becoming established in Thailand and can drive forward implementation if adequately resourced. Much has been done in a short space of time, reflecting the new policy concern of responding to climate change. The NCCC is a very important committee in this regard, being chaired by the Prime Minister, as it has the mandate to direct the national climate change response. Members of the committee are ministries that have both policy-oriented crosscutting roles as well as the line implementing agencies. The main institutional pillars of this committee with regard to forwarding the national climate change agenda are ONEP, the TGO and the NESDB, with support from the MoF, FPO and the BoB on fiscal and public expenditure issues. However, for this committee to operate efficiently and effectively it requires a well-resourced secretariat that can maintain momentum between its meetings. Whilst this secretariat has been identified within ONEP (the Climate Change Coordination Office) it has yet to be resourced. This represents an important next step in the institutional architecture to secure overall coordination on climate change.

Mitigation actions will depend critically on private sector engagement, particularly in the clean energy sector, where investments levels have recently averaged 16,000 million Baht per year. Private sector institutional arrangements are already advancing through the representation of the Thai Chamber of Commerce. The role being played by the TGO is also important, and this can be expected to grow in the post Kyoto era, particularly if the proposal to establish a Thailand Carbon Fund goes ahead. This has implications for the organisational development of the TGO.

New institutional arrangements in support of the provision of adaptation finance are needed. Whilst the ECON Fund is already providing financial support for some mitigation actions, there is no equivalent institutional arrangement for the financing of adaptation actions. One possible development that should be examined is the reformulation of the Environmental Fund to include a

funding window for climate adaptation activities. This would likely require legal amendment to the statute that created the fund.

Longer term sources of climate funding

Thailand's fiscal discipline is governed by a number of laws. The Public Debt Management Act B.E. 2548 is the law that sets the annual debt ceiling in every category of government and state-owned enterprises' loans. Under this policy, Thailand's fiscal stance has remained sustainable, with a public debt to GDP ratio that has remained below the government's fiscal sustainability framework of 50% to GDP. However, this discipline leads to inflexibilities in budget management and re-allocation. The Government Central Fund has been used as a tool to allow some flexibility in annual budget re-allocation. However, the contingency fund for all types of emergencies or immediate needs in 2012 is only 66,000 million baht or %15.7of the Central Fund. This fund cannot be regarded as a major long-term source of climate finance.

For financing the budget deficit, the government can only borrow from domestic sources under Public Debt Management Act B.E. 2548 in order to retain fiscal discipline. Given that this device is largely used to help balance the national budget it is also not regarded as a viable long-term source of climate funding.

Overall, there is little, if any, fiscal flexibility in the Government of Thailand's budget. Unless new sources of finance are found, budgetary expenditure in support of climate change actions can only be increased at the cost of reductions elsewhere in the budget. This should focus attention on new sources of funding through the possible use of fiscal measures and international funds. In respect of fiscal measures there has been limited use of specific initiatives to-date for climate related issues. However, given the balance of revenues between direct and indirect measures there would appear to be scope for review with a view to identifying potential specific initiatives.

Much attention has been given to new international funding sources for climate change. Although Thailand has benefited to some extent from these sources, the potential for major new flows appears modest. The much heralded Green Climate Fund has yet to be capitalised, and may have to compete with existing funds for donor support. Domestic sources of climate finance will therefore remain crucial to funding the national response to climate change.

Public Financial Management processes

There are two main PFM processes in Thailand: budgetary and extra-budgetary funds. Extra-budgetary funds fall under the governance of individual ministries and as a result the operation of each fund is independent of one another. Policy coherence through such funds is therefore rather limited. The challenge is to balance this flexibility of operation with national policy goals in respect of climate change. The latter could be achieved through the oversight of the NCCC. Acknowledging the present Cabinet moratorium on the creation of new Funds, it may be prudent to build on existing climate related funds rather than seek to establish a new 'Climate Change Fund' for Thailand.

The ECON Fund already has a record of supporting investments for clean energy production (with an annual budget of approximately 7,000 million Baht, sourced from levies on petroleum products) and hence covers part of what is required to further the national mitigation response. The present

strategic gap lies in a lack of dedicated financial support for adaptation actions. A re-formulated Environmental Fund could address this shortcoming.

National budget analysis

The Government budget in Thailand has averaged around 19% of GDP in the period reviewed from 2009-2011 but a significant reduction in the overall budget level was noted in 2010, followed by a sharp increase in 2011. This pattern had significant implications for the climate budget and the key ministries within which the climate budget is held.

On an indicative basis, the climate budget represented around 2.7% of the government total budget (52,000 million Baht per year). The climate budget was reduced by a greater percentage than the government's budget as a whole in 2010 and increased by a greater percentage in 2011. Economic analysis indicated that the climate budget has a large capital component (45%), which makes deferral or reduction of planned expenditure easier than for recurrent and legally committed or contractual expenditure such as salaries.

The two main Ministries in respect of climate activity are the Ministry of Agriculture and Cooperatives (MoAC) and the Ministry of Natural Resources and Environment (MoNRE), which account for 55% and 29% of the climate budget respectively. In line with the rest of government (with the exception of Public Health) these Ministries experienced sharp reductions in their budgets in 2010 and rapid increases in 2011. In respect of the climate budget within these Ministries, Agriculture's climate budget experienced greater variability, whilst MoNRE's experienced less variability than the government and ministry as a whole. This finding would tend to support the view that the capital intensive cost structure of the climate budget was the main reason for the variability in allocation.

There are 137 agencies involved in the delivery of climate activity in Government. This represents a significant policy and institutional coordination challenge. However, over three quarters of the budget is concentrated in only ten agencies, with two agencies: the Royal Irrigation Department of the MoAC and the National Parks, Wildlife and Plant Conservation Department of the MoNRE making up almost half of the allocated budget for climate related programmes in 2009-2011. This represents a more achievable goal for policy and institutional coordination in the short-term.

Economic analysis of the climate budget indicates that two key budgets make up most of the planned spend: land and buildings and personnel costs with 45% and 28% of the allocations respectively. As mentioned above, the capital element renders the climate budget susceptible to ready variability as financial resources dictate. This was particularly evidenced in the experience of the budget downturn in 2010.

Adaptation is the single largest component of the national climate budget (at 68%) and this is consistent with the economic analysis mentioned above in that adaptation in the Thai context is largely capital intensive. Support to mitigation activities comprises another 21% of the climate budget. Relevant capacity building has seen a progressive increase in both activity and budget (up to 9%) in the period reviewed.

In terms of the climate relevance of activity, around 1/5th of the climate budget was allocated to activities that were assessed as being highly relevant to climate change (representing approximately 0.5% of the government budget or approximately 10,000 million Baht per year). This expenditure is

supporting specific actions that improve climate resilience or contribute to mitigation, technology transfer and/or relevant capacity building.

The majority of the climate budget was found in mid-relevance programmes that have either secondary objectives related to building climate resilience or contributing to mitigation, or mixed programmes with a range of activities that are not easily separated but include at least some that promote climate resilience or mitigation. The most financially significant element of the overall climate budget is the mid relevance adaptation component, largely undertaken by the Ministry of Agriculture and Cooperatives through its water distribution and storage programmes. This analysis provides a useful focal point for strengthening the transaction of climate strategy to sector policy and consequently to the recognition of climate activity within mainstream sector activity.

Sub-national analysis

The CPEIR study found evidence that there is some awareness of climate change at the local government level. However, in the absence of a clear definition of climate change activities (and expenditures) agreed at the national level, and with limited support provided by technical ministries and line agencies, the clarity about what climate change activities and investments are needed depends on the level of knowledge and awareness that local leaders possess. For example, in the case of the tambon municipality of Mueng Klang, the local administration has pursued a clear strategy of strengthening and expanding mitigation activities and investments, as these result in a) political benefits (the mayor has been elected for three consecutive terms), and b) additional revenues to the municipality. In the case of the TAO of Bang Num Phueng climate change interventions are synonymous with environmental protection and conservation.

This limited clarity is not negative *per se* and can also have a positive influence. The experience of the tambon municipality of Mueng Klang shows that local government has a certain degree of freedom, in a relatively centralised administration system such as the one of Thailand, which enables local leaders with the necessary knowledge and know-how to pilot and develop locally suited interventions with external funding from NGOs, foundations, and the private sector.

This poses a dilemma for national policy makers: how to design policies and guidelines that provide the necessary clarity in defining climate change adaptation and mitigation activities and investments and, at the same time, preserve the incentives and entrepreneurship spirit that has motivated local administrations to gather knowledge and know-how to design activities which are both technically sound and politically feasible.

Recommendations arising from the study and proposed action plan

Climate finance should be prioritized in accordance with the two national master plans to achieve a low carbon society in Thailand by 2050. However, as long-term planning is necessarily uncertain we recommend that priority actions by government be identified using two time horizons: (i) immediate actions to be completed by 2015; and (ii) medium-term actions to be completed by 2020.

Immediate actions to be completed by 2015

Recommended Action	Lead Institution(s)
1. The National Climate Change Committee (NCCC) should develop a strategy on how to finance climate change actions in Thailand. This will require a more active role to be played by the Ministry of Finance to develop public finance instruments on top of the budgetary process managed by the Bureau of Budget.	NCCC, MoF, FPO, BoB
2. The secretariat office of the NCCC (the Climate Change Coordination Office within ONEP) should be equipped with sufficient personnel and a budget to oversee the overall management of the Climate Change Policy under the direction of the NCCC. 3. Measures and mechanisms to scrutinise the climate budget at ministry and parliamentary level should be strengthened. However, we would stress that compatibility with, and use of, the existing PFM architecture (such as budget management committees) should be considered before establishing separate administrative structures.	NCCC, ONEP
4. A specific climate functional marker or code should be introduced to the government chart of accounts. This marker should be applied, perhaps on a percentage basis, to all climate programmes to enable the tracking of the climate budget. This marker could also identify the nature of the climate intervention as adaptation, mitigation, capacity building or technology transfer. The national budget classification exercise completed by this CPEIR study could provide the foundation for this work. 5. A 'Handbook on public expenditure on climate change' should be prepared to provide guidance for both central and local government. This could be incorporated into budget instructions to ensure compatibility with existing PFM processes. 6. A national monitoring and evaluation system for climate change related activity should go beyond the measurement of financial inputs through the national budgetary system, but also consider the outputs and outcomes of such expenditure. This could, for example, be included within *Thailand's Budget in Brief*, published by the BoB.	BoB, ONEP
7. A review of fiscal measures should be undertaken to determine the potential for climate specific measures in support of the private sector to part-fund the long-term approach to addressing climate change issues. 8. The MoF should address how tax instruments, such as a carbon tax, can be accommodated within the normal taxation system, and the role of	MoF, FPO, TGO, BoT, SET, STI, MTEC

subsidies/incentives to be played in support of climate change actions by non-budgetary instruments like the ECON and Environmental Funds. 9. As an early priority, a study should be commissioned to determine the carbon base-line taxable activities before introducing a carbon tax/subsidy in support of private sector activity for mitigation. 10. Government should also consider the early establishment of the proposed 'Thailand Carbon Fund'. This would provide an important signal from government in support of small-scale project developers who are interested in clean energy and other appropriate climate change investments.	
11. As part of the budget preparation next year the Ministry of Agriculture and Cooperatives and the Ministry of Natural Resources and Environment should be encouraged to recognise the climate component of their budgets more explicitly in terms of both performance targets and the policy drivers behind the programmes. This initiative will raise the profile of the climate budget and will also mitigate the risk of gaps and/or overlaps in programme delivery. If the focus of co-ordination is initially restricted to these two ministries it is suggested that improvements can be more readily achieved in the short-term. 12. The CPEIR analysis indicates those sectors where most of the climate change related public expenditure is currently located. Further study at sector level is warranted to gain a better understanding of climate change actions and their coherence with sector policies. Agriculture, water and the forestry sectors would be good starting points for this sector analysis.	ONEP, MoAC, MoNRE, BoB
13. Road construction in rural areas is an area of public expenditure that warrants further research to improve understanding of the likely impact of such spending on climate change. The high level of expenditure (averaging approximately 61,000 million Baht annually between 2009 and 2011) indicates that this is a significant sector activity to consider in determining the national strategy towards climate change.	BoB, ONEP, Ministry of Transport
14. The methodology and analytical framework tested by the CPEIR should be expanded further at the sub-national level to support the design of a national policy and strategy which is flexible and can be adapted and tailored to accommodate local needs and specific circumstances.	ONEP, MoI, PAOs, LAOs
15. There is a need to design information material suited to local administrations that can provide a clear definition and explanation of climate change interventions both as adaptation and mitigation. The source of this information could be the National Climate Change Master Plan that is presently being completed.	ONEP, MoI, DoLA

Medium term actions to be completed by 2020

16. Rather than seek to establish a new 'Climate Change Fund' for Thailand, the establishment of 'climate adaptation facility' within a reformulated Environmental Fund under the MoNRE should be considered. This would likely require legislative change and so should be a medium-term goal to increase funding for public adaptation programmes that the national budget will not be able to meet.	MoF, BoB, MoNRE
17. Given the relatively low percentage of resources allocated to climate change within the national budget some consideration could be given by the Government to establish a target annual allocation for climate activities that is appropriate to available resources, has the potential to address long-term needs and can be sustained as part of a wider fiscal framework involving the private sector.	NCCC
18. As the response to climate change will involve long-term measures, a specific exercise to raise the profile of climate change related expenditures should be undertaken within the Medium Term Expenditure Framework. However, this exercise should await the introduction of a specific climate functional marker in the government chart of accounts.	MoF, BoB
19. There is need to capture the totality of climate investments available in each local area to strengthen the government's ability to prioritise and channel climate investments funds more appropriately to priority areas. Local administrations could be given the mandate and support to compile and track all climate investments and climate actions delivered in their jurisdiction.	MoI, LOAs, ONEP

1 INTRODUCTION

1.1 Significance of the Study

The world is facing a significant change in climatic conditions, with global warming regarded as the likely cause. The Intergovernmental Panel on Climate Change has pointed to the fact that global warming is the result of increasing concentrations of Greenhouse Gases (GHG[1]) in the atmosphere. It is widely accepted that human activity is the main source of such emissions and thus there is an anthropogenic cause to global warming. The impact of a changing climate may be observed from extreme weather conditions in Thailand, with severe droughts, heavy rainfall and flooding occurring more frequently than in the recent past. In some areas, land-slides are an increasing threat to the rural population. Farmers are affected by drought conditions during the planting season due to shifts in precipitation patterns, whilst heavy rainfall and flooding before harvesting causes loss of production and income to rural households.

According to Thailand's Second National Communication (NC) report[2], Thailand emitted Green House Gases (GHGs) equivalent to 281 million tons of CO_2 in 2000. Taking into account a sink of 52 million tons by the forest sector, the net GHG emissions reached 229 million tons. The energy sector constituted about 70% of total GHG emissions, followed by 23% from agriculture, with the remaining 7% shared among a range of other sectors (industry, forestry, and waste management respectively). The National Communication noted that GHG emissions have increased with economic growth in Thailand, which has relied heavily on imported fossil fuels.

The long range forecast of national climate change potential (1980-2100) has been carried out using a regional climate model[3]. This model predicts that Thailand will have higher rainfall in the order of 10-20% in all regions, although the number of days with rainfall is not expected to change significantly. All regions will be warmer and the duration of the cold season will be shortened. The NC has further noted that climate variability and extreme events, especially droughts, floods and storms will intensify as global warming increases. Such natural disasters have the potential to cause substantial damage to food production and rural livelihoods, as well as to the country's national economic and social development.

In order to secure long-term economic growth and an inclusive development[4] path, climate compatible development has to be financed. This finance can come from the government budget, non-budgetary finance such as national trust funds, borrowing, and grants from foreign sources. Financing used for adaptation will help reduce long-run vulnerability. Funding mitigation actions will reduce the concentration of greenhouse gases. These actions will counter climate change-induced

[1] GHGs comprise carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydro fluorocarbon (HFCs), per fluorocarbon (PCFs), and sulfur hexafluoride (SF_6). The global GHG concentration in 2005 was 379 ppm (parts per million), an increase of almost 100 ppm compared with the concentration at the beginning of the last century.

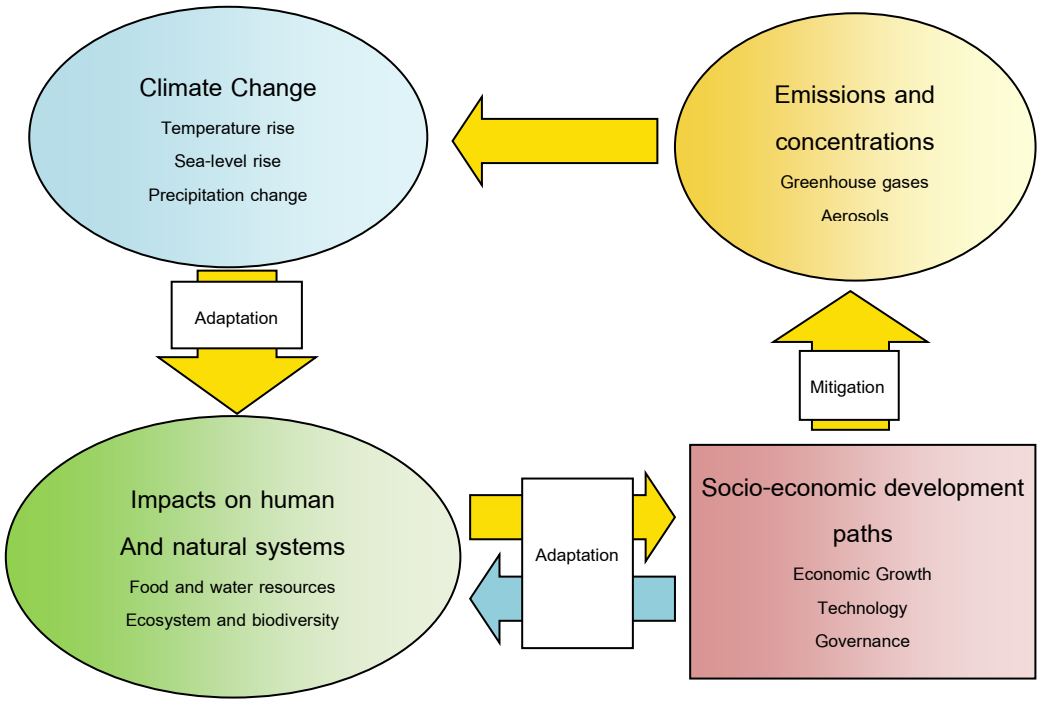
[2] Office of Natural Resources and Environmental Policy and Planning, Ministry of Natural Resources and Environment, National Communication report to the United Nations Framework Convention on Climate Change, 2011.

[3] Center for Technical Service, Chulalongkorn University (2010), Study on Impact of Climate Change and Climate Variability and Extreme Events in the Future and Adaptation of Key Sectors, report submitted to the Office of Natural Resource and Environmental Policy and Planning (in Thai).

[4] Economic Growth may not be inclusive if economic benefits do not give rise to improvements in social and environment sustainability. Economic development will be inclusive if it is sustainable by reducing poverty, the inequality of income, gender differential and female empowerment, and improved accessibility to health and education. This inclusiveness may be measured by the Human Development Index (HDI) of UNDP.

temperature rise, sea-level rise, severe precipitation change, and extreme events of droughts, flood and landslides.

Figure 1: An integrated framework model for the response to climate change



The impact of climate change on human and natural systems occurs through temperature and sea-level rise, with changing precipitation patterns causing droughts and floods. Consequently, food security may be expected to worsen, with the re-emergence of natural diseases which are harmful to human health, and the degradation of eco-systems and bio-diversity. However, climate change cannot be separated from the socio-economic development path that a country has chosen (Figure 1). A 'business as usual' development path, with high carbon intensity, will bring about greater emissions of Green House Gases compared to a 'Low Carbon Society' development path. Much depends on whether a country decides upon a set of consolidated policies that will lead towards a low carbon growth path or not. Depending on this choice, strategies, measures, programs and projects on adaptation, mitigation, technology transfer and capacity building will be reflected in the national climate policy and its financing.

1.2 Objectives of the CPEIR study

The primary objective of the Climate Public Expenditure and Institutional Review (CPEIR) is to review public spending on activities that are related to climate change, and to assess the extent to which this expenditure is supported by existing policy and institutional responsibilities. On the basis of this review, the CPEIR aims to generate recommendations to improve climate relevant public expenditure in the future.

Three core aspects of national funding on climate change actions are explored:

1. An assessment of current policy priorities and strategies as these relate to climate change;

2. A review of institutional arrangements for promoting the integration of climate change policy priorities into budgeting and expenditure management;
3. A review of the integration of climate change objectives within the budgeting process, including as part of budget planning, implementation, expenditure management and financing.

The CPEIR also has an important process function, acting as a starting point for longer term Government-led stakeholder dialogue and learning involving the public and private sectors, academia, civil society and international development partners.

1.3 Approach taken for the CPEIR

At the heart of the CPEIR is the classification of public expenditure through the national budget into different categories that are relevant to climate change. In this study, climate change expenditure has also covered non-budgetary expenditure, as well as funding from international sources. However, the budgetary process at both the national and local government level remains the core of the study. Fiscal measures such as government subsidies for clean energy provision and some others non-tax instruments, such as the Energy Conservation Promotion Fund and the Environmental Fund, are also reviewed as these serve the policy orientation that seeks to address the effects of climate change in Thailand.

The study has been completed by a team of three Thai experts, supported by three international specialists from the Overseas Development Institute in the UK. The study was carried out between February and June 2012, with information gathered through a review of the literature, key informant interviews, and a national workshop held on 1st June that reviewed the main findings and recommendations of the study. The recently instituted Working Committee on developing a Climate Fiscal Framework oversaw the development of the study and will determine what tasks should be carried forward based on the CPEIR findings.

2 POLICY ANALYSIS

2.1 Climate change policy

Thailand's policy on climate change has been drawn up to ensure that the country's commitments and obligations to the UNFCCC and the Kyoto Protocol are fulfilled and are consistent with the national interest. As indicated in Thailand's Initial National Communication[5] to the UNFCCC, Thailand has integrated climate change issues into the national development planning process since the 7thPlan (1992-1996). Under the 8th Plan (1997-2001), Thailand's development vision focused on human welfare as its core development objective. A holistic development approach was used to achieve a balance between the economic, social and environmental sectors. The 9thPlan (2002-2006), introduced the principle of the 'sufficiency economy' to guide the conduct of national development. However, major problems remained in respect of the quality of education, income distribution, public safety, and good governance. Although natural resource management improved concerning forest resources, environmental protection did not achieve the plan's targets, especially with regard to water quality and hazardous waste disposal.

The general policy on climate change under the 8thand 9thPlans has continued up to the present time. Under this policy, Thailand has formulated a range of relevant sector policies (e.g. energy, forestry, and water resources) to enhance GHG mitigation. Public awareness through formal education and information campaigns has been developed to strengthen adaptation to climate change, especially concerning agriculture and water resources. Guided by a vision of sustainable happiness for the Thai society, the 10thPlan (2007-2011) emphasized the development of economic, social and natural resource and environmental capitals. In addition, Thailand has defined specific strategies related to key natural resources and the environment. Among them is the first national strategic plan for organic agriculture development (B.E. 2551-2554).

The impact of unbalanced development, especially as it affects levels of self-reliance within communities, has led Thailand to adopt the 'sufficiency economy' philosophy as a guide towards balanced development in the midst of globalization. The 10thPlan recognized the dynamics of global economic, social and environmental change. The problems of continued pressure placed by population growth on natural resources and the environment, global warming, climate change and ozone depletion have aggravated the condition of the country's fragile ecological systems. Natural disasters, such as droughts, floods, typhoons and hurricanes have caused catastrophic damage to the country's physical infrastructure, the economy and human lives. New diseases, like SARS and bird flu, have emerged. These have affected people's welfare and livelihoods, and have stalled sustainable development.

Thailand recognizes climate change issues at the international and national level. The 11th Plan (2012-2016) cites global warming as a key concern that influences future national development. Thailand's 20-year development vision has identified approaches to enhance efficiency in energy conservation, expansion of biomass energy and adaptation to climate change. Key factors that will determine the country's development strategy are global warming and climate change, an aging society, and competition for resource use. As a non-annex I country of the UNFCCC, Thailand has no

[5] Royal Thai Government, 2000, Thailand's Initial National Communication for the UNFCCC.

international obligation to set a target on carbon emissions reduction. However, the recent negotiations have clearly indicated that developing countries like Thailand may gradually have to comply with the UNFCCC goal of a '2 degree Celsius' temperature increase in the coming years. The climate change policy of the Thai government recognizes these facts.

Sector level policies have been formulated to address the need to adapt to the impact of climate change, such as in water management and irrigation where combating increased levels of droughts and floods caused by extreme events is likely. In the agriculture sector, water stress resistant seed varieties are being researched and distributed for paddy cultivation as climate change is recognised to have a potentially serious impact on the security of Thai food supply. Climate change policy has also induced measures on disaster management. Departments and agencies as well as the private sector, led by the Thai Chamber of Commerce, are increasingly alert to the risk from climate change.

The country's mitigation policy aims to reduce carbon emissions from production and consumption activities. On the production side, this can be seen from several policy measures introduced by the Ministry of Energy. Mitigation activities can benefit from the structure of the proposed 'Feed-in-tariffs' and the existing 'adders' placed on top of the selling price per unit of electricity (kWh) if they use energy inputs from biomass, bio-gas, solar and wind. With this alternative energy price, private sector developers can bundle a Clean Development Mechanism (CDM) project with electricity production and sell to the national grid. On the consumption side, carbon footprint labelling is now shown on products to raise awareness among consumers. There are also attempts between large private companies and government research to look for second and third generation bio-fuels. However, there is no policy statement as yet on technology transfer.

The climate change policy on capacity building is expressed in every government administrative plan announced to the parliament. Media, books, newspapers, radio and television as well as websites are used to raise awareness on climate change. Capacity building among bureaucrats is reflected in the national and local government budget. But the most important goal is raising awareness among rural people, especially farmers, which is quite low compared to the urban population.

The recent extreme flooding event in Thailand in 2011 caused policy makers to give considerable attention to climate change. The heavy rain along with typhoons had never happened before in the last 100 years. This caused heavy flooding in the central plain area, including the Bangkok Metropolitan Region, during the third and fourth quarters of 2011, which led to a substantial loss of life and assets.

2.2 Climate change planning

The Office of Natural Resources and Environment Policy and Planning (ONEP), within the Ministry of Natural Resources and Environment published a 'National Strategy on Climate Change Management B.E. 2551-2555'. This strategy identified the following issues:

1. Climate change affects natural resource security and environment quality as well as life quality;
2. As Thailand requires positive economic growth in the medium to long run in order to raise the welfare of its people, carbon emissions will be unavoidable;
3. Thailand does not have an integrated plan for climate change adaptation and mitigation, as knowledge and data are not yet sufficiently accumulated;

4. People in Thailand need further capacity building and awareness raising in order to improve their participation in the national climate change response;
5. Government agencies need higher capability in managing integrated action plans. Agency staff within key ministries (e.g. MoAC, MoNRE) currently lack research and development, planning, operation and monitoring skills;
6. Thailand needs a clear direction on how to cooperate with the international community and the UNFCCC.

ONEP has also prepared the 'Thailand Climate Change Master Plan B.E. 2555-2593'[6]. This Master Plan identifies three strategies on (i) climate change adaptation; (ii) mitigation of GHG emissions and increasing carbon sinks; and (iii) capacity building for climate change risk management. Each of these strategies proposes short, medium-term and long-term objectives to be undertaken by lead government agencies.

However, climate change impacts cannot be remedied by policy measures without an explicit analysis of how to finance possible response actions. The National Economic and Social Development Board (NESDB) has realized this risk and is trying to search for solutions to prevent Thailand from the possible negative economic impacts of climate change, especially on energy and food prices, which in turn would have an adverse effect on the long-term economic growth potential and welfare of the Thai people. Most importantly, Thailand needs to turn this climate risk into a 'co-benefit' of economic development and GHG emission reduction. The Master Plan of NESDB[7], which is based on the economics of climate change, has attempted to identify long-term maximum welfare, measured by economic growth potential (2010-2050) as constrained by climate change scenarios for Thailand.

2.3 Approach in the Climate Change Master Plan by NESDB[8]

The Master Plan prepared by the NESDB relies on two sets of supporting studies. These are the studies on (i) climate science and (ii) the economics of climate change. The first set of studies focus on climate modelling that deals directly with the impact of rising global temperature on extreme weather conditions, the effects of which are down-scaled to the Southeast Asian region and Thailand in particular. The modelling predicts the quantity and timing of precipitation, as well as the risk of drought, floods and landslides in 'hot spot' areas. Climate change has given rise to seasonal shifts in weather patterns and an increase in the risk of damage to agricultural crops and food production.

In the Master Plan the risk to food security caused by the possibility of rising energy and food prices was analysed. It was found that climate change will cause a rise in food prices as the agricultural sector will be affected by extreme events more often than before. Loss of production will put pressure on food prices. At the same time, demand for energy will keep on rising as the world economy expands. The demand for fossil fuel, which is the main source of Thailand's energy supply, will increase despite declining stocks of crude oil reserves. Thus, energy prices (fossils and others)

[6] In final draft stage as at June 2012

[7] National Economic and Social Development Board (2010), A Master Plan on Climate Change in Thailand, 2010-2050: Energy Prices and Food Security.

[8] The master plan of NESDB has tried to identify the growth and development path under constraints of social disparity, income inequality or non-inclusiveness, and GHGs emission and impacts from climate vulnerability. The 'Climate Change Master Plan' proposed by ONEP to the Cabinet in 2011 is currently under revision.

will likely increase. Developing countries, in general, will face both rising energy and food prices in the near future, which will harm the pace of economic development and income growth. Especially, poorer households will be affected harder than before.

In order to design strategies for the Master Plan, the following models were constructed and analyses made: [9]

1) The climate model summary by Sucharit Koonthanakulavong and Kito (2010) is a down-scaled world model. This analysis concluded that Thailand will be affected by climate change. Droughts will occur alternately with flooding and disasters from landslides. However, the quantity and profile of precipitation will not be different in the near and medium-term (up to the middle of this century, compared to the latter half of last century). The study predicts hot spot areas and their severity, as well as suggesting both mitigation measures and adaptation responses.

2) Attachai Jintavej et al. (2010) applied a supply-side agricultural model to predict the yield and production level over time of the country's main cash crops: namely paddy rice, root cassava, sugar cane, maize for animal feed, and oil palm. Predictions based on the model indicate that Thailand will be able to remain food sufficient, as in the past. However, the model is based on the supply response to climate vulnerability, without taking the demand response of food prices into account.

3) Pattama Sirithanya (2010) has reported her experiments both in the laboratory and in the field to measure methane emissions from paddy rice. The study suggests that farming practices may need to adapt to climate change, especially the timing of water usage and crop residue burning.

4) As energy use by economic activities (measured by GDP) is the main cause of GHG emission intensity, the energy team led by Dawan Viwattandei and Weerin Wangjiranirun (2010) has constructed an energy model to predict the future demand and supply of fossil fuels with the substitution of alternative energies. Bio-fuel policy requires national integration efforts among the concerned agencies. Here, the Ministry of Energy needs to work closely with the Ministry of Agriculture and Agricultural Cooperatives (feedstock supply), the Ministry of Science and Technology (technology issues such as the mechanism of Technology Development and Transfer), and the Ministry of Finance (tax incentives and Funds such as the Mechanism of Financial Resources and Investment Mobilization scheme). Policy on energy-related GHG mitigation requires cooperation and input from the Ministry of Natural Resources and Environment (Clean Development Mechanism) and also the Ministry of Industry (investment incentives and production processes).

5) As forest conservation serves as a carbon sink, the UNFCCC has supported reforestation and various conservation strategies. Under the guidelines of the REDD+ concept (Reducing Emissions from Deforestation and Forest Degradation in Developing Countries), Chawalit Nuengdee (2010) has proposed to achieve the long-term goal of securing a national forest estate that can act as a carbon sink by taking into account the

[9] See the supporting studies for the master plan.

demand for wood and wood products in Thailand. With respect to the long-term plan of the Department of Forest[10], the forest area in the long-term plan is composed of both protective forest and productive forest according to a ratio defined in the national forest policy: where protective forest is 25% and the economic forest is 15% of the total land area. This constitutes a goal of 40% of the country being under forest cover (up from an estimated 25% in 1999).

6) In the study by Supakorn Chinawanno and Arnonda Sanitwong Na Ayuddhaya (2010) the authors tried to raise awareness on climate change and to plan for the risk of climate-induced disasters. Rural households in particular lack the necessary preparation. They have inadequate knowledge, people, machines and instruments, and funding. Thus, planned adaptation would be to fill the loophole of this insufficient man-machine-budget continuum. Most importantly, networking of rural households in vulnerable areas is needed, together with capacity building of the regional and local officers who deal with droughts, floods and disasters. Capacity building of central government departments is also necessary.

As the Master Plan would need to set a target growth path under the long-term constraint of GHG emission reductions, the plan explored the result of meeting the UNFCCC commitments as follows:

The Master Plan recognized that the COP16 meeting of the UNFCCC took note of the content of the 'Copenhagen Accord' that: (1) Parties will have global targets of GHG emission reductions, so-called 'Deep Cuts' such that the global temperature increment will be kept under the 2 degree Celsius limit as compared with the pre-industrialized era. Developed countries will reach the 'Peak' of GHG emissions and decline subsequently after the 'Deep Cuts', while developing countries will follow suit, with consideration of NAMAs (nationally appropriate mitigation plans of action); (2) Cooperative actions are pursued towards Adaptation among Parties, especially, the less developed countries and small island development states that need financial and technical support from developed countries; (3) while the Annex I Parties have to submit 'Economy-wide Emission Targets by 2020' by January 2010, the Non-Annex I Parties also have to provide planned mitigation actions and National Communication reports every two years; (4) with planned action on NAMAs, construction of domestic Monitoring, Reporting and Verification (MRV) procedures, including a GHG emission 'Registry' system by developing countries, the Annex I Parties commit to provide financial support worth 30 billion USD during 2010-2012 as new and additional resources for adaptation and mitigation actions. Non-Annex I countries would have to report their emissions reductions to keep within the target of limiting global warming.

Thailand has to weigh the cost-benefit of joining the Copenhagen Accord. The cost of complying with a global warming target of 2 degrees Celsius unilaterally would be the loss of economic growth compared with historical growth rates. This is because Thailand continues to rely on the use of fossil fuel for economic development. Thus, the 'Peak' epoch of GHG emissions may be not feasible until the middle of this century[11]. Compliance with this global target therefore acts as an external constraint on Thailand's economic development. However, if Thailand complies with the global

[10] We have obtained this valuable advice from Kovit Chaysurisri, Department of National Parks, Wildlife and Plant Conservation, Ministry of Natural Resource and Environment

[11] High energy intensity of GDP implies a high GHG intensity of energy usage.

target, the country may benefit from financial resources for national adaptation and mitigation investments, as well as technology development and transfer from developed country Parties.

The study by Kitti Limskul (2010) examined the economics of climate change and provided the following analysis:

1. Food and energy prices have a significant, positive relationship. That is to say, with the demand for fossil fuels in the course of economic development, given the shortfall of long-term fossil fuel supply, the price of fossil fuels will likely increase over time. Food prices will also increase as result of climate vulnerability. If this is the case, the study concludes that climate change will have a further effect on food security. The proper management of risk by adaptation and mitigation investment action can give rise to a 'co-benefit' to Thailand in the long-run. This will be achieved by investing in second generation bio-Fuels in the agriculture sector.
2. The study has run a dynamic economic model to analyze the impact of compliance with the 2 degree Celsius target. It was found that the economic growth potential of Thailand will be lowered.

The study proposes a development path named the 'Low Carbon Society' (LCS). It is a sustainable development path, with an investment programme based on Adaptation, Mitigation, Technology Development and Capacity Building of people and government bureaus to reach economic and social restructuring of the production and consumption patterns of the Thai economy. The LCS growth target will thus be the sustainable growth target associated with 2 degree Celsius compliance. The lower growth prospect mentioned in (2) would now turn to sustainable growth as a result of long-term investment.

2.4 The Economic Growth Target of Thailand 2010-2050

The LCS approach to GHG Emissions Reduction

According to the outcomes of the COP15 meeting, the Global temperature increment limit should be set at 2 degrees Celsius. This may present a threat to the economic growth potential of Thailand and may lower the country's development potential. The policy approach to relax this constraint can be analyzed as follows:

- Under Business as Usual (BAU), the 'no GHG reduction policy', greenhouse gas emissions will reach 498 million tons of CO_2 equivalent by 2020. With a 'LCS Policy' that will comply with the UNFCCC goal, GHG emissions would be reduced to 391 million tons of CO_2 equivalent by the same year. In the years 2030, 2040, and 2050, a 'LCS Policy' will reduce the greenhouse gas emissions as follows (Table 1):

Table 1: Projected greenhouse gas emissions under two scenarios

	Unit: $MtCO_2e$			
	2020	2030	2040	2050
Business as Usual	498	715	985	1,398
LCS Policy	391	497	669	955

This plan will reduce emissions per head from 20.1 (BAU) to 10.9 tons (LCS Policy) by 2050. However, this reduction will result in lower growth rates of the Thai economy, which may generate unemployment and a slowdown in economic development.

In order to set the economic growth target of Thailand along the LCS growth path with the external constraint regarding compliance with the 2 degree Celsius temperature increase, a SWOT analysis was carried out. It was found that Thailand's strength lay in the adequacy of its natural resources, fertile agricultural land, harmonized social system and a flexible economic structure that can be the basis for climate change adaptation and mitigation without sacrificing too much economic growth potential in the long-run. The identified weakness was that Thailand is currently relying too heavily on the importation of energy products, especially fossil fuels such as oil and gas. As a result, the energy intensity of GDP remains high. Reliance on imports in the GDP is increasing and putting a heavy burden on the country without improving energy efficiency in industrial processes and/or restructuring of energy usage.

Furthermore, in the absence of land-use allocation plans, the promotion of energy crops may harm food security in Thailand. Without further investment in research on mitigation technology, Thailand may have to rely on the current first generation of bio-fuels, undermining the path to LCS. The country therefore needs to invest in research into second-third generation bio-fuels, based on the abundant cellulose base in the Thai agriculture sector. Research on bio-diesel from algae, alternative energy from solar, wind, and geo-thermal sources, as well as mixing between bio-gas and biomass based energy will be both an opportunity for further co-benefits as sources of income generation and will narrow the development gap between rural and urban households.

The LCS growth path could therefore turn a threat into an opportunity with sustainable economic growth rates that comply with the global warming target. Moreover, the LCS may shorten the 'Peaking Years' from high GHG emission to moderate and lower levels of emissions without harming the economic growth potential of Thailand.

Low Carbon Society with Sustainable Economic Development Path

The development path called LCS represents growth with low GHG emissions according to the Policy Plan. Green investment is proposed to be a long-term counter cyclical macroeconomic policy.[12] In this development path, consumption and production is managed to be environmental friendly with lower emissions than in the BAU development path. Under this scenario, the long-term growth potential reaches 7.7% per year on average during 2010-2020 measured in terms of Gross Output; 4.4% per year during 2020-2030; 4.6 % per year during 2030-2040 and 4.6 % per year during 2040-2050 (Table 2).[13]

[12] This is called 'green investment' for sake of simplicity.

[13] Gross domestic expenditure or Final demand is exogenous while Gross domestic product is endogenous in this model without explicit feed-back in each period.

Table 2: Economic indicators of the Low Carbon Society development path

	2010	2020	2030	2040	2050
GHG Emissions under the LCS Policy (Million Tons of CO_2e)	327	391	497	669	955
Gross Fixed Capital Formation under Business as Usual (Million baht at constant price of 2010)	218,936	746,172	1,029,390	1,434,434	1,993,384
Gross Fixed Capital Formation as green investment (Million baht at constant price of 2010)	N/A	421,948	554,995	730,725	948,021
Growth rates of Final Demand with Green Investment (% per year)	N/A	7.7	4.4	4.6	4.6
Gross Output as result of Green Investment net of the Effect of GHG reduction under the Policy Plan (Million baht at constant price of 2010)	N/A	2,619,114	3,444,960	4,535,751	5,884,549

A Low Carbon Society (LCS) with sustainable economic development according to the Master Plan will be able to lower the energy intensity and thereby lower the carbon intensity of economic production. This is consistent with the concept of National Appropriate Mitigation Actions. In addition, this scenario will strengthen food security by producing food crops as well as first and second generation bio-fuels. The net benefit from producing food and energy crops will help to alleviate poverty and narrow the gap between rural and urban households.

2.5 LCS Growth Strategy for Thailand

Development Goal: Thailand will experience sustainable economic growth, with improvements in social welfare arising from the co-benefits of the low emission path.

Economic Growth Target: Long-term growth potentials reach 7.7% per year on average during 2010-2020 measured in terms of Gross Output; 4.4% per year during 2020-2030; 4.6% per year during 2030-2040 and 4.6% per year during 2040-2050.

Climate Change Strategies of the Master Plan

To achieve this growth target, the Master Plan proposes the following five strategies:

Strategy 1: Economic Restructuring towards a Low Carbon Society

Strategy 2: Adaptation to climate change with a Green Investment Policy

Strategy 3: GHG Mitigation Policy towards a Low Carbon Society in 2050 through a Green Investment Policy

Strategy 4: GHG Mitigation towards a Low Carbon Society in 2050 through Green Investment in Forest Conservation and an increase in the forest area under REDD+

Strategy 5: Capacity building and Human Capital Investment, Organizational Arrangement and Set up

The brief content of each of these strategies is as follows:

Strategy 1: Economic Restructuring towards a Low Carbon Society

Objective: Thailand will move forward with sustainable economic growth rates and low carbon emissions, with widespread co-benefits from GHG emissions reduction leading to welfare increases over time.

Economic Growth Target: 7.7% per year on average during 2010-2020 measured in terms of Gross Output; 4.4% per year during 2020-2030; 4.6% per year during 2030-2040 and 4.6% per year during 2040-2050.

Policy Proposal and Measures:

(1) Thailand should work towards an overall balance of consumption and production at all levels of society. The measure in this policy is to provide the necessary knowledge to adapt anthropogenic behavior on consumption and production. In addition, following the principle of a 'Sufficiency Economy' could lead to a Low Carbon Society. The co-benefit can raise income and saving, poverty eradication, and narrow the gap between rural-urban household income and wealth. Savings can finance the adaptation and mitigation investment in industrial restructuring towards LCS.

(2) It will be necessary to apply economic instruments to reach the target of adaptation and mitigation at the levels of economic activity.

(3) Domestic food security (and food exports) should be balanced with the supply-demand for energy in order to maintain a long-run sustainable growth path. The measure to be pursued is to normalize energy price distortions such that the marginal abatement cost is equalized by the social cost of carbon.

(4) A sustainable and balanced growth path requires human capital investment. One measure to be taken is to promote people's participation in climate change adaptation and mitigation activities.

Strategy 2: Adaptation to climate change with a Green Investment Policy[14]

Objective: Green investment will be used to reduce the risk of climate vulnerability so that autonomous and planned adaptation will materialize.

Policy Proposal and Measures:

(1) Investment in the infrastructure of water management to balance the demand and supply of surface and ground water in order to manage fluctuations in precipitation quantity, timing and durability.

[14] Green investment implies investment in infrastructure, human resources, processes of production and consumption etc., to reduce the risk of climate vulnerability.

(2) Investment in infrastructure to reduce the impact of disasters caused by climate vulnerability. The measures to be taken comprise planned adaptation in the river tributaries according to risk profiles. The people in hot-spot areas would act as the main partners in disaster monitoring. Government-led investment in new towns would respond to the need to adapt to climate change. Areas with different risk profiles will be monitored differently.

(3) Green investment in adaptation towards a low carbon economy should be consistent with the 'Sufficiency Economy' philosophy. Greater awareness is needed as a first priority among rural households concerning production and consumption patterns. Investment in 'knowledge infrastructure' for all stakeholders is a priority, especially rural households in the agriculture sector. Investment in the Health sector to prepare for the risk of a revival of epidemic illnesses and any new epidemic health hazard will also be required.

<u>Strategy 3:</u> GHG Mitigation Policy towards a Low Carbon Society in 2050 through a Green Investment Policy

Objective: Thailand will be an economy growing under the path of a Low Carbon Society in 2050 with sustainable economic growth rates.

Emission Boundary: GHG emission reduction such that global concentration will result in a global temperature increase of not more than 2 degree Celsius compared with the pre-industrialization era.

Policy Proposal and Measures:

(1) Appropriate mitigation actions in the agricultural sector: measures should be taken to reduce methane from paddy production and livestock production; and changing farmers' behavior towards farming patterns and the selection of new seed varieties that can resist drought and floods.

(2) Appropriate mitigation actions in the manufacturing and transportation sectors to reduce the energy intensity (and carbon intensity) using best available technologies. Measures would include restructuring of energy efficiency associated with production and consumption by investing in machinery and equipment by the private sector. Energy efficiency may also be improved by including the recycling of waste heat from production processes. The cost of technology may be financed by financial instruments such as those in the Energy Conservation Fund under the Ministry of Energy. These financial instruments can help increase energy efficiency and reduce carbon intensity. Tax and monetary instruments can be used to raise the usage of alternative energy to substitute for fossil fuels. However, it will be necessary to liberalize the distortion of energy prices to raise energy efficiency and reduce carbon intensity. In electricity production, measures to regulate the grid emission of GHGs through the proper structure of feed-in-tariffs should be considered by the Electricity Regulation Commission. The regulation of the electricity generation industry will need to include a revision of the electricity tariff structure. Not only is 'de-carbonization' in the power production sector necessary but also measures to reduce pollution from energy usage.

Mitigation measures that rely on the Clean Development Mechanism (CDM) can be modified during the post-Kyoto period as well. A market for domestic Voluntary Emission Reductions needs to be initiated by the Thailand Green House Gas Management Organization (TGO).

Mitigation actions should also involve the introduction of second generation bio-fuels from cellulose. Here measures to support research and commercialization of algae for bio-diesel should be a priority to help solve conflicts between food and energy usage of oil palm. Measures to institutionalize the process of implementing a national Registry, a NAMA, and domestic Monitoring, Reporting and Verification (MRV), are also required to comply with the international Post Kyoto commitments.

Strategy 4: GHG Mitigation towards a Low Carbon Society in 2050 through Green Investment in Forest Conservation and an increase in the forest area under REDD+

Objective: Thailand can move along the path of a Low Carbon Society by increasing the coverage of its forest area.

Target: Protective forest will provide a permanent GHG sink, whilst productive forests will be the source of wood supply. Forest coverage would be set at 40 and 50 % of the national land area by 2050 and 2100 respectively.

Policy Proposal and Measures:

(1) Measures will include empowering communities to take a leading role in securing forest conservation and an increase in the forest area. Furthermore, measures to review the legality of forestry in terms of ownership, transportation of wood products, processing and usage need to be carried out. Human capital investment in government agencies, forest community investment in infrastructure that is compatible to the green concept and conservation, awareness of people who are living near the national conservation area of forest would need to be raised.

Strategy 5: Capacity building and Human Capital Investment, Organizational Arrangement and Set up

Objective: To raise awareness among government officers and the general public towards the risk of climate change and to adapt to its impacts. This will be secured by changing human behaviour towards production and consumption, as well as proper risk management of extreme events.

Target: Reduce disaster loss of lives and assets by climate change in hot-spot areas covering the whole kingdom, both rural and urban area, and in all classes of society.

Policy Proposal and Measures:

(1) Capacity building of disaster warning volunteers and investment in the infrastructure of a warning system among the communities is needed. This is the connection between communities in hot-spot areas and local and regional officers.

(2) It is necessary to set policy to build up the 'knowledge infrastructure' by further green investment in the government bureaus both at the central, regional and local government level. The Office of Natural Resources and Environment Policy and Planning, Ministry of Natural Resources and Environment, which acts as the secretariat office of the National Climate Change Committee should be equipped with sufficient manpower and a budget to oversee the overall management of the Climate Change Policy. The office can act as the

national focal point for adaptation policy, while the focal point for mitigation policy could be delegated to the Thailand Greenhouse Gas Management Organization in the same Ministry. The international negotiation capacity for climate change requires investment in the Ministry of Natural Resource and Environment.

(3) Investment in 'knowledge infrastructure' to raise capacity building and institutionalization of implementation agencies.

2.6 Proposed Work Plans and Investment Projects for Mitigation and Adaptation Actions

These five strategies summarize the planned mitigation and adaptation actions towards a LCS growth path (Table 3, below). This path is consistent with a sustainable economic growth target. The projects initiated in the Master Plan are initial proposals that can be modified as appropriate to the level of GHG emissions and vulnerability in Thailand.

The values of investment in monetary terms may be determined from a top-down approach, applying the scale of severity reflected in the 'Social Cost of Carbon'[15]. In 2005, the marginal abatement cost of carbon mitigation (MAC) is equivalent to 250 baht per ton in current prices, or eight US dollars.[16] It is much lower than the social cost of carbon (SCC) if a longer time horizon is assumed. For example, a dynamic Social Welfare optimization calculated by the PAGE model in the case of Thailand 2010-2100, has found that the social cost of carbon is equivalent to 95 US dollars at PPP constant price of 2005. That is to say, if nothing is done to lessen GHG emissions, the price of carbon mitigation will rise from a social welfare aspect.

In 2005, the TGO reported that carbon emissions were 375 million tons of CO_2 equivalent. If the marginal abatement cost of carbon is used as the benchmark, Thailand may theoretically have to spend 93,750 million baht to mitigate GHG emissions. Of course, if SCC were applied the cost of GHG emissions would be much higher. In the Master Plan, the time horizon is 2010-2050[17]. Thus, the social cost of mitigation to reduce GHG emission overtime will be approximately 95 USD at the constant price of dollar in 2005. The investment cost of the work plans and investment projects on mitigation, adaptation, technology development as well as capacity building etc., will be the summation of the cost of carbon emission reduction plus the cost of adaptation, technology investment and capacity building together. This will need further study to identify the overall cost of investment.

Table 3: planned mitigation and adaptation actions towards a LCS growth path

Strategies	Measures	Work Plans
Strategy 1: Economic Restructure towards a Low Carbon Society	8	23
Strategy 2: Adaptation to the climate change with Green Investment Policy	9	43

[15] See the Master Plan and the NESD 'economics of climate change' report.

[16] Calculated from the Clean Development Project, see economics of climate change supporting report in this Master Plan.

[17] As Thailand will not reach the 'Peaking year' before 2050 in our study.

Strategies	Measures	Work Plans
Strategy 3: GHG Mitigation Policy towards a Low Carbon Society in 2050 through Green Investment Policy	19	56
Strategy 4: GHG Mitigation towards a Low Carbon Society in 2050 through Green Investment in Forest Conservation and increase the Forest coverage area under REDD+	4	14
Strategy 5: Capacity building and Human Capital Investment, Organizational Arrangement and Set up.	5	21
Total	45	157

Sector planning

The NESDB has proposed a sector approach, with a number of proposed flagship measures and projects that can be launched immediately after the Master Plan is approved. The indicative estimates of project costs provide an example of how 'green investment' can be implemented.

Flagship projects/ Flagship Measures Proposed in the Master Plan

1) Flagship Measures

Table 4: Flagship measures, activities and estimated budget and timeframe

Flagship Measures	Activities	Estimated Budget and Time Frame
(1) Removal of fuel price distortion on LPG and Diesel and substituted by other means	(1) Rationalization of LGP price distortion by general scheme of subsidy reduction within two years. (2) Rationalization of Diesel subsidy in ½ year (3) Subsidizing registered poor households who are eligible and affected by universal abolishment of price distortion on LPG through electricity tariff scheme for the poor. (4) Increase the plantation of energy crops for biodiesel and ethanol using second generation bio-fuel technology. Promotion of efficiency in electrical appliances.	Applying only from annual budget and does not need additional budget. The provision of second generation bio-fuels is flagship project number (3) below.

Flagship Measures	Activities	Estimated Budget and Time Frame
(2) Initiation of the Carbon Tax system	(1) Full scale expansion of Life Cycle Analysis concerning with the Carbon Foot Print [18] (2) Promulgation of a carbon tax based on this foot print (3) Provision for those who voluntarily reduce or donate funds for emission reductions in the Voluntary Emission Market to be initiated by the TGO	Does not require additional budgetary resources

Flagship measure (1) proposes the rationalization of the structure of energy prices. At present, energy taxes – especially taxes on gasoline and gas – are designed to meet the revenue requirements of the government. A planned oil fund will try to stabilize gasoline and gas prices faced by domestic consumers, by collecting taxes on gasoline when the world price of oil is low and then subsidizing the gap between domestic and international prices when the latter prices are high. The domestic price of LPG is heavily subsidized at present and this distortion needs to be rationalized to induce efficient usage. This will help to reduce both energy and carbon intensity.

Flagship measure (2) on the initiation of a carbon tax system' represents a considerable challenge. The NESDB master plan has estimated Green Investment funding needs, for example in the manufacturing and service industries. The GHG reduction achieved by introducing green investment requires both a public budget and private funding system. A carbon tax could be applied as a punitive measure according to carbon intensity activities. Equally, it can be designed as a subsidy. In a carbon tax regime, the cost of voluntary emission reductions could be deductible from the taxable income of corporate and any legal entities.

A carbon tax is not designed for the sake of revenue seeking. However, the efficiency of low carbon production and consumption (through increasing the carbon footprint label on consumer products) will theoretically induce a higher revenue base for green investment. It should be noted here that before the implementation of a carbon tax system, it will be necessary to put in place a transparent base-line carbon emission of taxable activity. After this base-line data is constructed, cost-benefit analyses will also be necessary. The FPO will then have to decide which taxable activities are liable to the carbon tax and what rates to apply, before seeking approval from the National Climate Change Committee.

The FPO could manage the consolidation of both the revenue and disbursement sides of any climate funds. On the revenue side, taxation allocation for climate finance is potentially a major source of revenue on top of other revenue that may be raised from international funds. On the expenditure side, consolidation of accounts by relevant non-budgetary funds such as the Energy Conservation and Development Fund managed under the Ministry of Energy, and the Environmental Fund managed under the Ministry of Natural Resources and Environment, will need to be monitored by the Ministry of Finance. The consolidation of source and disbursement will then need to be reported

[18] Carbon emission unit see Stern (2007)and IPCC (2007); Marginal Abatement Cost see McKinsey & Company (2007); National Inventories (2553) by Office of Natural Resource and Environmental Policy and Planning; and Thailand Greenhouse Gas Management Organization on Carbon Foot Print studies.

to the National Climate Change Committee annually to ensure that climate finance is consistent with national climate change policy.

2) Flagship Projects

Table 5: Flagship projects

Flagship Projects	Investment Activities	Estimated Budget and Time Frame
(1) Initiation of the Market for Waste Collection, Treatment and 3Rs (Reduce, Reuse and Recycle)	(1) Networking for schools, hospitals, and public institutions to collect, as well as campaign on the 3Rs (Reduce, Reuse and Recycle) (2) Promote the role of the private sector in the Waste Market through the Environmental Fund (3) Campaign the 3 R activities for households (4) Reformulate the incentive for industrial waste market (5) Promote the R&D business on waste management and sciences	*The estimated budget is 42,000 million baht for 10 years.* A first Phase of 2 years for drafting of the waste market formulation plan and promulgation of related laws and regulations. A Second Phase of 5 years for establishing the network and market transaction system of waste through fiscal and monetary incentives Third 3-year Phase for evaluation and drafting of further promotion plans.
(2) Investment in Human Capital	(1) Networking of students and teenagers (2) Training programme for young farmers and labourers as well as labour union (3) Training for engineers and shop stewards in the factories (4) Training for SME entrepreneurs (5) Training new generation of bureaucrats	Applies from the annual budget and does not need additional budget.
(3) Water Infrastructure Development Project under the Joint Public-Private Water Demand-Supply Management System	(1) Identify Hot Spots of droughts, flooding, and vulnerable areas (2) Infrastructure construction to manage water demand and usage, with conservation target of 1.5-2 years of stock in all 25 tributaries of the whole kingdom with the participation of rural households in the hot sports area. Rural communities will be set as decision making units to respond to climate vulnerability in time of disasters brought about by climate vulnerability.	*The estimated budget is 97,034 million baht for the project period of 25 years.* First phase 5 years (2011-2015) project site identification, preparation. Second phase 10 year (2015-2025) construction. Third phase 10 years (2525-35) management system in place with monitoring.

Flagship Projects	Investment Activities	Estimated Budget and Time Frame
(4) Construction of pilot Eco Town/ Green City to reduce GHG emissions	(1) Identify representative cities from five regions for the pilot project with the consent of Local Administrative Authorities (2) City planning with the consent of people and community for green areas (3) Infrastructure of mass transit in the city and campaign for a car free zone in the inner city to reduce GHG emission (4) Campaign for GHG emission reduction in household and business area (5) Campaign to use more bicycles (6) Infrastructure development for solar roofs in building and housing estate including tourist spots (7) Implementation of the Pilot Eco Town/Green City	*The estimated budget is 9,000 million baht for the project during 20 years.* First Phase Identification and planning. Second Phase Construction and Monitoring and Evaluation.
(5) Crops Varieties Genetic Research and Development Project with special reference to the water stress resistance to the climate vulnerability	(1) Research on risk analysis of bio-diversity impact of Climate Change (2) Research and Development on the genetic selection for crop varieties that can sustain water stress (3) Research and development (4) Construction of data-base for important crop varieties (5) Implementation of crop varieties in field experiments	*The estimated budget is 20,000 million baht for the project period of 10 years.* First laboratory phase 5 years (2011-2015) Second phase 10 years (2015-2025) of field experiments and diffusion implementation.
(6) Industrial energy efficiency: restructure of energy intensity (and Carbon intensity) in industrial production and transportation services	(1) Energy usage efficiency build-up by changing equipment and parts (2) Clean technology development and installation.	*The estimated budget is 8,000 million baht for the project period of 30 years*. First phase 10 years (2011-2021) energy efficiency improvement with existing technology and structure. Second phase 10 years (2021-2031) applying new technology. Third phase 10 year (2031-2041) investment in low carbon intensity technology and fully change transport mode.

Flagship Projects	Investment Activities	Estimated Budget and Time Frame
7) Production of Alternative Energy from Plants and Second Generation Bio-Fuels from Cellulose; Carbon Capture Storage.	(1) Investment in R&D and/or acquisition of second generation bio-fuels (2) Alternative energy production (Ethanol, Bio-diesel) from plant residues (3) Joint research implementation between implementing agency and university/ government research Institutes and private sector in 'Carbon Capture and Storage' (4) Supporting a study project on algae for energy by joint public-private coordination.	*The estimated budget is 30,000 million baht for the project period of 20 years.* First phase of 10 years (2011-2021) R&D, acquisition from technology market. Second phase of 10 years (2021-2031) diffusion of technology.
(8) Investment in reforestation and increase in forest areas. Forest area to be 50 % of total land area by 2083	(1) Classification of forest areas and land-use such that national conservation forest can be clearly identified as protective forest from productive forest within public lands (2) Investment programme and projects with public participation in decision-making processes to increase conservation forest area (3) Recovery of natural forest area by local people participating with government agency (4) Revision of forest control act and promulgations (5) Plantation of trees to restore forest area with rural household to Increase co-benefit from environmental system restoration (6) Seeking cooperation from international organizations in technology transfer and funding.	*The estimated budget is 76,000 million baht for the project period of 40 years* First phase of 20 years 2011-2030 (increase forest area by 0.5 % per year[19]). Second phase of 10 years (2030-2040) increase forest area by 0.5 % per year. Third phase of 10 years (2040-2050) increase forest area by 0.5 % per year.
(9) Coastal Area Conservation Project	Infrastructure investment along the coastline to preserve marine life by Mangrove plantation and rehabilitation of coral and marine life	*The estimated budget is 2,000 million baht for the project during 20 years*. First Phase of 10 years Mangrove plantation Second Phase of 10 years (2020-2030) rehabilitation of marine life and Coral.

[19]If forest area increases 1% per year (net) from 106 million rai in 2000 (33% of total national land), forest area will be 129 million rai or equivalent to 40% of total land area by 2020. If that is the case, gross forest area has to grow over 1% per year since there is still forest encroachment for cash crops during the period. Thus, the assumption of the net forest area would increase by not more than 0.5% per year is conservative and considered feasible by the master plan study.

Flagship Projects	Investment Activities	Estimated Budget and Time Frame
(10) Set up The Office of the National Climate Change Management and Negotiation within the current Office of Natural Resource and Environmental Policy and Planning, Ministry of Natural Resource and Environment	(1) Capacity building of the current secretariat office on the Climate Change by Increasing human resources on climate science in the Office and defining clear job descriptions for the officers to be in line with task as the national focal point (2) Raise the 'Office' to be a public organization under the ministry similar to the TGO with annual budget and human resources provision and planning as national focal point of the climate change (3) Act as a National focal point for the UNFCCC to prepare the National Inventories and National Communications and being national coordination point on Adaptation with line agencies (4) Formulate the national plan on Adaptation, Mitigation with TGO, Technology Transfer with STI Ministry of Science and Technology, and Financial Assistance and Budgetary Aspects with Ministry of Finance (5) Prepare the National position on the International Negotiation and agreements.	*The estimated budget is 100 million baht per year.* For the initial set-up phase, the office would need 50 million baht for a set-up fund. Total manpower needs will be not more than 40 personnel. The structure of organization and management as well as promulgation procedure can follow the process of TGO set-up.

These flagship projects are those prioritized in the NESDB master plan. They cover adaptation, mitigation, capacity building and technology transfer activities. The flagships can be seen as an immediate response by the Thai government to the impact of climate change. The proposed investments are intended to reduce the risk of disaster caused by increased climate variability. This can be seen in projects on water supply management (3), coastal area conservation (9), and water stress resistant crops varieties (5) respectively. Actions to mitigate greenhouse gas emissions in the energy supply and usage sectors like industry and transportation (6), as well as maximising the carbon sink of forestry activities (8) are listed. Also prioritized is increasing the awareness of the Thai people, and the introduction of technology appropriate for both mitigation and adaptation actions. It is proposed to establish a 'low carbon city' (4) and waste market (1) concept that deal mostly with issues associated with urbanization and climate change in Thailand in the coming decades. Equally important, are the planned investments in human capital that are also proposed (1) in the master plan, along with the setting up of climate change policy management and coordination office for ONEP (10).

2.7 The role of the private sector in mitigation actions

GHG emission reductions are undertaken by private companies, most of whom are national Thai companies (although there are some joint companies with international developers). The driving force of this interest from the private sector comes from two government policies. The first is the 'adder' price for electricity generation from biomass, bio-gas, solar and wind. The second is the expected CERs produced by CDM projects under the Kyoto Protocol framework. The demand for CERs by Annex I countries of the UNFCCC has induced supply in non-Annex I countries, including

Thailand, where the private sector has been active for some time in the carbon market. However, the private sector in Thailand has been cautious on CERs trading. They have perceived that carbon trading may be used as a trade barrier. This general perception is changing, especially among industries such as cement, petrochemical, waste management, ethanol and bio-diesel producers who would like to invest in electricity generation while producing CERs as well. This is not to mention the recent private investment in solar energy. This has been induced by the alternative energy policy plan of the Ministry of Energy, which set a high target for electricity generation by non-fossil sources. It can be said that the private sector in Thailand has responded to the energy policy quite effectively.

By the end of February 2012, there were 168 projects that had been given the 'Letter of Approval' (LOA) as CDM projects. These projects can potentially produce CERs of 10 $MtCO_2$ e/year, with 58% from bio-gas; 23% from biomass and 19% from some others sources such as solar PV and heat, hot air, composting from waste, and wind turbines. However, only 67 of these projects have been registered with the Executive Board of the CDM and only 12 are currently certified for their issuance of 1.15 $MtCO_2$ e CERs. This amount is very small when compared with the total CERs issued in the world of 896 $MtCO_2$e. Recently, 273 applicants from the private sector have expressed their intention to apply for LOAs, of which 63 projects are for solar PV.

Private sector clean energy investment levels

Estimating the size of private sector investment for climate change related actions is beyond the scope of the CPEIR study, although an estimate of the scale of such investment would provide a useful comparison with the level of public expenditure. One international source that has monitored relevant private sector investment is the UNEP Sustainable Energy Finance Initiative (SEFI), which together with commercial data provider Bloomberg New Energy Finance, prepares a yearly report on global trends in sustainable energy investments made by the private sector[20]. Table 6 lists the recorded level of investments in Thailand together with the CPEIR estimate of the national public climate budget. As can be seen, there was substantial growth in the level of clean energy investments between 2009 and 2010 (reflecting strong investment in large-scale photovoltaic projects), with a slightly reduced level of investment in 2011.

Table 6: Climate public expenditure and private investment on clean energy, 2009-2011

Year	Public Expenditure on climate change (Million Baht)	Private investment on clean energy (Million Baht)
2009	53,414	9,000
2010	44,855	21,000
2011	59,065	18,000

It is important to emphasise that this analysis is incomplete, as the private investment is limited to the clean energy sector. However, it does show that private sector engagement with climate change business opportunities is increasing in response to government policy (e.g. Thailand's Strategic Plan

[20] SEFI came to an end in 2010. The annual investment reports continue to be produced by UNEP, Bloomberg NEF and the Frankfurt School of Finance and Management

for Renewable Energy Development which calls for 20% of total final energy consumption to be supplied by 2020 from renewable sources).

Looking ahead

The role of the private sector in climate change activity can be observed from their realization that public awareness of the carbon intensity of consumer's products at home and abroad is increasing. As a result, Thai companies have applied for a 'carbon footprint' label from the TGO-led committee. This label will certify that products have low GHG emissions throughout the life cycle process. In this manner, we can say that the private sector in Thailand has positively responded to the climate change policy on mitigation.

In the Post Kyoto era after 2012, the role of the private sector in mitigation actions is expected to increase further. This is because after several rounds of negotiations under the UNFCCC it has been agreed that the Post Kyoto period will see a visible contribution to reduce carbon emissions from all the Parties. For a non-Annex I country like Thailand this will require capacity building to establish a Nationally Appropriate Mitigation Action programme under a 'Monitoring-Reporting-Verification system that has international recognition. A transparent database on carbon emissions and related parameters has to be put in place before a national Registry can be established. Under the international negotiation process if these necessary conditions are prepared, technology transfer and other international funding flows may be strengthened.

Thailand's private sector is very cost aware in terms of its operations. The private sector first considered climate change as a global issue and yet it was having more and more impact on its business in terms of acting as a trade barrier (this was confirmed in discussion with the Chamber of Commerce during the CPEIR). However, the private sector has now realized the benefits of compliance with mitigation actions as it offers the prospect of trade penetration to developed countries. Although the international trade negotiations have never allowed the climate change issue to become a barrier to trade, it is still implicit in the movement of consumerism in developed economies. Thus, compliance with climate mitigation actions under a NAMA is a cost-benefit consideration for the private sector. The key to green investment is how technology transfer can best be optimized in support of actual commercial activities. The direction of the Post Kyoto debate on mitigation led by TGO has certainly had an impact on the private sector's actions.

2.8 International policy aspects

The need for climate finance in Thailand will put considerable pressure on development finance, effectively constraining development infrastructure. Some climate change adaptation measures match development needs but most adaptation investments are needed to combat the risk of losses and damages owing to increasing climate variability. The demand and supply of climate finance may give rise to a gap that cannot be filled by the domestic public budget and private financial market alone. Additional sources may have to be found, including coming from international funding (Table 7).

Table 7: International climate funds – support for Thailand

Name of Fund	Thematic Focus	Objective of Fund	Eligibility requirements	Support for Thailand
Adaptation Fund	Adaptation	To finance concrete adaptation projects and programs in developing countries that are Parties to the Kyoto Protocol.	Developing countries particularly vulnerable to the adverse effects of climate change. At the 13th meeting of the Adaptation Trust Fund Board, the Board approved a cap of USD 10 million for each country funded for support by the Adaptation Fund.	None to-date
Clean Technology Fund	Mitigation	The CTF aims to support the rapid deployment of low-carbon technologies on a significant scale, with the objective of cost-effective reductions in the growth of greenhouse gas emissions.	Country access is based on: (a) ODA-eligibility (according to OECD/DAC guidelines); (b) an active multilateral development bank (MDB) country programme.	A national investment plan was endorsed in 2009 for USD 300 million.
Forest Carbon Partnership Facility	Mitigation – REDD	To assist developing countries in their efforts to reduce emissions from deforestation and forest degradation (REDD).	All borrowing member countries of the IBRD or IDA that are located in subtropical or tropical areas are eligible. However, priority is given to countries with substantial forest areas and forest carbon stocks and to those that have forests that are important for the livelihoods of forest dwellers and indigenous peoples.	Thailand prepared a Readiness Plan Idea Note (R-PIN) in 2009. A Grant Agreement for USD 0.2 million was signed in 2011.
GEF Trust Fund – Climate Change focal area GEF-5	Mitigation	To help developing countries and economies in transition to contribute to the overall objective of the United Nations Framework Convention on Climate Change (UNFCCC).	GEF funding is in accordance with the following eligibility criteria: (a) GEF grants are made available within the framework of the financial mechanisms of the UNFCCC and should be in conformity with the eligibility criteria decided by the Conference of the Parties. (b) A country is an eligible recipient of GEF grants if it is	Under GEF-4, between 2008-2010, four Thai projects received funding of USD 11 million.

			eligible to borrow from the World Bank or if it is an eligible recipient of UNDP technical assistance through its country Indicative Planning Figure (IPF).	
The International Climate Initiative of the German Government	All categories	The overall objective of the fund is to provide financial support to international projects supporting climate change mitigation, adaptation and biodiversity projects with climate relevance.	Focuses on a number of countries that have a high potential for emissions reduction. Innovative projects are also being supported in other selected countries and regions. Existing structures of development cooperation are used for the implementation of projects.	Six ICI projects have been implemented in Thailand since 2008, with a grant contribution of USD 13 million.
Japan's Fast Start Finance	All categories	To assist developing countries to address climate change.	Disbursement of funds is dependent on bilateral policy consultations with Japan.	One grant funded project for USD 8 million in 2010 (Forest Preservation Project)
Special Climate Change Fund	Adaptation and Technology Transfer	The overall objective of the fund is to implement long-term adaptation measures that increase the resilience of national development sectors to the impacts of climate change.	All Non-Annex 1 countries of the UNFCCC are eligible to apply.	One grant funded project for USD 0.9 million in 2009 (Strengthening the capacity of vulnerable coastal communities)

Source: Climate Funds Update website, accessed on 27 March 2012.

Early experience with the Clean Technology Fund

The Clean Technology Fund (CTF) is the largest international source of dedicated public funds that are available to assist Thailand finance its national response to climate change. It therefore warrants review to assess how the early experience with this source of new finance has added value to the country's domestic climate change actions.

The CTF country investment plan (CIP) was drafted in 2009 as a 'dynamic document, with the flexibility to consider changing circumstances and new opportunities'[21]. This approach has seen a major revision of the plan, which is now in its second iteration with a much reduced financing component (down from USD 300 million to USD 170 million). Three programs have been approved, with implementation through the International Finance Corporation (IFC) and the Asian Development Bank (ADB).

[21] Clean Technology Fund, Investment Plan for Thailand (2009) paragraph 2, page 4.

Table 8: Timeline of Thailand engagement with the CTF

Date	Action
May 2009	Government of Thailand requests access to CTF Funds
July 2009	Initial joint scoping mission by ADB, IBRD and IFC
December 2009	CTF Trust Fund Committee endorse the country investment plan for up to USD 300 million Plan consists of three elements: i. Clean energy advancement – public sector ii. Clean energy advancement – private sector iii. Urban transformation
June 2010	Thailand Renewable Energy Accelerator Program approved by CTF Trust Fund Committee for USD 40 million under element ii. of the CIP, to be implemented by the IFC
October 2010	Thailand Sustainable Energy Finance Program approved by CTF Trust Fund Committee for USD 30 million under element ii. of the CIP, to be implemented by the IFC
June 2011	Government of Thailand notifies its interest to reallocate funds within the CIP to shift resources from public sector projects to private sector investments
August 2011	Joint mission by ADB and IFC
November 2011	Cabinet of Government of Thailand approve revised CIP
March 2012	Revised CIP endorsed by CTF Trust Fund Committee
April 2012	Private sector renewable energy program submitted to the CTF Trust Fund Committee for USD 100 million, to be implemented by the ADB (yet to be approved)

The revised Country Investment Plan

A major revision of the CIP was carried out in 2011. The updated plan saw a significant shift away from public sector projects, which was explained by the Thai Government as being due to:

1. Public financing being available at historically low rates obviating the need for external concessional financing of public sector projects.
2. The long duration of 1 to 2 years needed to complete the review and approval procedures for sovereign borrowing by the Thai Parliament.

The financial implications of the revised CIP were described by the CIF Administrative Unit in January 2012 as: *'*The revised investment plan for Thailand proposes (1) not to pursue the development of the proposed public sector projects in clean energy and urban transformation with the World Bank totalling USD 230 million in CTF financing, (2) to reallocate USD 100 million of that funding to private sector projects in clean energy to be developed through the Asian Development Bank, and (3) to "temporarily relinquish" the remaining USD130 million.'[22]

Changes to the financing of the revised CIP

The revised CIP saw a number of significant changes to its indicative financing plan, in addition to the overall reduction in the proposed CTF funds. This reflects the shift away from public sector projects to private sector investments:

[22] Letter from CIF Administrative Unit, dated 26 January 2012

- The Government of Thailand co-financing element of USD 2,083 million was removed
- The IBRD loan element of USD 230 million was removed
- A new ADB loan provision of USD 360 million was introduced
- Additional private sector co-financing of USD 960 was identified (up from USD 400 million)
- The potential contribution of carbon finance was reduced from USD 367 million to USD 160 million.

Implementation speed of the CIP

The second factor cited by the government in revising the CIP was the slow implementation speed associated with constitutional constraints on approval procedures for sovereign borrowing by the Thai Parliament.

In addition, the speed of project implementation has been a concern of both the CTF Trust Fund Committee and the Thai Government. This is perhaps reflected in the timescale of the revised CIP, which states that: 'The updated CIP is focused on achievable success in the next two years (2012-2013)'. The intention to allocate the entire uncommitted CTF co-financing of USD 100 million through the ADB in April 2012 is in keeping with a focus on early implementation, although CTF Trust Fund Committee approval for this project appears not to have been made to-date[23].

However, even after CTF Trust Fund Committee approval finance does not become immediately available for project activity, as much depends on the implementing MDBs internal procedures and their having a pipeline of fundable projects. This can be seen in the implementation experience with the two earlier approved IFC programs under the initial CIP. As of August 2011, out of the available USD 70 million approved for IFC implementation, a total of USD 4 million had been approved by the IFC's Board for the Renewable Energy Accelerator program for two utility scale solar projects. All other investments under both IFC programs remain in the project pipeline stage.

Lessons learned

A major challenge is the urgency of the response to climate change. This is one justification given for the support provided by the international community to developing countries. The experience of the CTF in Thailand suggests that despite the early expectation of significant new and additional funding becoming available through such channels implementation experience has shown otherwise. In addition, rather than being seen in isolation such finance may become significant only when it contributes to a broader pool of funding. The management of such financial arrangements is necessarily demanding and inevitably slows down implementation.

The terms on which international finance is available is also an important consideration, as has been found with the CTF concessional financing. Faster implementation may have been possible if grant finance had been available. New funding opportunities also bring with them structures that introduce an additional dynamic in the governance of such funds, as the interaction with the CTF Trust Fund Committee members has demonstrated. Finally, finance – by itself – may not be sufficient to secure an early, effective response to climate change. As projects tackle issues increasingly 'at scale' a lack of technical skills to identify and manage such project investments becomes a significant barrier.

[23] Letter from UK CTF Trust Fund Committee member, dated 11 May 2012

2.9 Conclusions

This climate change policy analysis has drawn on two national master plans. The first is the Thailand Climate Change Master Plan under preparation by ONEP (and now close to completion). The second, the Master Plan on Climate Change for Thailand: energy prices and food security, was prepared by the NESDB. These two reports are consistent with one another and can be used as policy guidance for the NCCC. In short, the proposal of policy, strategies, measures, and projects are in accordance with the mandate of the NCCC on adaptation, mitigation, capacity building and technology transfer. These expressions of national policy on climate change are also increasingly recognised within the national development planning process.

The climate change policy in Thailand is well defined in accordance with the UNFCCC goal to keep the world's temperature rise under the 2 degrees Celsius threshold. This reflects a strong engagement with the international policy discourse, which will continue to be a major policy driver for national climate change actions. The proposed long-term economic growth and development path will set a direction for growth towards a low carbon society. Under this growth strategy the economy will grow, consistent with low levels of carbon emissions of not more than ten tons of CO_2e per head by 2050. The Thai economy is expected to grow in terms of gross output at a rate of 5.3% per year on average until 2050 (at constant prices).

The climate change policy in Thailand can therefore move forward with adequate funding. However, the climate change policy in Thailand has not been comprehensively addressed in the national budgetary process to-date, nor through extra-budgetary funds. Climate change-related public finance needs to be well planned within these processes to cope with the recurring risk of damages by climate variability. While most of the mitigation actions are market orientated in nature, suggesting a leading role to be played by the private sector, some mitigation activities such as maintaining a carbon sink through forest protection require considerable public funding. Responding to the need to adapt to a changing climate will be a significant component of government's development spending for years to come.

3 INSTITUTIONAL ANALYSIS

3.1 Institutional Setting for Mitigation Action and Climate Finance in Thailand

In Thailand, mitigation measures are being implemented mainly through market mechanisms. The Thai government has established the Thailand Greenhouse Gas Management Organization (TGO), which acts as Thailand's Designated National Authority for the Clean Development Mechanism (CDM), granting Letters of Approval (LoA) to proposed GHG mitigation projects. Certified Emission Reductions under the CDM, if approved by the Executive Board of the CDM, are tradable on the Carbon Market.

Major players in mitigation actions are private sector companies involved in cement manufacture, electricity generation, agricultural production and food producers, transportation, and waste management. Most projects involve biogas and biomass production, while solar and wind projects are increasing. The incentive for project initiation comes from two foreseeable benefits: (i) the selling of electricity generated at the buying price plus any 'adder' or 'feed-in tariff' announced by the Electricity Regulator Commission (ERC), and (ii) the income from selling CERs on the carbon market if the project is approved by the CDM's Executive Board.

Mitigation activities may not need much public climate finance directly from the national budget as they are dominated by private actors responding to market opportunities for mitigation. However, mitigation activities can be expanded by tapping into non-budgetary sources such as the Energy Conservation Promotion Fund. The Ministry of Finance has also considered an environment tax on waste and residuals from industrial production processes. However, it is not yet clear whether the proposed tax scheme will cover GHG mitigation[24].

Government bureaus have to rely on the government budget to fund climate change-related activities. For example, there is a joint committee on 'Collaboration in Applying Science and Technology for Alternative Energy Development' co-chaired by the Permanent Secretary General, Ministry of Science and Energy. The committee is made up of all concerned departments and ministries, who propose projects on alternative energy, applying science and technology as the main impetus. The committee has tried to avoid duplication of budget proposals between departments and is able to explain the rationale of the budget proposal to the Budget Bureau through the normal channel of budget requests. The committee has achieved significant success in securing allocations from the Budget Bureau in 2011. This is the single example of collaboration among government departments on climate finance budget requests in Thailand.

Mitigation actions will not need the same level of government intervention as for adaptation activities, as these will be supported mostly through the carbon market mechanism, such as CDM projects (mandatory under the Kyoto Protocol ending 2012), and the initiation of VER (Voluntary Emission Reduction) as a Post Kyoto carbon reduction scheme in Thailand under the TGO's initiation. If the TGO proposes to establish a national Carbon Market or an Emission Trading Scheme or 'Cap-and-Trade' at sector level it will require securing the National Climate Change Committee's (NCCC) permission, and the infrastructure on GHG inventory, NAMA, Registry, MRV, and a domestic Transaction System will need to be put in place.

[24] The proposed law was not approved by Cabinet and is being revised by the FPO at present (May 2012).

In terms of climate finance development, the need for additional funding can be seen from the attempt to establish a 'Thailand Carbon Fund' by the TGO. The TGO first expressed its intention to replicate the structure and transaction activity of a 'Mutual Fund Company' of Thailand as a starting point of the Carbon Fund[25]. The Ministry of Finance is also considering the provision of tax privilege on net income receipts and value-added proceeds of carbon transactions[26] (if the ETS or Carbon Market materialize). The Bank of Thailand has informed the TGO[27] that a financial institution can invest in a Thailand Carbon Fund with the compliance of the SET regulation on investment. In addition, financial institutions can accept carbon transaction agreements as collateral for bank loans. However, the Bank of Thailand does not allow financial institutions to deduct carbon credit transaction loan payments from the overall debt obligation in the provisional reserve.

The Ministry of Finance has also approved the Export and Import Bank and the Bank for Agriculture and Agricultural Cooperatives to give bank credits for CDM project development. The TGO's initiative on the Carbon Fund for mitigation has been supported strongly by the MoF, SET and BoT. This will benefit the private sector in Thailand, whether they are large or small enterprises. The collaboration between domestic and foreign carbon developers can also be promoted through these schemes.

3.2 Institutional Setting for Adaptation Action and Climate Finance in Thailand

Thailand has assigned the Office of Natural Resources and Environment Policy and Planning (ONEP) to act as the national focal point to coordinate government agencies, private entities, non-governmental organizations, and academia in developing a coherent adaptation strategy, as well as to function as the Secretariat to the NCCC, chaired by the Prime Minister. Two sub-committees, namely the Academic Sub-Committee and the Negotiation Sub-Committee are the main bodies for which ONEP acts as Secretary, assisted by the TGO. In this respect, ONEP is regarded as overseeing the national adaptation function, with the TGO overseeing mitigation actions.

However, adaptation activities have no clear, distinct boundary with general economic and social development. Climate finance for adaptation is therefore not independent from development finance. In Thailand, ministries propose development budget requests through their routine line of command each fiscal year. However, at the national level budget items and codes are not designated for adaptation (nor mitigation, capacity building and technology transfer) by the Budget Bureau. There are only line items within the TGO budget request for mitigation actions, where the codes are set by the Budget Bureau and are promulgated as budget law every fiscal year. Hence there is a clear need for improved classification of climate budgets and expenditure on a functional, administrative and economic basis.

Extra-budgetary finance for adaptation to climate change is not visible either. The Energy Conservation Promotion Fund can be regarded as supporting only mitigation actions. The Environmental Fund, within the Ministry of Natural Resources and Environment may be regarded as being appropriate for adaptation actions. However, the legal status of this fund would have to be amended to cover adaptation activities. At present, there seems to be some discordance between

[25] Ministry of Finance has agreed with the Security Exchange Commission to use the structure of a Mutual Fund Company, as of May 3rd 2011. SEC has drafted regulation and set for hearing through its Website, 8-23 September 2011. SEC and TGO have additional hearing on 25th Oct. 2011. The draft text is expected to be completed by 2012.

[26] Royal Decree 21st Feb. 2011.

[27] 17th Mar. 2011.

the Ministry of Natural Resources and Environment and the Ministry of Finance over priority of authority in the management of the fund if this fund were to be reformed to become a larger climate change fund.

According to the Environment Promotion and Quality Preservation Act B.E. 2535, clauses 25(3) and 25(4), the Environmental Fund can offer loans and provide grants to address environmental problems. The Fund has twenty years of experience in supporting both national and local government agencies, state enterprises, private entities and non-profit organizations through a total of 246 projects at a cost of 12,908 million baht. In 2011, the Fund supported seven projects (336 million baht). A wide range of projects were supported, including the treatment of water and technology transfer in solid waste management (grant to local government), agricultural residue management for composting (grant to university), reforestation capacity building for communities and rehabilitation of water ecological system (grants to non-government agencies), waste water treatment and using biogas for 4.5 MW electricity generation (private sector loans). However, the Fund has no direct source of incoming revenue other than the government budget allocation. It does not have a mechanism to access private and public clients' budgets to share for environmental protection.

So, the question remains whether the Environmental Fund could be reformulated to serve the purpose of a Climate Fund. The Ministry of Finance and the Ministry of Natural Resource and Environment, both members of the National Climate Change Committee, would need to reformulate the Fund in accordance with the mandate set by NCCC. As the Prime Minister chairs both the National Environment Committee and the National Climate Change Committee, it may be possible to consolidate the activities and function of both committees. Most importantly, the roles of both MoF (on source of revenue) and BoB (on expenditure allocation) have to be strengthened as significant pillars in the NCCC. Unlike the 'Thailand Carbon Fund' which has its main players from the private sector, this 'Adaptation Fund Facility' proposed under the Environmental Fund would support mostly government agencies and state enterprises, local government, public institutes, and non-government entities like communities. This would require a large accounting system and would need central government funds to be directly channelled into adaptation activities. A clear line would have to be drawn between environmental activities and climate change activities and 'in-between' activities. The definitions and practices in this study could assist in setting forth such boundaries.

3.3 National Coordination Mechanisms for Climate Change

Thailand has established a number of institutional arrangements to address climate change at the national level. The apex of these institutional arrangements is the National Committee on Climate Change (NCCC), which was established in 2007[28]. The NCCC, which is chaired by the Prime Minister, is responsible for the formulation of national climate change policy as well as determining the national position towards the international negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). The committee also has the remit to monitor line ministries' implementation of climate change-related activities, including the allocation of climate budgets to line ministries. The NCCC has recommended setting up a Climate Change Coordination Office under ONEP, MoNRE, to act as the Secretariat of the NCCC.

[28] Declared by Prime Minister General Surayuth Juranond, June 4th, 2007.

In 2009, the number of committee members on the NCCC from relevant ministries was increased, together with their advisors[29]. The committee now consists of Permanent Secretaries General from 13 ministries, together with a representative member from the Bangkok Metropolitan Region and the National Economic and Social Development Board. The committee members are supported by a broad range of advisers on Law, Economics, Environment, Science and Technology, and Energy[30]. The Permanent Secretary General of the Ministry of Natural Resources and Environment acts as secretary to the committee, with the Directors General of ONEP and TGO acting as Assistant Secretaries. This institutional development has shown that Thailand has gradually recognized the importance of climate change policy, as well as the role of line agencies and private sector participation in the process of negotiation.

The NCCC has called several meetings to set Thailand's policy stance before the international negotiations during the last 2-3 years and so far, the outcome of the UNFCCC negotiations has not been in contradiction to national interests. However, the NCCC may need to strengthen its leadership role in the Post Kyoto era, as the international community moves beyond a reliance on CDM projects in support of mitigation actions.

The NCCC may also have to seek a solution on how to finance climate change actions. This may require a more active role by the Ministry of Finance to develop public finance instruments on top of the budgetary process by the Bureau of Budget. How tax instruments, such as a carbon tax, can be accommodated within the normal taxation system, and the role of to be played by non-budgetary instruments like the energy and environment funds, are issues that the NCCC will have to grapple with in the medium term.

3.4 Institutional profile of the main climate change-related government agencies

The main cross-cutting government organizations responsible for the national response to climate change comprise:

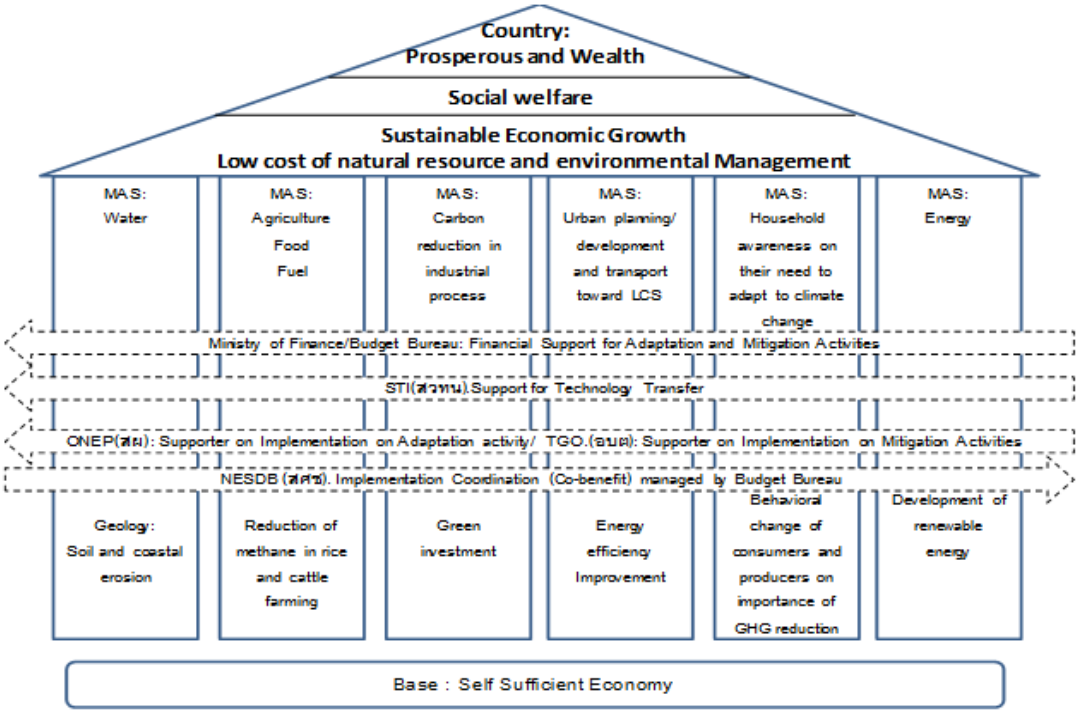
- The Office of Natural Resources and Environmental Policy and Planning (ONEP)
- The Office of the National Economic and Social Development Board (NESDB)
- The Thailand Greenhouse Gas Management Organization (TGO)
- The Ministry of Finance (MoF) - Fiscal Policy Office (FPO)
- The Prime Minister's Office (PMO) - Bureau of the Budget (BoB)
- The National Science Technology and Innovation Policy Office (STI)
- The Ministry of Foreign Affairs (MFA) – International Negotiation Unit

The relationships between these organizations are shown in Figure 2 below.

[29] Declared by Prime Minister Abhisit Vejashiva on September 27th 2009.

[30] Declared by Prime Minister Abhisit Vejashiva on March 7th 2011.

Figure 2: Relationships between government institutions



The Office of Natural Resources and Environmental Policy and Planning (ONEP)

The Office of Natural Resources and Environmental Policy and Planning (ONEP), under the Ministry of Natural Resources and Environment (MoNRE), is the core agency responsible for overseeing national climate change actions and activities, as well as international cooperation under the multilateral environmental agreements. ONEP serves as the national focal point agency to the UNFCCC.[31] ONEP also supports projects relating to climate change adaptation carried out by implementing government units. Examples of these projects include basic infrastructure relating to water storage, coastal erosion, sea defences, urban planning and low carbon building. The office also promotes action planning to tackle natural catastrophes such as floods and soil erosion.

According to the instruction of the NCCC that the ONEP should establish a Climate Change Coordinating Office, this is currently under promulgation and allocation of human resources. This Office will have to be strengthened to deliver effective performance on policy coordination, international negotiation, national strategy development, and economy-wide capacity building. On mitigation actions, the office can rely on the TGO with an extended role beyond CDM management. More importantly, ONEP needs to have enhanced capability to negotiate with the Bureau of Budget on behalf of the line ministries in line with the NCCC mandate. ONEP may have to work together with FPO, MOF to design a public finance system (including tax and subsidy, domestic and international funds) to develop a climate finance policy for Thailand. ONEP has an obligation also to pave Thailand's economic and social development path to optimize the 'Low Carbon Society' by working with the NESDB.

[31] ONEP also has the responsibilities for national planning related to natural resources and environment, as well as for reviewing environmental impact assessments of major projects and monitoring national environmental quality.

Office of the National Economic and Social Development Board (NESDB)

The Office of the National Economic and Social Development Board is responsible for drafting the national development plan and coordinating with ministries over its implementation. NESDB is therefore responsible for national development policy, which is now put at risk by climate change. NESDB has therefore integrated climate policy into its 11th economic and social development plan. The direction of economic growth is directed towards green growth, or a low carbon growth path that will allow Thailand to grow towards a 'Low Carbon Society'. The NEDB Master Plan on climate change cites food security and energy prices as major concerns. It has also set priority on policy measures and strategies on climate change. These measures can be seen from green investment projects to a revision of the economic structure towards a low carbon growth pathway. As a member of the NCCC the NESDB has to work out how the plan can be continuously financed through the budgetary process with assistance from MOF, ONEP and TGO.

Thailand Greenhouse Gas Management Organization (TGO)

The Thailand Greenhouse Gas Management Organization (TGO) was established in 2007 as an autonomous governmental organization under the Ministry of Natural Resources and Environment, with the specific purpose of acting as the national implementing agency for the reduction of greenhouse gas emissions. Since its establishment, the TGO has approved many CDM projects as Thailand's designated national authority for the Clean Development Mechanism. These CDM projects are mostly in the country's north-eastern provinces and have generated approximately 23,000 million baht in both the domestic private sector and foreign investment.

Under its GHG mitigation investment and marketing promotion policy, the TGO hosts events to provide opportunities for Thai CDM developers to meet Certified Emission Reduction (CER) buyers. This is intended to stimulate CDM project development in Thailand. The TGO also works on introducing GHG mitigation innovations, including a Carbon Labelling scheme, the first such initiative in ASEAN countries. Thailand has granted carbon labels to 25 manufacturers who have demonstrated reduced GHG emissions of their product manufacturing processes.

Although the Kyoto Protocol is ending in 2012, Thailand is committed to the Post-Kyoto international architecture as a non-annex I country. The TGO is embarking on the revision of some of its structures to respond to the Post-Kyoto environment, which will cover a wider area of climate change mitigation than just CDM projects approval under the Kyoto Protocol. The TGO is preparing to set the path for sector carbon reduction, through the development of a national Registry system, and procedures to develop a National Appropriate Mitigation Action plan. Here, the role of monitoring-reporting-verification (MRV) has to be transparent and acceptable to all Parties under the UNFCCC.

The TGO acts as assistant secretary to the NCCC for mitigation actions. Such actions rely primarily on the mechanism of the carbon market involving private developers in response to the demand and supply of CERs (certified emission reductions). The TGO has to work out with the FPO/MOF and the Board of Investment, Security Market, and Bank of Thailand, to consider establishing a Carbon Fund to support the domestic Voluntary Emission Reduction (VER) Market.

Ministry of Finance (MoF) and the Fiscal Policy Office (FPO)

Under the vision of being the 'Fiscal and Economic Pillar for Sustainable Development', the Ministry of Finance is responsible for the country's fiscal policies. This comprises both tax instruments and non-budgetary funding from both domestic and international sources. There are two extra-

budgetary funds in place that are relevant for climate change. The Energy Conservation Fund effectively reduces carbon intensity by lowering the energy intensity of supported actions. Another fund, the Environmental Fund, may be revised to expand its role to cover adaptation activities. However, these two examples need injection of annual budget resources for the sake of continuation of execution of policy by requested projects. Here, the role of FPO is to coordinate the financing of climate change policy. The Fiscal Policy Office is also responsible for determining the framework for the local government financial revenue share of the national tax revenue.

The FPO is currently designing an environment and climate taxation structure. However, up to the present, specific climate change tax instruments have not been imposed. It may be necessary to design a list of products with their carbon intensity for a climate excise tax system that adds on the current products list. In addition, it is necessary to consider how tax incentives and disincentives can be implemented through other means including through the deduction of taxable income for corporate bodies. The FPO may have to design carbon tax-subsidy measures to support the TGO's initiation of a carbon market on voluntary emission reduction (VER), an incentive measure to conserve the environment and natural resources, as well as the reduction of GHGs by corporate social responsibility. A key challenge at this time that the MoF has to consider is to design a climate finance infrastructure according to the NCCC mandate.

The Prime Minister's Office and the Bureau of Budget (BoB)

The Bureau of the Budget is a part of the government service, working within the office of the Prime Minister. This office is responsible for preparing the annual government statement of expenditure in order to present it to the Prime Minister and the Cabinet for approval and submission to parliament. For climate policy, the BoB is responsible for preparing the budget every five years for investment projects relating to climate mitigation and adaptation. In principle, climate finance under the national budget allocation must be in line with long-term investment plans. Unfortunately, up to present, there is not a formal design of budget codes and items for either climate finance going through the national or the local budgetary systems.

National Science Technology and Innovation Policy Office (STI)

The STI was established under the National Science Technology and Innovation Act, 2008. The Executive Board of the STI is chaired by the Minister of Science and Technology. It acts according to the policy mandate of the National Science Technology and Innovation Policy Committee (NSTIC), chaired by the Prime Minister of Thailand. The STI provides planning and support to government on science, technology and innovation, and is involved in policy formulation, coordination, and policy promotion. The office is committed to assisting the country in moving towards a knowledge-based economy in order to promote the country's capacity and strength. The Science Technology and Innovation strategic plan and policy recommendations provided to the government by the office are expected to improve the country's competitiveness and enhance socio-economic sustainability.

The STI works with industry, government, academia and local community sectors in undertaking its activities. Collaborative networking is an essential part of the office's role and is emphasized by the creation and promotion of active collaboration through strong linkages and exchange programs with local, overseas, and international organizations.

STI is responsible for climate change policy dialogue of the UNFCCC on technology transfer. For example, the STI was responsible for a study on 'Technology Assessment Needs'. This may act as the

basis for the scientific and engineering measures relating to technology transfer that may help mitigate GHGs such as Carbon Capture and Storage (CCS) and second and third generation Bio-fuels as well as other state-of-the-art technology.

Ministry of Foreign Affairs (MFA)

For climate policy, the Ministry of Foreign Affairs (MFA) hosts an international negotiation unit particularly for the UNFCCC. The MFA staff work as national negotiators in support of the Head of the National Negotiating Team as the MFA is responsible for any legal text in international negotiations. Normally, the head of delegation is the Minister of MoNRE, whilst the head of negotiating team is nominated by the NCCC.

3.5 The institutional linkage between national climate policy and implementation

In order to implement the national climate policy and its associated strategies, collaboration between the policy agencies documented in the previous section and a range of line ministries at all levels are necessary. The following represent some of the most relevant line ministries.

Ministry of Natural Resources and Environment (MoNRE)

- The Department of National Parks, Wildlife and Plant Conservation is responsible for coordinating with local communities to protect natural forests from felling, burning and natural fires. This activity prevents the release of carbon into the atmosphere by protecting the forest area, which is the country's main carbon sink.
- The Department of Marine and Coastal Resources is responsible for coordinating coastal communities towards conserving the mangrove forest and preventing coastal damage and coral reef bleaching.
- The Pollution Control Department (PCD) is responsible for setting standards for, and the control of, the amount of each type of toxic gas emission through continuous monitoring. A representative of the PCD sits on the standing sub-committee on mitigation and sustainability for CDM project approval.
- The Department of Environmental Quality Promotion takes the major role in campaigns to raise awareness on natural resource conservation, particularly forests and water, together with emission reduction issues. This is conducted through volunteer activities and other channels such as publications.
- The Royal Forest Department assumes a major role in the integrated management of forest resources, including carbon storage. The Department is working to the policy goal of achieving 40 percent national forest cover by 2050.
- The Department of Water Resources is responsible for developing irrigation and drainage systems.

Ministry of Agriculture and Cooperatives

The Ministry of Agriculture and Cooperatives (MoAC) plays a major role in developing and improving the efficiency of water irrigation and drainage systems with the cooperation of local communities.

- The MoAC is responsible for monitoring cultivation and the harvesting of food crops to safeguard food security. Under the increased risk of climate change, floods and droughts may strike during the planting and harvesting season. The MoAC therefore has to work closely with the Ministry of Science and Technology in weather forecasting as warning

systems for farming communities become increasingly important. The MoAC may initiate a crop insurance policy against crop loses by working closely with the Ministry of Commerce and the Ministry of Finance on this design of such climate-related instruments.

- The Royal Irrigation Department develops water storage systems, whereas the Land Development Department is responsible for the conservation and protection of the soil from erosion together with plant development and the re-habitation of livestock adaptable to climate change.

Ministry of Energy (MoE)

The Ministry of Energy (MoE) aims to secure energy supply for economic growth. In the short-run, it stabilizes energy prices to ensure the welfare of consumers and industrial competitiveness. As a net oil and gas importing country, Thailand's high energy intensity implies high carbon intensity. Efforts to address mitigation actions by the Ministry of Energy can be seen in the Alternative Energy Development Plan (AEDP) 2012-2021 and the Energy Conservation Plan (2011-2030). According to these plans, Thailand aims to substitute fossil fuel with alternative energy by 25%. That is to say the energy intensity will be reduced by 25%, which will lead to a reduction in GHG emissions by 206 million tons CO_2e by 2030. The ministry aims to increase the share of alternative energy by communities' investment and the private sector by revising rules and regulation to support alternative energy investment.

The Energy Conservation Promotion Fund (ENCON) monitored by the Department of Alternative Energy Development and Energy Conservation (DEDE) has been used as a non-budgetary instrument for energy conservation and energy efficiency. It supports projects on alternative energy, demonstration and the promotion of alternative energy projects, energy efficiency, and technical research. Climate change projects (other than energy efficiency and alternative energy projects) have included: 1) fact finding and drafting of the regulation for CDM projects within the energy sector in 2005; 2) Life Cycle Assessment of ethanol production from cassava and sugar cane in 2006; 3) A small-scale energy development CDM project in 2008; 4) Capacity building in preparation for CDM in Thailand in 2010 and 2011; and 5) a project on GHG emission reduction in the energy sector in 2011.

Ministry of Industry

The Ministry of Industry plays a significant role in strengthening cooperation between business entrepreneurs in the private sector and the Federation of Thai Industries. One climate change related objective is to adjust industrial production to reduce energy usage, particular energy coming from fossil fuel sources which create GHGs, to promote energy efficiency and the use of alternative clean energy and clean technology. The ministry's responsibility also covers legislation and other measures to help promote investment in environmental friendly technology, certification of industrial standards and the establishment of eco-industrial townships.

Ministry of Transportation

The Ministry of Transportation has the responsibility to promote energy efficient transportation by road, water and rail, the use of electric vehicles, the use of public transport and the development of coordinated traffic information.

Ministry of Science and Technology

This ministry is responsible for developing and preparing technology, as well as establishing policies to use second and third generation bio-technologies for energy and food production. The rail technology development by the Office of Science Technology and Innovation (STI) and the Life Cycle Assessment and Inventory by MTEC led to the role of the ministry on technology transfer as well as setting base lines for carbon emission in each production sector.

Ministry of the Interior

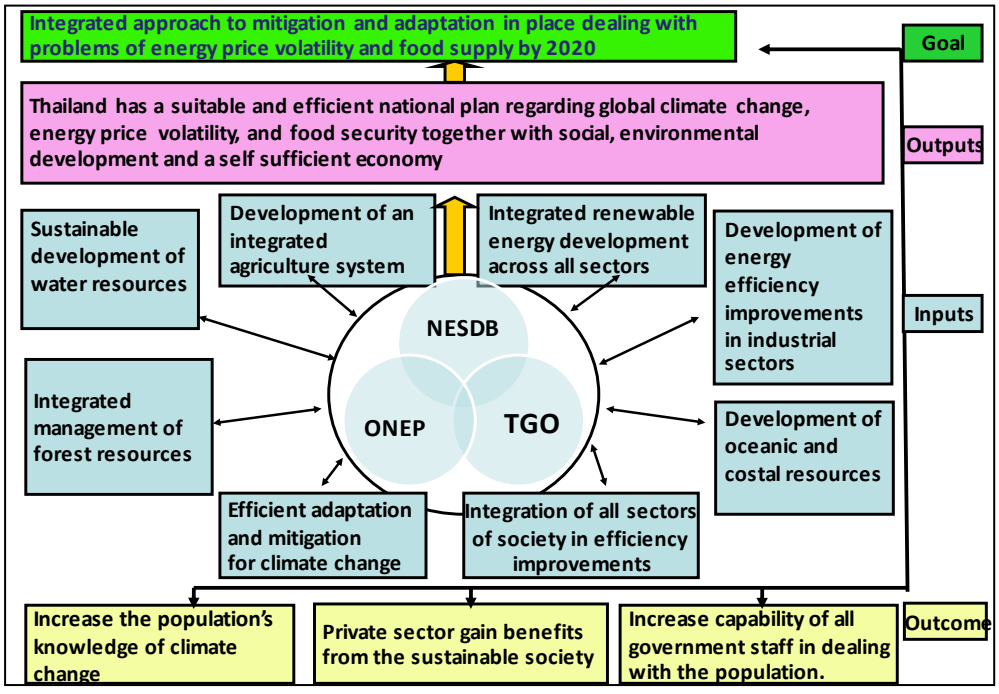
The Ministry of the Interior is responsible for urbanization policies and supports local government in promoting green areas in urban areas which could be used for carbon sinks. Furthermore they also promote energy saving in building and construction as well as the avoidance of construction on areas prone to flooding.

Ministry of Education and the Ministry of Labour

These two ministries collaborate and play a major role in human resource management by providing training for the private sector, NGOs and the population as a whole to help them adapt to climate change. They also focus the population towards understanding how to use disaster warning systems, and adjusting to new life styles that help reduce GHG emissions.

The linkages between these functions as carried out by line ministries and the climate policy agencies are presented in the Figure 3.

Figure 3: The integration of the climate policy government units with the national economic and social development plan



Source: NESDB (2010), A Master Plan on Climate Change in Thailand, 2010-2050: The Energy Prices and Food Security, Bangkok, Thailand.

3.6 Private Sector organisations

In Thailand, the Board of Trade and the Federation of Thai Industry are the main representatives of commerce and industry. The Board of Trade has set up a climate change committee to share views and to participate in negotiation missions attending the UNFCCC COP meetings. In the beginning, the Board of Trade disagreed with mitigation proposals regarding private production and consumption activities. However, after several rounds of discussion, the Board decided to participate in the policy formulation process. Before attending negotiation meetings held by the UNFCCC, the committee chaired by the Board of Trade deputy reviews the negotiation text and considers the costs and benefits to the private sector and the public at large.

The Federation of Thai Industries has been more active at the sub-committee level in the process of issuance of 'Letters of Approval' for CDM projects. The Federation has also sent a permanent representative to scrutinize proposed CDM projects to determine whether they comply with climate science parameters as well as the sustainable development criterion.

Individual private sector actors have recently been involved in raising awareness on climate change impact and mitigation options. Producers in various sectors are well aware that the climate change issue may become a trade barrier. They therefore have sought for voluntarily compliance to climate mitigation by applying a climate change campaign label: the 'Carbon Footprint'. Basing on a Life Cycle assessment, the TGO has set up an independent committee to permit the labelling of these carbon footprint labels.

It is clear that the private sector has been alerted and is aware of climate change impacts. The private sector has consistently responded to, and supports, the national climate policy, climate finance and tax-subsidy instruments if properly designed with clear cost and benefit to commerce and industries.

The Association of Banking will also be crucial to climate funding through private lending. A climate subsidy on interest rates may be effective for green investment to reduce carbon intensity. The role of the private sector in mitigation under the country's NAMA will need assistance from the banking sector with regard to project finance for technology investment. Thus, an understanding of national policy and coordination among private institutions is necessary.

3.7 Conclusions

The institutional arrangements to address climate change are becoming established in Thailand and can drive forward implementation if adequately resourced. Much has been done in a short space of time, reflecting the new policy concern of responding to climate change. The NCCC is a very important committee in this regard, being chaired by the Prime Minister, as it has the mandate to direct the national climate change response. Members of the committee are ministries which have both policy-oriented crosscutting roles as well as the line implementing agencies. The main institutional pillars of this committee with regard to forwarding the national climate change agenda are ONEP, the TGO and the NESDB, with support from the MoF, FPO and the BoB on fiscal and public expenditure issues. However, for this committee to operate efficiently and effectively it requires a well-resourced secretariat that can maintain momentum between its meetings. Whilst this secretariat has been identified within ONEP it has yet to be resourced. This represents an important next step in the institutional architecture to secure overall coordination on climate change.

Mitigation actions will depend critically on private sector engagement, particularly in the clean energy sector. Private sector institutional arrangements are already advancing through the representation of the Thai Chamber of Commerce. The role being played by the TGO is also important, and this can be expected to grow in the post Kyoto era, particularly if the proposal to establish a Thailand Carbon Fund goes ahead. This has implications for the organisational development of the TGO.

New institutional arrangements in support of the provision of adaptation finance are needed. Whilst the ECON Fund is already providing financial support for some mitigation actions there is no equivalent institutional arrangement for the financing of adaptation actions. One possible development that should be examined is the reformulation of the Environmental Fund to include a funding window for climate adaptation activities. This would likely require legal amendment to the statute that created the fund.

4 PUBLIC FINANCE MANAGEMENT PROCESSES

4.1 Government Policy Implementation

The government can implement its spending policies on climate change through two public finance management channels: budgetary expenditure and extra-budgetary expenditure. While there is a move to increasingly capture spending on-budget, there are also sources of funding that are legitimately off-budget such as revolving funds.

4.2 Process Overview of budget expenditure

In respect of the government budget, there are three steps in the budgeting process as set out in the Annual Budget Expenditure Act B.E.2502 (1959). This primarily deals with the annualized approval process of planned expenditure and the allocation of new or available funds, rather than the process of matching the budget with policy.

Budget Policy Formulation

Budget planning is a one-month process. It is carried out by four agencies: the Ministry of Finance, the Bureau of the Budget, the National Economic and Social Development Board, and the Bank of Thailand. After these four agencies endorse the consensus economic forecast and submit it to the Cabinet, the Cabinet considers the budget policy, the budget amount, the annual budget structure and the allocation strategy in accordance with the National Administration Plan.

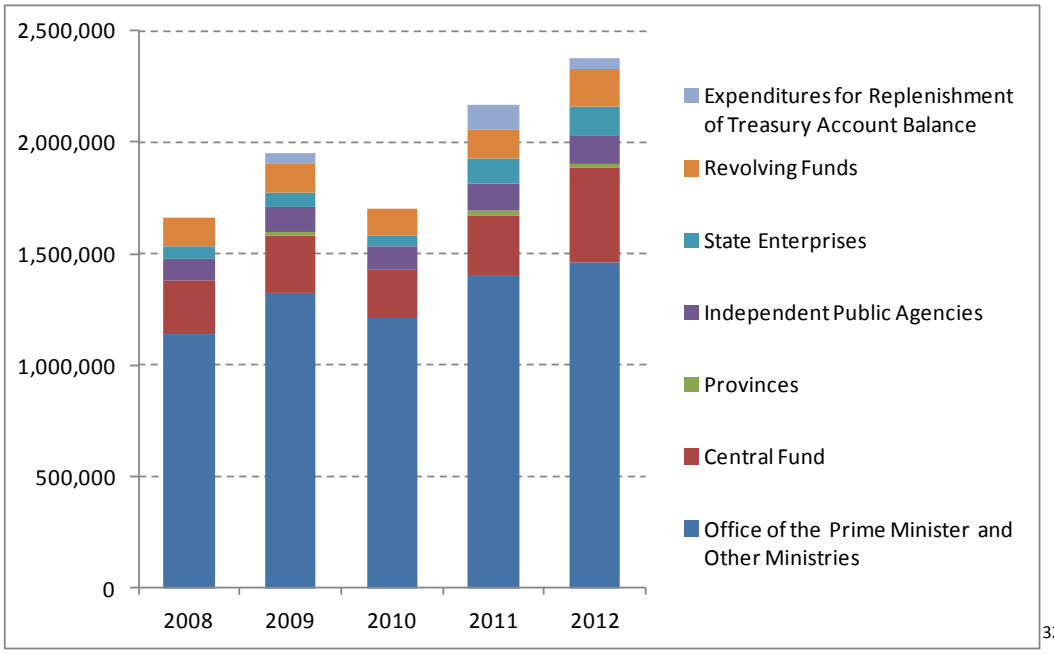
Budget Preparation

Budget Preparation then takes about three months. Ministries, state enterprises and other agencies work on their annual budget submissions, including the budget amount and spending request, and submit it to their minister for approval. Each ministry then submits its annual budget submission to the Bureau of the Budget for preparing the details of the annual budget, prior to submitting to the Cabinet for approval. If an agency is bidding for an allocation sum over its ceiling, parliament will rank projects in accordance with the strategy based in the National Administration Plan. According to the law, the internal processes are the same for all ministries, including those administratively responsible for climate issues. This is perhaps the point where climate change funding is most likely to be allocated priority for new or additional Government funding.

Budget Adoption

It takes about three months for the House of Representatives and the Senate to consider and approve the Act. The Act is then launched and becomes effective. In general, over 80% of government expenditure under the Annual Budget Expenditure Act in each fiscal year is direct expenditure through the Prime Minister's Office, Ministries and the Central Fund. 15% of the government budget refers to budgets of state enterprises, revolving funds, and other independent regulatory agencies. This shows that most of the budget is that of official agencies that operate policies directly under the scrutiny of parliament. This is illustrated in Figure 4: Budget Expenditures by Organizations (Million Baht).

Figure 4: Budget Expenditures by Organizations (Million Baht)



[32]

Once budget expenditure is set for each official agency, this expenditure cannot be transferred to another Ministry unless specific consent is obtained to do so (see Appendix 1), thereby setting the control parameters of expenditure for the year. The regulation of budget expenditure transfer is stated in the Budget Procedures Act, B.E. 2502 (1959).[33] Budgets are established on an Administrative, Functional and Economic basis, in compliance with the classification standards in the Government Finance Statistics Manual (2001). This allows monitoring and control in relation to: (i) the agency that holds the budget, (ii) the objective of the budget, and (iii) the nature of the expense. Transfers within agencies are tightly controlled but delegated to the Head of Agency to agree in conjunction with central government agencies. This regulation is set out in Clauses 27 to 29 of Regulations Governing Budget Management B.E. 2546 Amended By (No.2) B.E. 2547.

Government can use the Central Fund which is approximately 18% of the budgetary appropriation. However, the contingency fund for emergencies or immediate needs is only 16% of this fund. For the rest of the Central Fund, about 54% is used for financial reserves, contributions and compensation, medical care for civil servants, employees and public personnel, and pension and gratuities. 28% of the Central Fund was spent for flood relief and flood prevention in late 2011. Whilst this overall arrangement presents some financial flexibility within controlled PFM mechanisms and processes to respond on a short-term basis to climate change issues, the nature of the mechanism is outside of policy considerations and is therefore not subject to the act of balancing the budget with policy that is undertaken within the MTEF. In other words, there is financial agility in the mechanisms, but to ensure ongoing commitment of funds to climate-related priorities requires the allocation of funds to be made to agencies on a medium-term basis to enable planning and monitoring to take place. Planning the budget annually and holding it centrally does not enable government to resolve climate issues that are long term in nature.

[32] Source: Bureau of the Budget.

[33] See0. Appendix 1: The regulation of budget expenditure transfer (Budget Procedures Act, B.E. 2502).

4.3 Debt Based Financing

In practice, policy implementation through expenditure each year depends on tax revenue, which fluctuates with economic conditions. There is therefore an inherent risk of fiscal difficulty that is overcome by legally permitted borrowing. For example, Government will generally run a budget deficit during a period of economic recession in order to stimulate economic activity. The permitted purposes for raising revenues by contracting additional debt are stated in the Public Debt Management Act B.E. 2549 (amended by the Public Debt Management Act (Vol.2) B.E. 2551) Clauses 20 and 21. The full text of the relevant section is set out at Appendix 2. The salient points from the law are that:

- Raising debt is a power held only by the Ministry of Finance
- Raising debt to fund 'economic and social development' is legally permissible
- Borrowing must be from domestic sources and must be in Thai baht
- There are limits, based on the overall appropriation, on sums that can be raised

Historically, this device has been used in crisis circumstances as an economic management tool, such as in the fiscal year of 1997-1998 during the Asian Crisis when the government stimulated the economy by implementing a deficit budget policy. Since 2007, the Thai economy has been affected by the US economic crisis, high oil prices, European public debt and domestic floods and the government has used this device to run a budget deficit (Table 9).

Table 9: Domestic Borrowing under the Public Debt Management Act[34]

Fiscal Year	Budget Appropriation	Legitimate Maximum Domestic Borrowing[35]	Proposed Domestic Borrowing
	Baht Millions	Baht Millions	Baht Millions
1998	923,000	209,588	0
1999	825,000	169,280	25,000
2000	860,000	177,853	110,000
2001	910,000	191,708	105,000
2002	1,023,000	225,135	200,000
2003	999,900	227,941	174,900
2004	1,163,500	260,024	99,900
2005	1,250,000	290,061	0
2006	1,360,000	306,549	0
2007	1,566,200	357,632	146,200
2008	1,660,000	368,421	165,000
2009	1,951,700	441,280	441,060
2010	1,700,000	380,736	350,000
2011	2,169,968	460,037	400,000
2012	2,380,000	513,483	400,000

[34] Source: Bureau of the Budget

[35] Domestic borrowing in each fiscal year for financing budget deficit will not exceed 20% of the total budget, plus 80% of the principal repayment.

Table 9 illustrates that some financial flexibility exists within the parameters of the device and also that this is a potential source of climate finance in Thailand. However, the primary purpose of this borrowing has been for macroeconomic management rather than for any specific policy to-date. It may be concluded that the general use and intended purpose of clauses 20 and 21 would preclude it from being a viable long-term source of Climate Finance.

4.4 Medium Term Expenditure Framework (MTEF)

The Government introduced its Medium Term Expenditure Framework (MTEF) in 2004. The process is led by the Budget Bureau. In Thailand, the MTEF is 1+3 years rolling forward plan. The outer year estimates are driven by increments rather than policy based programmes. Preliminary budgeting is based on the MTEF, with the MTEF being used to assess the minimum expenditure (baseline) in each year based on a balanced budget policy. The baseline estimates consist of current expenditures, capital expenditures, and principal repayments[36]. Current expenditures are calculated from wages and salaries, interest payments, minimum subsidies and transfers. Capital expenditures are from previously approved and legally committed investments but, crucially from a climate change point of view, they exclude new capital budgets. This has the effect of ensuring that each new capital project requires approval to proceed and also, from a cost behavior point of view, presents a vulnerability to restrictions or reductions in the budget that are more challenging to apply and implement in the case of recurring costs such as the government's payroll.

Efficiency and Effectiveness of MTMF

The Medium Term Macroeconomic Framework (MTMF) is the minimum budget estimate for the period of 1+3 years. The estimate of the first year is used for considering the annual budget expenditure framework, while the three-year estimate provides policy makers with the trend of the government's fiscal space. In practice, once a year has passed the old estimate will indicate if the new minimum expenditure will increase or how it will be different from the previous one. However, the MTMF is only used as a guideline for the policy maker. For climate-related expenditures, the expenditures which are the normal functional expenditures will be included in the minimum forecast no matter whether they are current expenditure or committed capital expenditure.

Taken at the aggregate level, Ministry and Government commitments are compared to macroeconomic forecasts of available resources and this informs the government of the financial flexibility available to fund new policy measures – including climate related issues – using the fiscal space, which is the difference between policy commitments and forecast available resources.

4.5 The 2011 Budget Strategy

Government's strategy for the FY 2011 budget allocation[37] is set under the framework and direction of the government policy according to the 2009-2011 Government Administrative Plan. This plan acts as the guideline for the operation of government agencies, state enterprises and other public offices and some cross Ministry cohesion on climate actions is evident. There are nine strategies set out in the present budget strategy document as follows:

[36] Principal repayments will be considered based on assumption that there is no roll over and no loan raising under balanced budget policy.

[37] http://www.bb.go.th/FILEROOM/CABBBIWEBFORMENG/DRAWER14/GENERAL/DATA0000/00000025.PDF pages 6 to 26

1. Creation of the country's confidence
2. Upholding national security
3. Development of society and quality of life and reduction of inequality in the society
4. Management of economic growth with stability and sustainability
5. Management of natural resources and environment to cope with the world's climate change
6. Management of science, technology, research and innovation
7. Management of foreign policy and international economic affairs
8. Management with efficiency and good governance
9. Expenditures on general administration

Relevance to climate change appears in two strategies, most notably Strategy 5, but also under Strategy 4.

Strategy 5

This budget strategy describes five priority programmes for 2011:

(i) Conservation of natural resources: This programme addresses the conservation of land, forests and mineral resources. It also addresses the development of these resources and the potential for community management.

(ii) Management of water resources: The aim of this programme is to develop mechanisms to manage water resources for public benefit and economic production. The programme also plans to organize warnings for water threats in disaster-prone areas.

(iii) Disaster response: this programme focusses on setting up protection and warning systems to alleviate the effects of natural and public disasters in coastal areas.

(iv) Management of environmental quality: this programme addresses the management of the environment to standards stipulated by the government.

(v) Rectifying problems from climate change: The objective of this programme is to lessen the adverse impacts of climate change through the promotion of clean energy in order to reduce the emission of greenhouse gases.

Strategy 4

Programme 4.7 of strategy 4 aims to lessen dependency on imported energy. The programme focuses on improving efficiency in energy consumption, energy conservation and providing incentives for investment in energy conservation projects.

4.6 Non-budgetary expenditure

The Budget Procedures Act, B.E. 2502 defines non-budgetary funds as 'any funds which have been deposited by government offices and organizations with the Ministry of Finance, other than the budget fund, national revenue, any returned excess withdrawn fund, and returned excess withdrawn fund from the previous fiscal year.' The definition covers various types of funds and official agencies in terms of their operational goals and objectives, responsible authority, and regulations for monitoring. The non-budgetary expenditure can be divided into two groups: external borrowing and revolving funds.

External borrowing for economic and social development

Apart from financing the budget in the case of a budget deficit, government can also raise loans in foreign currency for up to 10% of the annual budgetary appropriation under the Public Debt Management Act B.E. 2548 for economic and social development purposes. The full text of the relevant section is set out at Appendix 3: Public Debt Management Act B.E. 2548 (Clause 22). According to this law, the purpose of foreign loans is to fund economic and social activities. As the government has to repay the principal and interest for these loans, they should be used for projects that are considered economically and socially optimum investments. Namely, these projects must provide returns not less than the interest payment. In the case of climate change projects, most do not provide economic and social returns in the short-run. As a result, it is unlikely that the government will raise foreign loans for such projects.

At present, the direct government debt in foreign currency amounts to US$ 1,433 million. The major sources of these loans are the International Bank for Reconstruction and Development (IBRD), the Asian Development Bank (ADB), and the Japanese Bank for International Cooperation (JBIC). In November 2011, the direct government debt from these three sources accounted for 69% of government's external debt.

There are two types of loan: project loans and programme loans. A project loan is a loan released for spending on a specific project, such as a Highway Development Project. As for a Programme Loan, the lender will consider the borrowing country's overall conditions and approve credit lines on that basis. The borrowing country is then able to manage the money, consider and select the appropriate projects itself. Recently, Thailand took out a Development Policy Loan with credit lines of US$ 1,000 million from the World Bank to support projects under the 'Thailand: Invest for Strength to Strength 2012' initiative and government policies.

Based on the above budget structure and the law, government policy implementation is again rather limited due to the need to maintain fiscal discipline. Also, functions and responsibility are completely separated among ministries. Raising foreign currency loans for social and economic development, as it is broadly defined by development banks and donors, is restricted by the law. These conditions emphasize the need for fiscal discipline perhaps at the expense of flexibility in implementing emergency or climate expenditure, especially in relation to any disaster response.

Revolving Funds

Revolving Fund are funds established for operations permitted to raise revenue for financing their continuing operations. The spending procedure of revolving funds must be based on specific laws. The income of the revolving fund may come from the national budget or from the fund's revenue permitted by law.

In recent years, due to the limitation of the budget process and the government's increasing need of expenditure, revolving funds have become an important tool for implementing government policies outside the normal budget system. Revolving funds are set up for flexibility in policy implementation in order to achieve specific policy objectives. The operation of each fund must be in accordance with government operation through its original affiliation. There must be a balance between flexibility and strict fiscal discipline. Flexibility can be considered in terms of the financial dimension (i.e. no need to wait for budgetary appropriation) and operation under the governance of the original affiliation. However, laws and regulations enforced in many revolving funds seldom allow flexibility

in operation. Moreover, revolving funds are under the governance of a certain ministry. The operation of each fund is independent from one another, i.e. there is no integration among such funds.

Even though these funds are set up for financial and operational flexibility, in practice, many rely on the budget. In fiscal year 2012, there are 28 funds and revolving funds that rely on the budget. These funds have a worth of 163,000 million baht or 6.9% of the annual budget expenditure. A full list of the funds established is shown at Appendix 4: Funds and Revolving Funds. The funds with a relevance to climate issues are described in the following section.

4.7 Climate related extra-budgetary funds

Several extra-budgetary funds provide public resources to support climate change actions in Thailand, in addition to resource allocation through the national budget. Perhaps the most significant of these is the Energy Conservation Promotion (ENCON).

Energy Conservation Promotion (ENCON) Fund[38]

The ENCON fund was established in 1995, as a consequence of the 1992 Energy Conservation Promotion Act. This Act aims to ensure that factories and buildings implement energy conservation measures. As stipulated in the Act, the ECON Fund can be used for:

- Working capital, grants or subsidies for investment in and operations of energy conservation programs and solving environmental impacts of energy conservation programs
- Grants and subsidies for various activities related to energy conservation or solution to environmental problems of energy conservation programs
- Administrative cost of energy conservation promotion work according to the Act

The Fund's annual budget is approximately 7,000 million Baht, sourced from levies on petroleum products, although there has been significant variation in this revenue in recent years as a result of changes to the rates of the imposed levies, are prescribed by the Prime Minister (Table 10).

Table 10: ENCON fund revenue

	2008	2009	2010
Revenue (Million Baht)	7,810.49	11,678.77	4,464.11
Rate of remittance to the ENCON fund (Baht/litre)	0.75[39]	0.75	0.25

Source: Data from the ENCON Fund Committee meeting (December 2011)

The administration of the Fund consists of: (i) a National Energy Policy Council (NEPC) chaired by the Prime Minister; (ii) a fund administration; (iii) a fund sub-committee, with the Ministry of Energy as the chair and EPPO as the secretariat; and (iv) a programme evaluation sub-committee. The project cycle of the ENCON fund is similar to the state budget process, which usually take approximately 4 months. The process is conducted by EPPO and chaired by the Permanent Secretary.

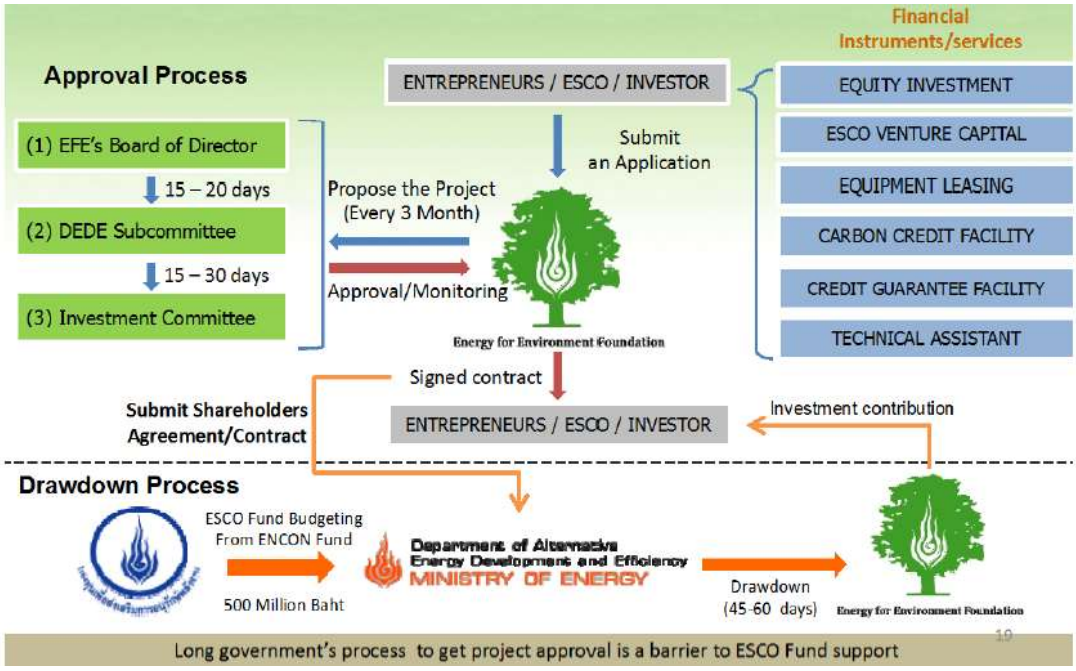
Several financial instruments, which are implemented as part of the overall ENCON fund, are innovative with a high uptake from intended beneficiaries:

[38] This section draws on the study carried out by Silvia Irawan (UNDP, unpublished)

[39] The rate of remittance to the ENCON fund increased from 0.07 Baht/litre to 0.75 Baht/litre on 11 Jan 2008.

1. A Revolving Fund that provides soft loans, with a maximum interest rate of 4% for a loan period of up to seven years. Eleven commercial banks have participated as implementing partners. The scheme provides loans, via financial institutions, for investment in energy efficiency improvement projects and renewable energy development utilization projects. The scheme is monitored by the DEDE. This Revolving Fund has supported over 250 projects over the period 2002-2008 and resulted in a total investment of around 16,000 million Baht.
2. DSM Bidding provides financial support to encourage business operators to invest in higher energy efficiency machines/equipment. The subsidy provided is based on actual units of energy saving achieved in a year. With the bidding mechanism, companies requesting lower weighted subsidy rates are subsidized first. This scheme is monitored by EPPO.
3. The ESCO Fund invests jointly with private operators (i.e. Energy Service Companies - ESCO) in energy efficiency and renewable energy projects, targeting SMEs and small projects. The programme is established by DEDE and during the first phase, two fund managers were assigned to manage funds. A range of financial services are provided, ranging from equity investment and venture capital in energy efficiency and renewable energy projects to equipment leasing, a carbon credit facility, a credit guarantee facility and technical assistance (Figure 5). The three main programs with high uptake are the carbon credit facility, equity investment and equipment leasing.

Figure 5: Project cycle of the ESCO fund



Source: Irawan (unpublished)

The success of the implementation relies heavily on the screening process of the projects and the role of the project managers.

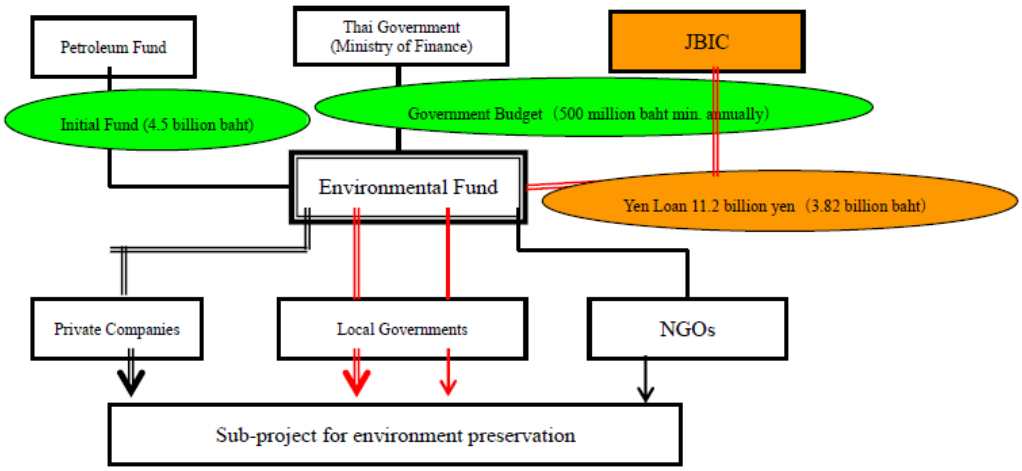
The Environmental Fund

A second relevant Fund is the Environmental Fund, which was set up by the Enhancement and Conservation of National Environmental Quality Act, B.E. 2535 (A.D. 1992). The Fund seeks to address environmental problems with participation of all sectors, largely through the provision of air pollution and wastewater treatment systems and waste disposal systems (although the remit of the Fund is not completely restricted to supporting such actions – see fourth bullet, below). The objectives of the Fund are provided in Section 23 of the Act as follows:

- To provide grants to government agencies or local administrations for investment in and operation of such treatment systems.
- To provide loans to local administrations or state enterprises for making available treatment systems.
- To provide loans to the private sector where there is a legal duty to make available a treatment system.
- To provide aid or grants to support any activity concerning the enhancement and conservation of environmental quality as the Fund Committee sees fit and with the approval of the National Environment Board.

The Environmental Fund began with an initial capital of 5,000 million Baht approved by the government, consisting of 500 million Baht from the Revolving Fund for Environmental Development and Quality of Life, and 4,500 million Baht from the Fuel Oil Fund. During 1993-1995, the government subsidised the Fund by a further 1,250 million Baht. In 1994, the Japan Bank for International Cooperation also provided a loan to the Environmental Fund of 100 million USD (Figure 6). The Office of the Environment Fund is responsible for the management and administration of the Fund and is a division under the Office of Natural Resources and Environment Policy and Planning within the Ministry of Natural Resources and Environment. The Industrial Finance Corporation and Krung Thai Bank serve as the financial intermediaries for the fund's credit facilities.

Figure 6: Environmental Fund: funding flows



Note: Loans are indicated by ⇒; grants, by →.

Source: Mori, 2006. Thailand Environmental Fund Project Ex-post Evaluation

TGO – Thailand Carbon Fund

This Fund is currently under preparation and aims to assist the many small CDM projects whose credits are not large enough to attract current institutional investors. The fund will play an active role in collecting credits, allowing industries in developed countries to access the carbon market in Thailand more easily. It is planned that the fund would be open to institutional investors under two models. The first model will be a carbon credit fund in support of domestic companies that operate a business involved in greenhouse gas emission reductions. The second model will allocate units to the public who will obtain returns in cash.

The fund is expected to encourage small and medium-sized project developers that do not have sufficient resources to develop their own projects. The fund would drive investments in small-scale projects with the ability of generating fewer than 25,000 carbon credits per year. The anticipated investors would be from industrialized nations seeking to buy certified emission reductions (CERs) to comply with domestic or international emission regulations.

4.8 Fiscal Space and Financial Flexibility

If the government implements all its planned policies, such as investments in the transport system and infrastructure, as well as social, healthcare and education policies, the budget will be in deficit and consequently government will be required to raise loans for financing the deficit. Whilst such a loan increases receipts for the current year, the fiscal space in the next year will be reduced because of increases in government's principal repayment and interest payments. Currently, government tends to run budget deficits. The government has limited scope for increasing revenues by raising domestic loans from both a legal and financial management point of view. As a result, the Government does not have much, if any, financial flexibility under the current revenue raising arrangements to take account of new policy measures, such as a response to climate change. This presents the dilemma faced by Government in prioritizing climate initiatives within an already crowded and competitive policy environment against a backdrop of limited financial flexibility. This situation perhaps sharpens the need to focus on separate and new fiscal measures in relation to climate change issues and presents an opportunity in that context to consider alternative, possibly hypothecated, fiscal measures.

4.9 Fiscal measures

Climate change spending carried out by the public sector will need to be complemented by private sector activity if an adequate response to climate change in Thailand is to be achieved. This is particularly the case for mitigation actions within the energy sector, where there is already existing experience with innovative fiscal instruments that encourage private sector activity. The main benefits of using fiscal measures (as opposed to a regulatory approach) have been listed by Peters (2012):

- Revenue raising potential for government
- Significant co-benefits are produced
- Represents a domestically controlled strategy, thus avoiding the difficulty of accessing international finance

The choice of fiscal instrument promoted by government is one that needs to take account of a number of factors, such as cost effectiveness, adoption and compliance incentives, ability to cope with uncertainty and the ability to provide a clear and credible price signal to investors (de Serres, Murtin and Nicoletti, 2010). These all require careful cost-benefit assessment and suggest that there is no one optimum option. At this time, there is likely benefit from exploring a range of policy options to determine which approaches have the desired impact.

Types of Fiscal instruments

Three main types of fiscal instrument may be considered in support of private sector engagement on climate change actions: (i) tax policies (e.g. fuel taxes, building material taxes), (ii) subsidies (direct price subsidies, intergovernmental fiscal transfers), and (iii) regulatory instruments which have fiscal components (e.g. feed-in tariffs).

(i) Tax Policies

Taxation in general is an efficient means of changing incentives and therefore administrative costs tend to be lower than comparable regulatory instruments. Climate taxes can raise the costs of activities that may have a negative impact on climate change, and therefore discourage such damaging activity; such an example is the Ozone Depleting Substance Excise tax.

Tax policy may also be used to lower the cost of alternatives actions that lead to reduced carbon emissions. For example, in Hong Kong in the 2012-13 budget a new Buildings Ordinance[40] was introduced (as happened in India in 2007). These codes consider not only energy efficiency and building standards but the materials and design required to meet those standards. It is possible that within the basket of revenues in Thailand at this time (65% to 35% in favour of indirect taxation) that some flexibility exists to manipulate specific sales taxes, for example, in respect of certain building materials. This approach would be compatible with Strategy 4 of the 2011 Budget Strategy Paper that highlights both energy efficiency *and* planned approaches to drive growth in manufacturing that includes the development of Social Responsibility in the SME (Small and Medium-sized Enterprise) sector. Such an approach, with specific research and political management of what may be a difficult area of decision making, has potential to engage the private sector and encourage market reaction towards mitigation solutions.

Transport is a key growth consequence and driver of economic growth and there is scope within the indirect tax revenue budget to vary, for example, vehicle excise duties or import duties on these with a view to promoting (as well as dissuading) certain patterns of consumption that may be regarded as supporting or contradicting the move to a low carbon society.

(ii) Subsidies

Subsidies can be applied to provide incentives to switch to activities that are less damaging to the environment, which may therefore encourage low carbon growth. Subsidies may be direct subsidies, incentives provided through direct taxation, or by differentiating the indirect tax rates on VAT and excise duties. The next section examines the history of government subsidies for clean energy provision.

(iii) Regulatory instruments with fiscal elements

[40] http://www.theclimategroup.org/our-news/news/2012/2/2/hong-kong-continues-to-fund-climate-change-measures/

Regulatory instruments (such as quotas, standards and product bans) are usually imposed where the more efficient fiscal instruments are likely to be ineffective. Regulation may be applied in cases where the fiscal incentives will not be passed to the consumer, where their enforcement is costly, or where production would be diverted to the informal sector if a fiscal instrument is pursued. A key action as mentioned under Strategy 4 (above) is the development of social responsibility in the private sector. In engaging the private sector in adaptation activity as fulfilment of this, some consideration could be given to the use of the insurance market as an instrument. Insurance, of itself, does not reduce the physical damage from climate impacts but it can mitigate the consequent business and personal losses and is therefore adoptable within a disaster response strategy. A potential course of action is to progressively make the purchase of insurance mandatory, or at least attractive through a subsidy, perhaps for businesses of a certain size.

In practice, there is overlap between the three categories of fiscal measure and in previously tested interventions elements of all three have been used to address both mitigation and adaptation. Subsidies, for example, are frequently used in respect of transport and energy policy – two key drivers and consequences of economic growth. However, it should be stressed that in the context of Thailand's overall fiscal position, that fiscal measures should primarily be considered as re-allocative and behavioural instruments of policy rather than as revenue raising initiatives.

4.10 Government subsidies for clean energy provision

In May 2001, the Thai government initiated a pricing subsidy in the form of energy payments for electricity generated by renewable energy sources for a period of five years at a maximum rate of 0.36 baht/kWh, under a competitive bidding scheme. A budget of 3,060 million baht was allocated from the Energy Conservation Promotion Fund for this purpose (Ruangrong, 2008). Under the ensuing pilot scheme a total subsidy of 1,400 million baht was awarded to 20 new small power producers programs.

In 2007, the Ministry of Energy initiated another supportive scheme, termed 'Adder Provision'. This was to provide an additional energy purchasing price on top of the normal prices that power producers would receive when selling renewable electricity to the country's Power Utilities. The adder was variable, depending on the technology used, and its location (Table 11). The provision of adders was to be for a period of seven years as from the commercial operation date.

The Energy Policy and Planning Office terminated the adder provision system in 2011, with the intention of replacing it with a new feed-in tariff. To-date, this new system has not been put in operation.

Table 11: Adder for renewable energy power production by type and capacity

Fuel Types / Size	Original Adder (Baht/kwh)	Extra Adder (Electricity from RE for diesel oil replacing) (Baht/kWh)	Extra Adder for Southern Provinces & Remote Areas Adder (Baht/kWh)	Period (Years)
1. Biomass				
Capacity ≤ 1 MW	0.50	1.00	1.00	7
Capacity > 1 MW	0.30	1.00	1.00	7
2. Biogas				
Capacity ≤ 1 MW	0.50	1.00	1.00	7
Capacity > 1 MW	0.30	1.00	1.00	7
3. MSW				
AD / Land Fill Gas	2.50	1.00	1.00	7
Thermal Process	3.50	1.00	1.00	7
4. Wind Energy				
Capacity ≤ 50 kW	4.50	1.50	1.50	10
Capacity > 50 kW	3.50	1.50	1.50	10
5. Mini Hydro				
Capacity 50 kW ≤ 200 kW	0.80	1.00	1.00	7
Capacity < 50 kW	1.50	1.00	1.00	7
6. Solar PV	8.00	1.50	1.50	10

Source: EPPO, quoted by 2009 CTF Investment Plan for Thailand

4.11 Conclusions

Thailand's fiscal discipline is governed by a number of laws. The Public Debt Management Act B.E. 2548 is the law that sets the annual debt ceiling in every category of government and state-owned enterprises' loans. Under this fiscal discipline, Thailand's fiscal stance has remained sustainable, with a public debt to GDP ratio that has remained below the government's fiscal sustainability framework of 50% to GDP. However, this discipline brings about inflexibilities in budget management and re-allocation. The Government Central Fund has been used as a tool to allow some flexibility of annual budget re-allocation. However, the contingency fund for emergencies or immediate needs in 2012 is only 66,000 million baht or %15.7of the Central Fund. This fund cannot therefore be regarded as a major long-term source of climate finance.

For financing the budget deficit, the government can only borrow from domestic sources under Public Debt Management Act B.E. 2548 in order to retain fiscal discipline. Given that this device is largely used to help balance the national budget it is also not regarded as a viable long term source of climate funding.

Extra-budgetary funds fall under the governance of individual ministries and as a result the operation of each fund is independent of one another. Policy coherence through such funds is therefore rather limited. The challenge is to balance this flexibility of operation with policy goals in respect of climate change in Thailand. The latter could be achieved through the oversight of the

NCCC. Acknowledging the present Cabinet moratorium on the creation of new Funds, it may be prudent to build on existing climate related funds rather than seek to establish a new 'Climate Change Fund' for Thailand. The ECON fund already has a record of supporting investments for clean energy production and hence covers much of what is required to further the national mitigation response. The present strategic gap lies in a lack of dedicated financial support for adaptation actions. A re-formulated Environmental Fund would address this shortcoming.

Overall, there is little, if any, fiscal flexibility in the Government of Thailand's budget. Unless new sources of finance are found, budgetary expenditure in support of climate change actions can only be increased at the cost of reductions elsewhere in the budget. This should focus attention on new sources of funding through the use of fiscal measures and international funds. In respect of fiscal measures there has been limited use of specific initiatives to-date for climate related issues. However, given the balance of revenues between direct and indirect measures there would appear to be scope for review with a view to identifying potential specific initiatives.

5 CLASSIFICATION OF CLIMATE CHANGE EXPENDITURE

5.1 Definition of Climate Change Mitigation and Adaptation Activities

Mitigation

Mitigation of global warming refers to the actions taken by individuals or corporations to reduce greenhouse gas emissions in order to minimize the effects of global climate change. This usually works in conjunction with national and international policies that minimize greenhouse gas production and its release into the atmosphere.

Most often, climate change mitigation involves the reduction in the concentrations of greenhouse gases, either by reducing their sources or by increasing their sinks. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to renewable energy (solar energy or wind power), improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere.

The OECD has defined mitigation activity as follows[41]:

DEFINITION

An activity should be classified as climate-change-related mitigation if:	It contributes to the objective of stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system, by promoting efforts to reduce or limit GHG emissions, or to enhance GHG sequestration.
CRITERIA FOR ELIGIBILITY	The activity contributes to a) the mitigation of climate change by limiting anthropogenic emissions of GHGs, including gases regulated by the Montreal Protocol; or b) the protection and/or enhancement of GHG sinks and reservoirs; or c) the integration of climate change concerns with the recipient countries' development objectives through institution building, capacity development, strengthening the regulatory and policy framework, or research; or d) developing countries' efforts to meet their obligations under the UNFCCC Convention.

[41] http://www.oecd.org/dataoecd/18/31/44188001.pdf

EXAMPLES OF TYPICAL ACTIVITIES	
1. Typical activities take place in the sectors of: *Water and sanitation* *Transport* *Energy* *Agriculture* *Forestry* *Industry*	• GHG emission reductions or stabilization in the energy, transport, industry and agricultural sectors through application of new and renewable forms of energy, measures to improve the energy efficiency of existing generators, machines and equipment, or demand side management. • Methane emission reductions through waste management or sewage treatment. • Development, transfer and promotion of technologies and know-how as well as building of capacities that control, reduce or prevent anthropogenic emissions of GHGs, in particular in waste management, transport, energy, agriculture and industry. • Protection and enhancement of sinks and reservoirs of GHGs through sustainable forest management, afforestation and reforestation, rehabilitation of areas affected by drought and desertification.
2. Typical non-sector specific activities are: *Environmental policy and administrative management* *Biosphere protection* *Biodiversity* *Education/training* *Environmental research*	• Protection and enhancement of sinks and reservoirs through sustainable management and conservation of oceans and other marine and coastal ecosystems, wetlands, wilderness areas and other ecosystems. • Preparation of national inventories of greenhouse gases (emissions by sources and removals by sinks); climate change related policy and economic analysis and instruments, including national plans to mitigate climate change; development of climate-change-related legislation; climate technology needs surveys and assessments; institutional capacity building. • Education, training and public awareness related to climate change. • Climate change-related research and monitoring as well as impact and vulnerability assessments. • Oceanographic and atmospheric research and monitoring.

Adaptation

Adaptation to the impact of global warming can be defined as adjustments of a system to reduce vulnerability and to increase the resilience of a system to change, in this case the climate system. Adaptation occurs at a range of inter-linked scales, and can either occur in anticipation of change (anticipatory adaptation), or be a response to those changes (reactive adaptation). Most adaptation being implemented at present is responding to current climate trends and variability, for example new seed varieties that can resist water stress and flooding in Thailand. Some adaptation measures,

however, anticipate future climate change, such as the construction of a higher bridge elevation to take into account the effect of future sea-level rise on ship clearance under a bridge.

Adaptive capacity and vulnerability are important concepts for understanding adaptation; vulnerability can be seen as the context in which adaptation takes place, and adaptive capacity is the ability or potential of a system to respond successfully to climate variability and change, in order to reduce adverse impacts and take advantage of new opportunities. Those societies that can respond to change quickly and successfully have a high adaptive capacity. The social drivers of adaptive capacity are varied but may include broad structures such as economic and political processes, as well as processes which operate at a very local scale, such as access to decision-making and the structure of social networks and relationships within a community. Adaptive capacity at a local scale is constrained by larger scale processes. For example a farmer's adaptive capacity will not only depend on access to resources (both physical and social) within the community which allow a crop to be grown successfully, but also the effect of macro-scale economic processes on the price received for the crop. Gender is another factor which is important in determining adaptive capacity and vulnerability, for example women may have limited participation in decision-making, or be constrained by lower levels of education[42].

5.2 Classifying climate change expenditure in Thailand

Following the methodology of previous CPEIR studies, the present study reviewed the draft national master plan on climate change by the Office of Natural Resources and Environment Policy and Planning (ONEP), as well as the National Economic and Social Development Board's analysis of climate change policy (see Chapter 2). This was carried out to provide insights as to how climate change actions are being defined in Thailand. This literature also gives a strong indication of where climate expenditure is to be found across the ministries, departments and agencies of government.

All the national budget expenditure codes were then compiled from the relevant budget documents for 2009, 2010, and 2011:

- Annual Budget Expenditure Act B.E. 2554 (2011)
- Annual Budget Expenditure Act B.E. 2553 (2010)
- Annual Budget Expenditure Act B.E. 2552 (2009)

This produced a 3-year database that contained 404 agencies of government with 1,307 functions and 134,341 line items. Each function was then classified according to whether the purpose of the expenditure was related to climate change, based on four thematic areas: mitigation, adaption, capacity building, and technology transfer. This analysis resulted in climate change activity being identified within 137 agencies, 195 functions and 26,774 line items.

Based on this sub-set of activities, all line items were then ranked according to the CPEIR classification (Table 12) on climate relevance. For each line item an estimate was made of the proportion of expenditure considered relevant to climate change, on a scale of 0 – 100%, based on project documentation and expert judgement. All activities were then grouped into the recommended four categories in Table 6, with the subsequent analysis based on these groupings.

[42] http://en.wikipedia.org/wiki/Adaptation_to_global_warming

Table 12: CPEIR classification of climate change relevant activities

Relevance	Rationale
High	Clear primary objective of delivering specific outcomes that improve climate resilience (adaptation) or contribute to mitigation, technology transfer and/or relevant capacity building
(Climate dimension weighting more than 75%)	Examples: • Energy mitigation (e.g. renewables, energy efficiency) • Conservation of protected areas and other actions that increase the forest area • Acquisition of non-fossil fuel energy technology, such as second and third generation bio-fuels • Rationalization of fossil fuel energy pricing structure • Management of water resources to combat increasing variability in droughts and floods • Planning towards a 'sufficient and low-carbon economy' in the agricultural sector to secure food supply security (and balancing with energy crops supply) • Disaster risk reduction and disaster management capacity • The additional costs of changing the design of a programme to improve climate resilience (e.g. extra costs of climate proofing infrastructure, beyond routine maintenance or rehabilitation) • Anything that responds to recent droughts, typhoons or flooding, because it will have added benefits for future extreme events • Relocating villages to give protection against typhoon/sea-level • Healthcare for climate sensitive diseases • Building institutional capacity to plan and manage climate change, including early warning and monitoring • Raising awareness about climate change, data base and knowledge infrastructure, training of government officials, community networking • Anything meeting the criteria of international climate change funds (e.g. GEF,CTF)
Mid	Either secondary objectives related to building climate resilience or contributing to mitigation, or mixed programmes with a range of activities that are not easily separated but include at least some that promote climate resilience or mitigation
(Climate dimension weighting 50% to 74%)	Examples: • Forestry and agroforestry that is motivated primarily by economic or conservation objectives, because this will have some mitigation effect • Water storage, water efficiency and irrigation that is motivated primarily by improved livelihoods because this will also provide protection against drought • Bio-diversity and conservation, unless explicitly aimed at increasing resilience of ecosystems to climate change (or mitigation) • Eco-tourism, because it encourages communities to put a value of ecosystems and raises awareness of the impact of climate change • Livelihood and social protection programmes, motivated by poverty reduction, but building household reserves and assets and hence reducing vulnerability. • Appropriate mitigation actions through increasing the supply of non-fossil energy

	by input from biomass, bio-gas, waste to energy, solar-energy etc. • Re-structure of production technology in industry, building and transportation towards low carbon intensity or by green investment-led by government procurement and by monetary and fiscal measures
Low	Activities that display attributes where indirect adaptation and mitigation benefits may arise
(Climate dimension weighting 25% to 49%)	Examples: • Water quality, unless the improvements in water quality aim to reduce problems from extreme rainfall events, in which case the relevance would be high • General livelihoods, motivated by poverty reduction, but building household reserves and assets and reducing vulnerability in areas of low climate change vulnerability • General planning capacity, either at national or local level, unless it is explicitly linked to climate change, in which case it would be high
Marginal	Activities that have only very indirect and theoretical links to climate resilience and in some cases may lead to an increase in carbon emissions
(Climate dimension weighting less than 25%)	Examples: • Short term programmes (including humanitarian relief) • The replacement element of any reconstruction investment (splitting off the additional climate element as high relevance) such as highway construction (which is expected to raise carbon emissions) • Subsidies on Para Rubber plantations where this leads to encroachment of protected forest areas • Education and health that do not have an explicit climate change element

Relevance is defined as being 'relevant to (i) improving climate resilience (for adaptation) or (ii) to the mitigation of climate change'. Many activities which address (i) and (ii) are already in national development budgets to address the 'development deficit' (Burton, 2004). This makes the allocation of expenditure very difficult in practice and this is an on-going challenge for the CPEIR methodology. It is widely recognised in the climate change literature that continued development may be one of the best defences against climate change (Narain et al., 2011; Schelling, 1992). Development makes more resources available for abating risk and recovery from climate change. Adaptation is also crucial for development.

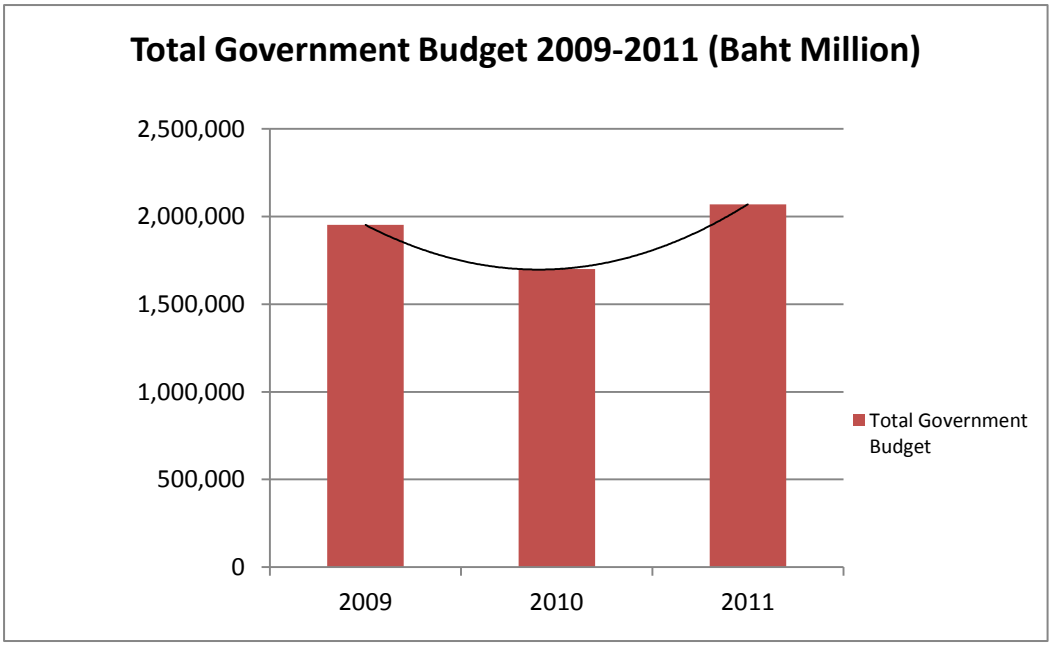
For these reasons, the key to developing an approach that has broad buy-in and confidence, based on expert judgement and consensus, is vital to the subsequent analysis (recognising the limitation on precision that the current methodology entails).

6 NATIONAL BUDGET ANALYSIS

6.1 Overall Government Budget, 2009-2011

The CPEIR analysis covered the three budget years from 2009 to 2011. This was a relatively uncertain period for public expenditure against a background of international recession. Accordingly, this position is reflected in the trend of the government's overall budget, as shown in Figure 7:

Figure 7: Overall Government Budget 2009-2011



It can be seen that the overall budget reduced in 2010 before recovering in 2011 to an increased level. This budget includes all components of the finance identified in Figure 4: Budget Expenditures by Organizations (Million Baht).

The government is a significant agent in the economy with budgets accounting for, on average, 19% of GDP in the years reviewed. This is shown in Table 13 below:

Table 13: Government Budget as a % of GDP

(Million Baht)	2009	2010	2011
Total Government Budget	1,951,700	1,700,000	2,169,967
GDP	9,041,551	10,104,821	10,539,446
% of GDP	21.6%	16.8%	20.6%

The reason for the 2010 government budget reduction was a fall in tax revenue. Thailand's economy was expected to expand at a rate of 2% to 3% in 2010, resulting principally from the strengthening of domestic demand and exports. However, 40% of government receipts come from direct tax and in 2009 Thailand's economy had contracted at the rate of -3% to -3.5% resulting from a decline in

domestic consumption and a slowdown in international economic activity at a rate which was more severe than had been anticipated at the beginning of the year. This led to a continued contraction of exports and imports in 2010, while consumption in the private sector took time to recover due to a decline in household income resulting from price reductions of agricultural commodities in the world market and employment uncertainty. In addition, domestic borrowing did not progressively increase during this period (as was shown in Table 9).

6.2 The Climate Budget

Overview

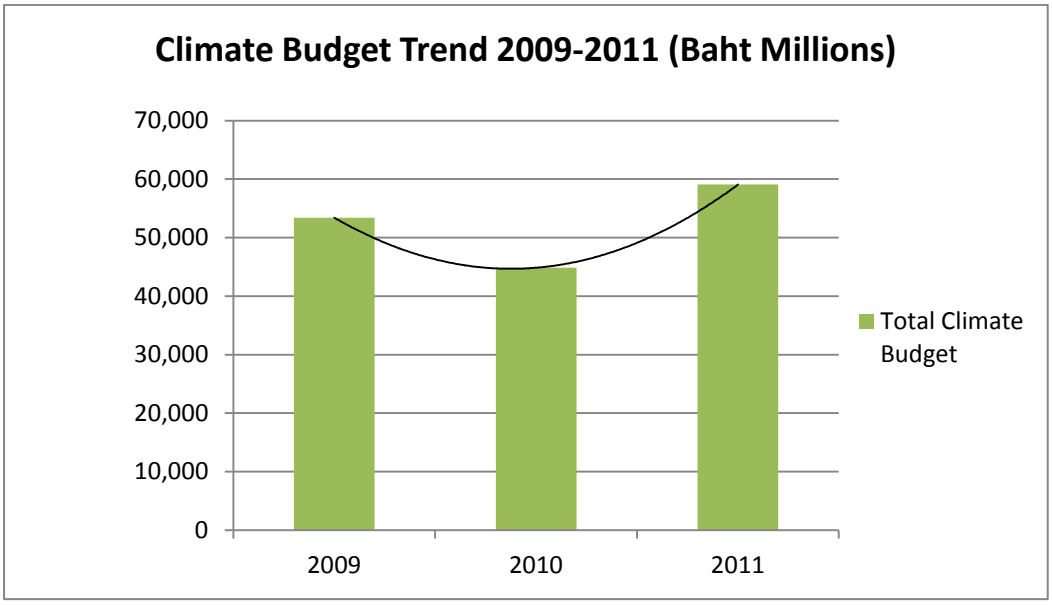
The climate budget, as identified using the methodology outlined in the previous chapter, suggests that on an indicative basis, this budget represents around 0.5% of GDP and 2.7% of the government budget. This is shown in Table 14 below:

Table 14: Climate Budget as % of Government and GDP 2009-2011

(Million Baht)	2009	2010	2011	Average
Climate Budget	53,414	44,855	59,065	52,445
Total Government Budget	1,951,700	1,700,000	2,169,968	1,940,556
GDP	9,041,551	10,104,821	10,539,446	9,895,273
As a % of Government Budget	2.7%	2.6%	2.7%	2.7%
As a % of GDP	0.6%	0.4%	0.6%	0.5%

Interestingly, the sums identified as climate budgets followed a similar pattern to the budget as a whole as is illustrated in Figure 8.

Figure 8: Climate Budget 2009-2011



The climate budget represented, on average, 2.7% of the overall government budget between 2009 and 2011. This is shown together with further comparators in Table 15 below.

Table 15: Climate Budget Compared to Government Budget 2009-2011

Fiscal Year	Climate Budget	Government Budget	Climate as %
2009	53,413,790,640	1,951,700,000,000	2.7%
2010	44,855,277,320	1,700,000,000,000	2.6%
2011	59,065,004,881	2,169,968,000,000	2.7%
		Average	**2.7%**
% Change (+/-)			
2009			
2010	-16%	-13%	
2011	+32%	+28%	
2011 v 2009	+11%	+11%	

Table 15 illustrates that the climate budget was subject to a sharper reduction in 2010 and a greater increase in 2011 than the overall government budget. Economic analysis of the climate budget explores this point further at Table 21: Economic Classification of Climate Budget.

Sensitivity Analysis of Key Ministries and Climate Budgets

Table 16 below shows a breakdown of the identified climate budget by Ministry.

Table 16: Total Climate Budget By Ministry (Aggregated 2009-2011)

Ministry	Three Year Aggregate	%
Ministry of Agriculture and Cooperatives	86,350,636,260	**54.9%**
Ministry of Natural Resources and Environment	44,872,780,510	**28.5%**
Ministry of Education	9,235,981,476	**5.9%**
Ministry of Interior	5,066,865,305	**3.2%**
Ministry of Energy	4,541,689,990	**2.9%**
Ministry of Transport	2,730,543,400	**1.7%**
Ministry of Finance	1,790,138,000	**1.1%**
Ministry of Science and Technology	977,060,105	**0.6%**
Ministry of Industry	765,838,880	**0.5%**
Ministry of Information and Communication Technology	625,092,390	**0.4%**
Prime Minister	232,859,075	**0.1%**
Ministry of Defence	96,173,100	**0.1%**
Red Cross Society	32,908,320	**0.0%**
Province and the province	15,500,000	**0.0%**
Total Climate Budget	**157,334,066,811**	**100.0%**
TOTAL GOVERNMENT BUDGET	**5,821,668,000,000**	
Climate Budget as a % of Government Budget	**2.7%**	

The two key Ministries in respect of Climate Budget allocations in the period reviewed are the Ministry of Agriculture and Cooperatives and the Ministry of Natural Resources and Environment. These Ministries accounted for 3.7% and 1.2% of the government budget respectively. These two Ministries also accounted for 54.9% and 28.5% of the Climate budget in the same period.

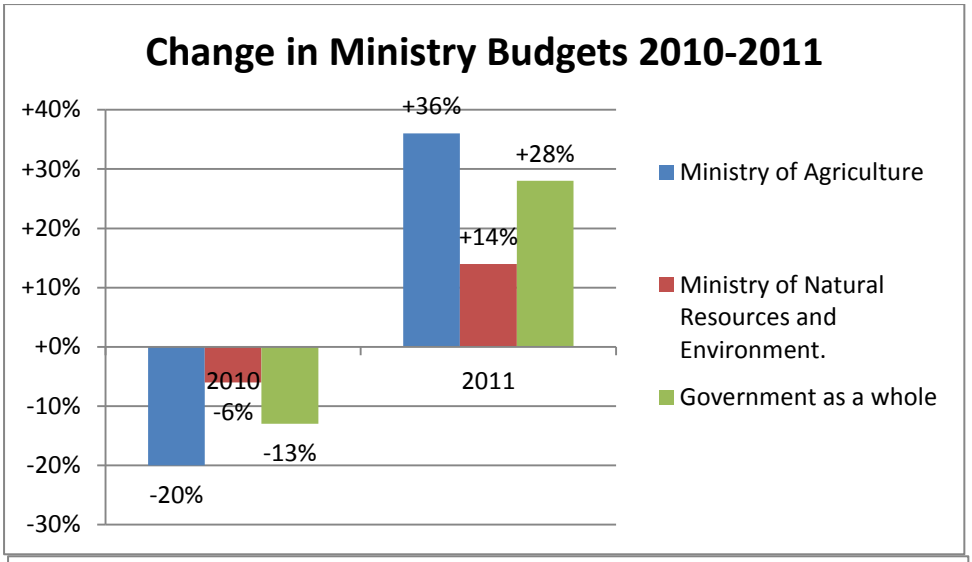
The overall government budget decreased by 13% in 2010 and then increased by 28% in 2011 (Table 15). The Ministry of Agriculture budget decreased by a greater magnitude in 2010 than the Government average, and increased by a greater magnitude in 2011. This could reflect a policy priority, but again, the flexibility and vulnerability of the cost structure to agile decisions on budget reductions should not be discounted. It is interesting to note that the Climate budget within the

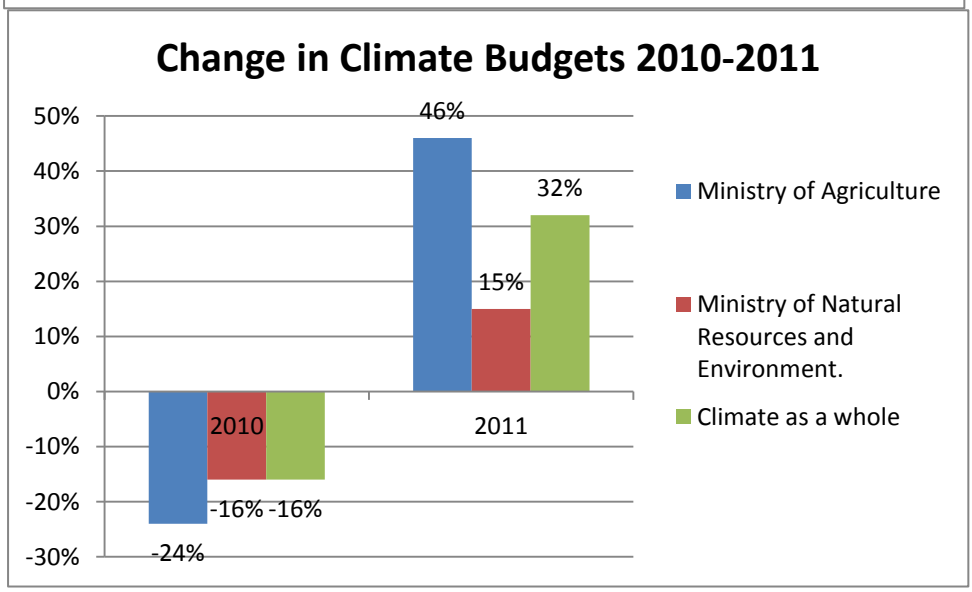
Ministry experienced a greater variability (in the same directions) in both years. A similar position arose in the Ministry of Natural Resources and Environment where the climate budget reduced and subsequently increased in 2009 and 2010 by greater margins than that of the Ministry as a whole. The relevant data is presented in Table 17 below:

Table 17: Key Ministry and Climate Budget Sensitivity Analysis

Key Ministry Overall Budget	**2009**	**2010**	**2011**	**% of Government Budget**
Ministry of Agriculture.	72,902,070,300	57,982,444,000	78,701,563,900	**3.6 %**
Ministry of Natural Resources and Environment.	22,714,674,300	21,267,047,200	24,321,126,400	**1.2%**
Key Ministry Climate Budget	**2009**	**2010**	**2011**	**% of Climate Budget**
Ministry of Agriculture	30,036,301,330	22,854,698,800	33,459,636,130	**54.9%**
Ministry of Natural Resources and Environment.	15,970,333,525	13,474,312,640	15,428,134,345	**28.5%**
Change in Ministry Budget	**2009**	**2010**	**2011**	
Ministry of Agriculture		-20%	+36%	
Ministry of Natural Resources and Environment.		-6%	+14%	
Government as a whole		-13%	+22%	
Change in Climate Budget	**2009**	**2010**	**2011**	
Ministry of Agriculture		-24%	+46%	
Ministry of Natural Resources and Environment.		-16%	+15%	
Climate as a whole		-16%	+32%	

In general, the budget of each Ministry shows the same trend as the national budget but in differing proportions. In the case of agriculture the swings in allocations at ministry and climate budget levels were greater than the Government as a whole, whilst in MoNRE at Ministry and Climate budget levels the swings were less than the overall Government budget. It is known that some climate relevant budgets were not reduced as they were legally committed, which tends to suggest that changes and the sensitivity of changes were related to cost structures rather than rational policy proritisation. This thesis tends to be borne out in this analysis as the climate budget was affected in markedly different ways in each of the two Ministries yet each represents a significant component of the government's climate activity. This is presented in graph format below:





6.3 Administrative Analysis of the Climate Budget

Ministry Level

A total of 14 Ministries had a programme with a climate component in the period reviewed. The Ministries / Agencies annual budgetary allocations are set out below in Table 18.

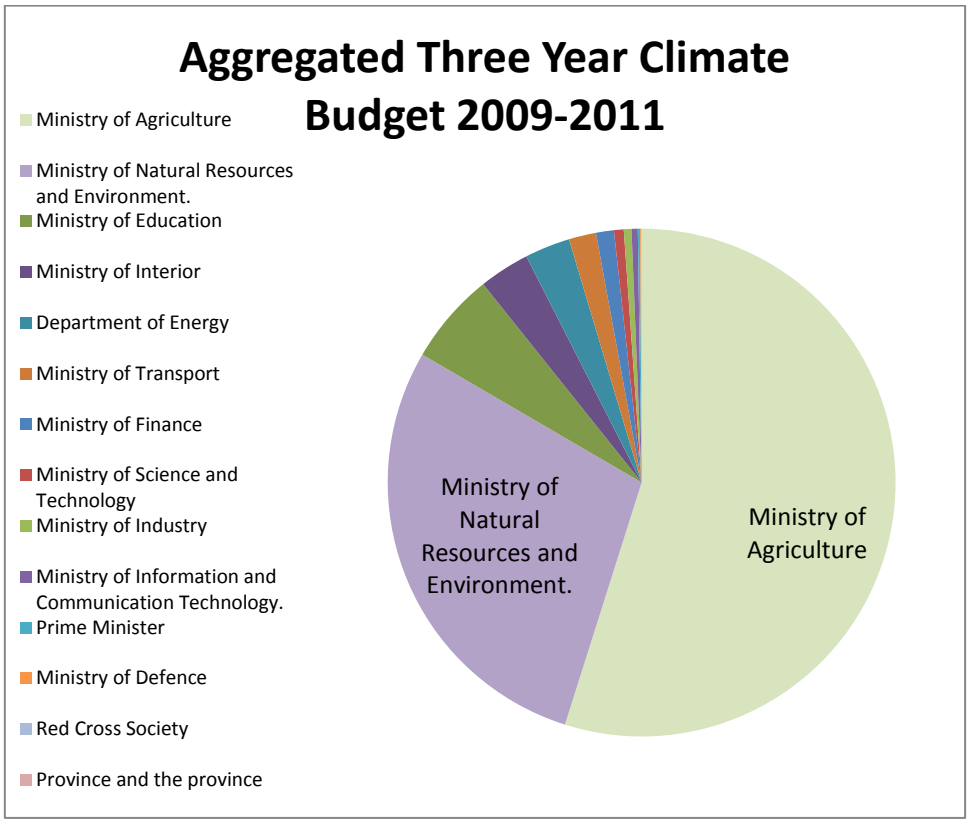
Table 18: Ministries with Climate Budgets 2009-2011

Ministry	2009	2010	2011	Three Year Aggregate	% of Total Climate Budget
Ministry of Agriculture	30,036,301,330	22,854,698,800	33,459,636,130	86,350,636,260	**54.9%**
Ministry of Natural Resources and Environment	15,970,333,525	13,474,312,640	15,428,134,345	44,872,780,510	**28.5%**
Ministry of Education	1,755,145,916	3,401,041,520	4,079,794,040	9,235,981,476	**5.9%**
Ministry of Interior	754,266,415	1,880,335,530	2,432,263,360	5,066,865,305	**3.2%**

Department of Energy	1,661,542,320	1,419,248,040	1,460,899,630	4,541,689,990	**2.9%**
Ministry of Transport	1,487,200,000	585,000,000	658,343,400	2,730,543,400	**1.7%**
Ministry of Finance	984,282,400	403,075,600	402,780,000	1,790,138,000	**1.1%**
Ministry of Science and Technology	251,374,480	272,178,040	453,507,585	977,060,105	**0.6%**
Ministry of Industry	69,917,000	301,500,160	394,421,720	765,838,880	**0.5%**
Ministry of Information and Communication Technology.	239,116,470	188,109,390	197,866,530	625,092,390	**0.4%**
Prime Minister	98,372,545	65,128,275	69,358,255	232,859,075	**0.1%**
Ministry of Defence	79,608,000		16,565,100	96,173,100	**0.1%**
Red Cross Society	10,828,230	10,647,315	11,432,775	32,908,320	**0.0%**
Province and the province	15,500,000			15,500,000	**0.0%**
Total Climate Budget	**53,413,788,631**	**44,855,275,310**	**59,065,002,870**	**157,334,066,811**	**100.0%**

As previously noted, the main Ministries involved in climate change activities within the government are the Ministry of Agriculture and Cooperatives and the Ministry of Natural Resources and Environment. These two ministries comprised 83.4% of the total aggregated climate budget allocation over the three years reviewed. This is further illustrated in Figure 9:

Figure 9: Key Ministries - Share of Climate Budget 2009-2011



Department / Agency Analysis

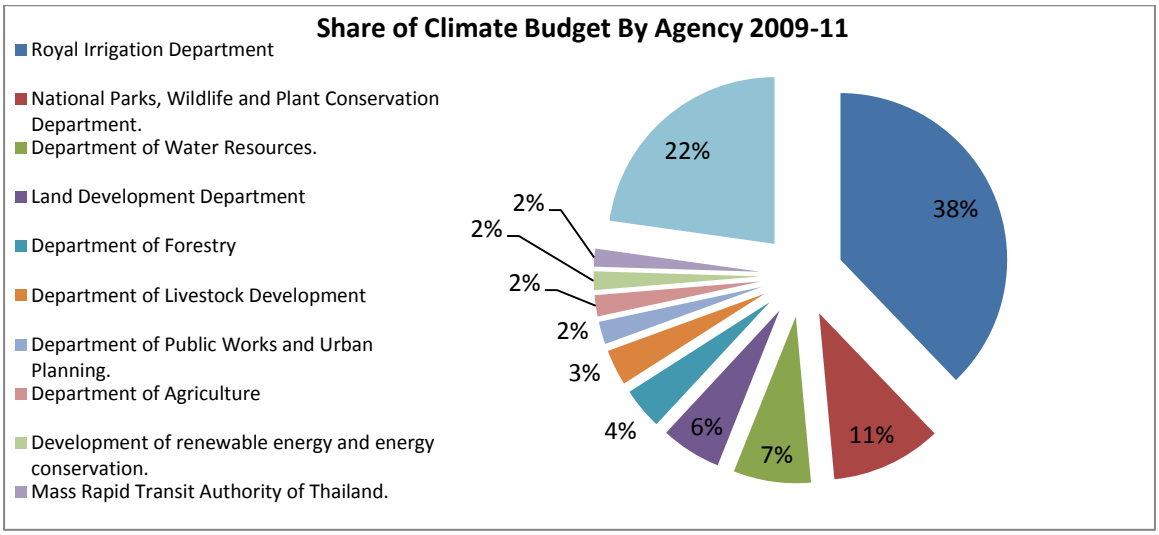
A total of 137 agencies and departments from an overall total of 404 in the government have been allocated budgets for climate programmes in the three years from 2009 to 2011. This is a substantial number that presents challenges in operational and policy co-ordination, and also highlights a need for institutional and policy leadership. The values of the programmes are, however, concentrated in a much smaller operational sphere, with the top two agencies, the Royal Irrigation Department and the National Parks, Wildlife and Plan Conservation Department accounting for almost half of the budget allocated in the period reviewed (48.5%). The top 10 budgets cover a reasonably diverse portfolio of administrative responsibility and account for 77% of the budget allocated in the same period. Fuller details are shown in Table 19 below:

Table 19: Climate Budgets by Department 2009-2011

Agency	Ministry	2009	2010	2011	Aggregate Total	%
1. Royal Irrigation Department	MoAC	21,422,923,160	14,169,838,995	23,915,074,145	59,507,836,300	37.8%
2. National Parks, Wildlife and Plant Conservation Department	MoNRE	7,118,733,715	4,637,998,755	5,113,695,185	16,870,427,655	10.7%
3. Department of Water Resources	MoNRE	2,994,444,165	4,044,970,525	4,778,136,465	11,817,551,155	7.5%
4. Land Development Department	MoAC	3,119,286,010	2,967,637,705	3,118,778,850	9,205,702,565	5.9%
5. Royal Forest Department	MoNRE	2,250,190,850	1,970,215,975	2,138,368,765	6,358,775,590	4.0%
6. Department of Livestock Development	MoAC	1,882,072,880	1,717,048,680	1,881,668,680	5,480,790,240	3.5%
7. Department of Public Works and Urban Planning.	MoI	235,551,605	1,376,129,615	1,845,602,165	3,457,283,385	2.2%
8. Department of Agriculture	MoAC	1,128,901,200	1,021,397,985	1,076,356,425	3,226,655,610	2.1%
9. Development of renewable energy and energy conservation.	MoE	1,118,605,800	830,818,800	896,979,300	2,846,403,900	1.8%
10. Mass Rapid Transit Authority of Thailand.	MOT	1,487,200,000	585,000,000	658,343,400	2,730,543,400	1.7%
Top 10 Agencies		**42,757,911,394**	**33,321,059,045**	**45,423,005,391**	**121,501,969,800**	**77.2%**
127 Other Agencies		**10,655,879,246**	**11,534,218,275**	**13,641,999,490**	**35,832,097,011**	**22.8%**
Total Climate Budget		**53,413,790,640**	**44,855,277,320**	**59,065,004,881**	**157,334,066,811**	**100.0%**

This data is also presented in graph format in Figure 10:

Figure 10: Share of Climate Budget By Agency 2009-2011



6.4 Functional Analysis of the Climate Budget

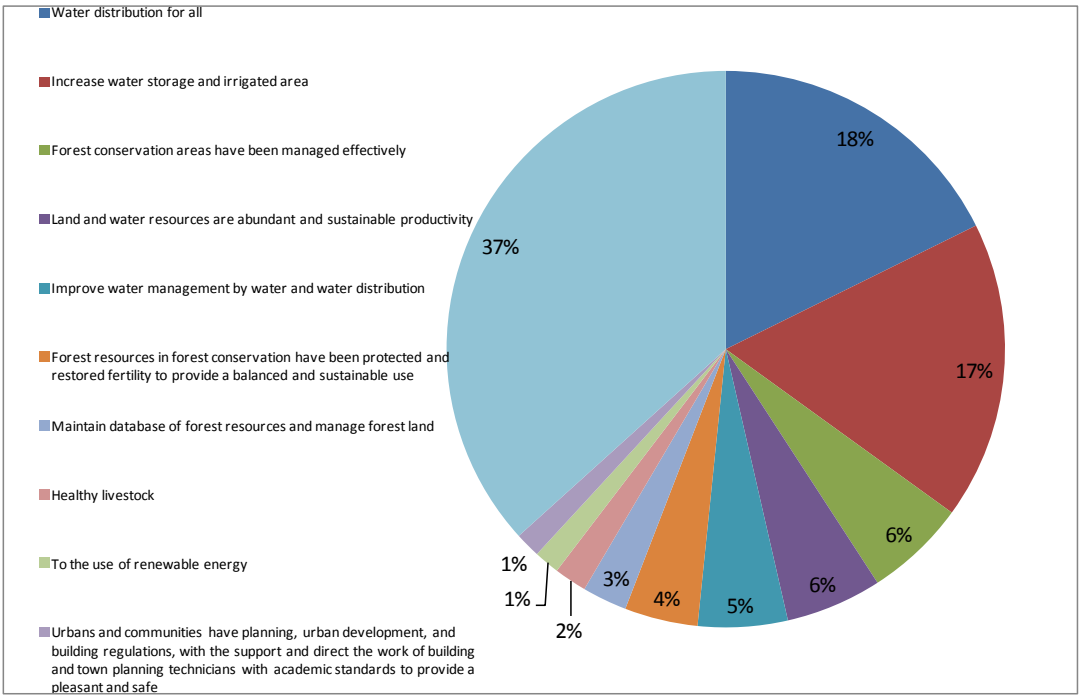
In the Government chart of accounts each budget line is allocated a goal or objective as part of the classification of the budget. A total of 195 functional codes from an overall total of 1,307 (15%) identify budgets for climate programmes in the three years from 2009 to 2011. The values of programmes are concentrated in a much smaller operational sphere with the top two functions (water distribution for all and increasing water storage and irrigated area) accounting for over one third of the climate budget allocated in the period reviewed (35.0%). The top 10 budgets account for 63% of the budget allocated in the same period.

Table 20: Functional Analysis of Climate Budget 2009-2011

Functions	2009	2010	2011	Aggregate Total	%
1.Water distribution for all	9,527,074,700	6,666,803,130	11,641,940,050	27,835,817,880	17.7%
2.Increase water storage and irrigated area	9,791,774,395	6,811,913,615	10,578,023,950	27,181,711,960	17.3%
3. Forest conservation areas have been managed effectively		4,381,756,080	4,847,735,360	9,229,491,440	5.9%
4.Land and water resources are abundant and sustainable productivity	3,005,652,360	2,816,819,505	2,959,195,270	8,781,667,135	5.6%
5.Improve water management by water and water distribution	-	3,794,819,985	4,391,796,660	8,186,616,645	5.2%
6.Forest resources in forest conservation have been protected and restored fertility to provide a balanced and sustainable use	6,692,938,250	-	-	6,692,938,250	4.3%

7.Maintain database of forest resources and manage forest land	-	1,964,434,225	2,124,064,345	4,088,498,570	2.6%
8.Healthy livestock	1,018,145,680	966,312,160	994,664,880	2,979,122,720	1.9%
9.To the use of renewable energy	922,294,900	682,480,800	724,649,800	2,329,425,500	1.5%
10.Urbans and communities have planning, urban development, and building regulations, with the support and direct the work of building and town planning technicians with academic standards to provide a pleasant and safe	-	1,086,443,540	1,223,337,830	2,309,781,370	1.5%
Top 10 functions	**30,957,880,285**	**29,171,783,040**	**39,485,408,145**	**99,615,071,470**	**63.3%**
185 other functions	**22,455,908,346**	**15,683,492,270**	**19,579,594,725**	**57,718,995,341**	**36.7%**
Total climate budget	**53,413,788,631**	**44,855,275,310**	**59,065,002,870**	**157,334,066,811**	**100.0%**

Figure 11: Functional Analysis of Climate Budget



Considering the data, most of the national climate budget is concentrated on water issues. For Thailand, water is very important to the Thai way of life, especially as more than a half of Thai people work in the agricultural sector.

6.5 Economic Analysis of the Climate Budget

In the Government chart of accounts each budget line is allocated an economic description as part of the classification of the budget. This indicates the nature of the expense, such as staff costs, supplies, transfer payments, capital works and so on. The climate budget is classified within eight

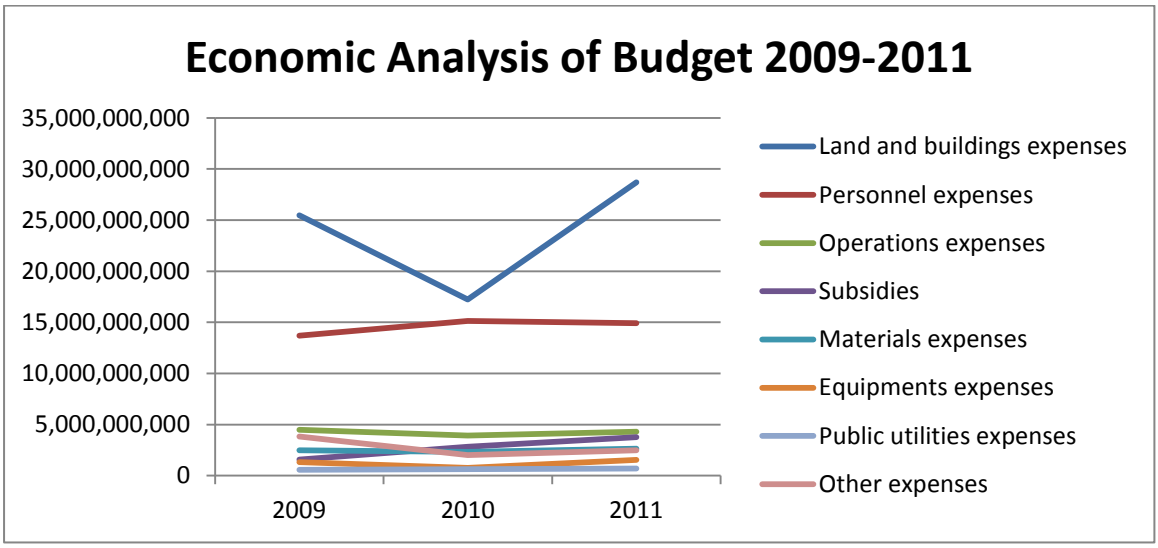
overall economic activities. Land and buildings and personnel expenses account for around three quarters of the aggregate budget in the past three years. This is shown in Table 21.

Table 21: Economic Classification of Climate Budget

Economic Classification	2009	2010	2011	Aggregate Total	%
Land and buildings expenses	25,468,707,740	17,248,529,211	28,702,403,624	71,319,640,575	45.4%
Personnel expenses	13,692,306,175	15,144,020,833	14,925,492,230	43,761,819,238	27.8%
Operations expenses	4,496,034,635	3,921,300,785	4,308,220,062	12,725,555,482	8.1%
Subsidies	1,575,145,255	2,818,335,295	3,754,217,750	8,147,698,300	5.2%
Materials expenses	2,478,384,665	2,323,741,040	2,650,372,740	7,452,498,445	4.7%
Equipment expenses	1,311,370,301	750,137,735	1,538,250,354	3,599,758,390	2.3%
Public utilities expenses	571,417,820	638,525,775	688,230,955	1,898,174,550	1.2%
Other expenses	3,820,422,040	2,010,684,635	2,497,815,155	8,328,921,830	5.3%
Total climate budget	**53,413,788,631**	**44,855,275,310**	**59,065,002,870**	**157,334,066,811**	

Land and buildings budgets have the highest allocation at 45.4% indicating a considerable element of capital assets within the climate budget. The second highest component is salaries and personnel expenses. It is very noticeable that the decrease in resources allocated in 2010 was much more deeply applied to the former than to the latter. In relative terms, from a cost behavior perspective it is much easier to reduce or defer capital expenditure than to reduce recurrent salaries. It would appear that this is what happened in 2010 and perhaps explains why the climate budget could be reduced so markedly. It perhaps remains a moot point the extent to which this reduction was a result of a policy driver, however this evidence would suggest that it was not and that budget reductions due to reduced tax receipts were applied in a pragmatic way to those costs most readily deferred or reduced. Given that climate activity is capital intensive, it was and most likely remains vulnerable to expedient, financially driven decisions. Figure 12Figure 12 shows this reduction in the capital element of the climate budget in 2010 very starkly.

Figure 12: Economic Analysis of Budget 2009-2011

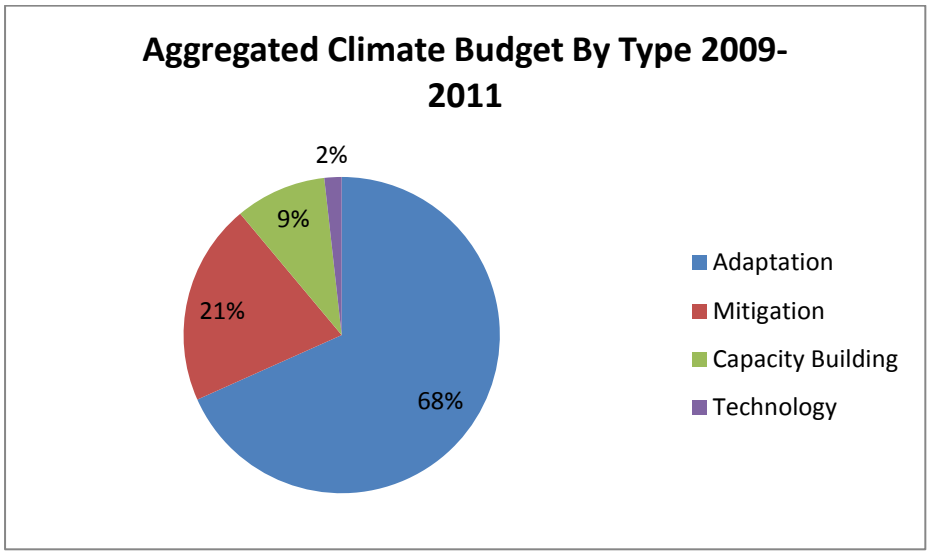


6.6 Mitigation, Adaptation, Technology Transfer, Capacity Building

Mitigation and Adaptation

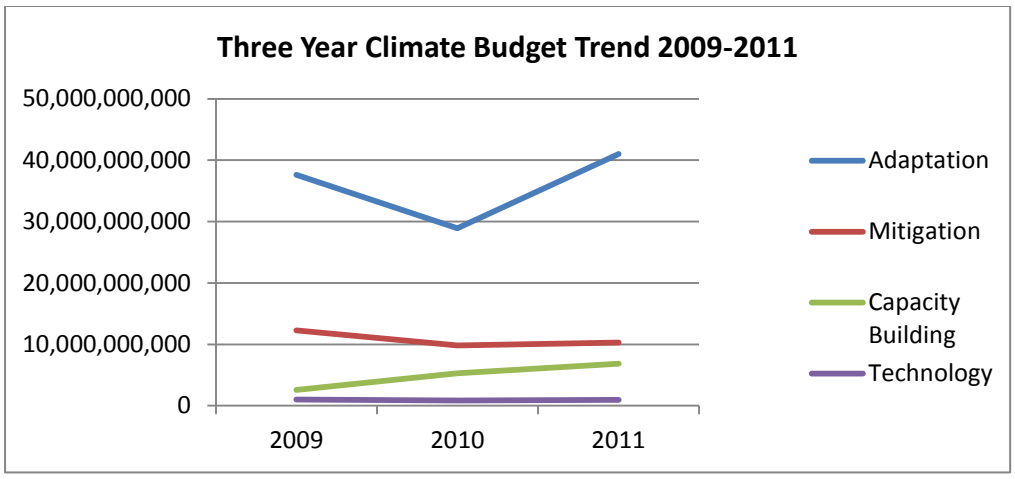
Line items were classified in one of four categories within the overall climate budget. This analysis was completed on an aggregated basis over the three years using the methodology set out in chapter 5. The results are shown below in Figure 13.

Figure 13: Aggregated Climate Budget 2009-2011 By Type



This indicates that around 2/3rd of the national climate budget had been allocated to adaptation and around 1/5th for mitigation. It was noted from the short three-year trend analysis that the adaptation budget displayed the same 'dip and increase' characteristics of the government budget as a whole and has increased in absolute terms between 2009 and 2011. Perhaps the most interesting finding was that the mitigation budget was reduced in 2010 and has not yet returned to its 2009 level as it was relatively static between 2010 and 2011. However, the capacity building budget showed a progressive year-on-year increase over the period. This is illustrated in Figure 14:

Figure 14: Climate Budget Trend Analysis 2009-2011



The data used in Figure 13 and Figure 14 is presented below in Table 22.

Table 22: Classification of Climate Budget By Type 2009-2011

Type	2009	2010	2011	Aggregated Total	%
Adaptation	37,605,709,730	28,894,258,340	40,984,801,200	**107,484,769,270**	68.3%
Mitigation	12,274,759,115	9,822,862,220	10,311,770,650	**32,409,391,985**	20.6%
Capacity Building	2,551,272,946	5,281,642,450	6,836,023,090	**14,668,938,486**	9.3%
Technology	982,046,840	856,512,300	932,407,930	**2,770,967,070**	1.8%
Grand Total	**53,413,788,631**	**44,855,275,310**	**59,065,002,870**	**157,334,066,811**	**100.0%**

Capacity Building

It was noted in the administrative and activity analysis that capacity building activity has increased progressively over the three years. *Prima facie,* this would appear to be largely driven by activity in the Ministry of Education where there has been a significant increase in the number of climate line items in recent years. This is shown in Table 23 below:

Table 23: Climate Budget Line Items 2009-2011

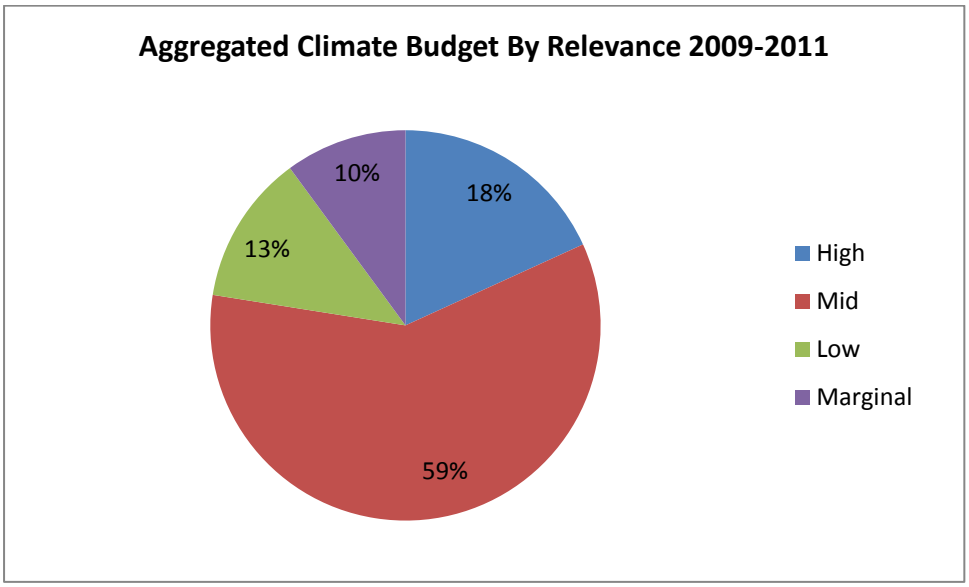
Climate Budget Line Items	2009	2010	2011	Aggregated Number of Line Items
Ministry of Education	3,099	2,520	4,077	9,696
Ministry of Agriculture	2,223	1,794	2,749	6,766
Ministry of Natural Resources and Environment	1,970	1,386	1,868	5,224
Ministry of Energy	896	744	783	2,423
Ministry of Interior	245	614	824	1,683
Other Ministries (9)	302	288	392	982
Total	**8,735**	**7,346**	**10,693**	**26,774**

The ministry which receives the highest budget allocation of capacity building is the Ministry of Education in order to generate human resources. According to the functional analysis, most of this budget is for developing human resources in science and technology to address climate issues. Most of this capacity building is delivered within marginal programmes.

6.7 Climate Budget by Relevance

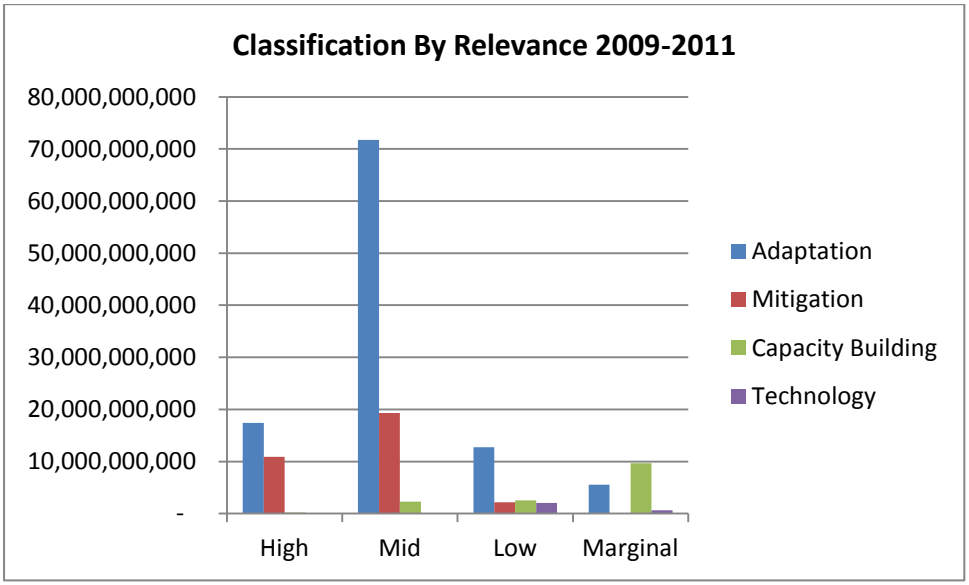
The aggregated climate budget was further classified by relevance based on the methodology. The analysis indicated that around 1/5th of the budget was allocated to codes that were assessed as highly relevant to climate change whilst the majority of the budget was found in mid-relevance programmes (59%). This is illustrated in Figure 15 below:

Figure 15: Climate Budget By Relevance 2009-2011



This data is further analyzed by the type of spend in Figure 16 below:

Figure 16: Classification By Relevance 2009-2011



It can be seen from Figure 16 that the most financially significant element of the overall climate budget is the mid relevance adaptation component. This accounts for around 45% of the aggregated climate budget over the three years 2009-2011. The mid relevance mitigation component (the second highest allocation) accounted for around 12% of the aggregated three year budget. The data used to generate Figure 15 and Figure 16 is presented in Table 24 below:

Table 24: Climate Budget Type By Relevance

Classification	High	Mid	Low	Marginal	Aggregated Budget
Adaptation	17,421,802,280	71,737,275,855	12,756,132,440	5,569,558,695	**107,484,769,270**
Mitigation	10,912,079,550	19,301,814,675	2,195,497,760		**32,409,391,985**
Capacity Building	194,106,900	2,275,830,375	2,550,846,280	9,648,154,931	**14,668,938,486**
Technology	91,119,300		2,031,048,760	648,799,010	**2,770,967,070**
Grand Total	**28,619,108,030**	**93,314,920,905**	**19,533,525,240**	**15,866,512,636**	**157,334,066,811**
Classification	**High**	**Mid**	**Low**	**Marginal**	**% of Climate Budget**
Adaptation	**11.1%**	**45.6%**	8.1%	3.5%	**68.3%**
Mitigation	6.9%	**12.3%**	1.4%	0.0%	**20.6%**
Capacity Building	0.1%	1.4%	1.6%	6.1%	**9.3%**
Technology	0.1%	0.0%	1.3%	0.4%	**1.8%**
% of Climate Budget	**18.2%**	**59.3%**	**12.4%**	**10.1%**	**100.0%**

6.8 Review of High and Mid Relevance Climate Budget

Overview

The high and mid relevance climate budget accounted for over three quarters of the climate budget (78%) and around 2.1% of the overall government budget on an aggregated basis over the period 2009-2011. The key Ministries and type of climate activity, from a financial perspective, are:

- Ministry of Agriculture: **Adaptation** (56.5% of the combined high and mid relevance budget)
- Ministry of Natural Resources and Environment: **Mitigation** (19.9% of the combined high and mid relevance budget)
- Ministry of Natural Resources and Environment: **Adaptation** (14.2% of the combined high and mid relevance budget)

The financial data used to generate these figures is summarized by Ministry at Appendix 5: Aggregated Financial Data High and Mid Relevance Climate Budget and is shown on a percentage basis in Table 25Table 25:

Table 25: High and Mid Relevance Climate Budget Analysis

Ministry	Adaptation	Mitigation	Capacity Building	Technology	High and Mid Relevance Climate Total (%)
Ministry of Agriculture	**56.5%**	0.0%	0.0%	0.1%	**56.6%**
Ministry of Transport	0.0%	2.2%	0.0%	0.0%	**2.2%**
Ministry of Natural Resources and Environment	**14.2%**	**19.9%**	1.6%	0.0%	**35.7%**
Ministry of Energy	0.3%	2.7%	0.0%	0.0%	**3.0%**

Ministry of Interior	2.1%	0.0%	0.2%	0.0%	**2.3%**
Ministry of Science and Technology	0.0%	0.0%	0.2%	0.0%	**0.2%**
High and Mid Relevance Total (%)	**73.1%**	**24.8%**	**2.0%**	**0.1%**	**100.0%**

Mostly, the adaptation functions of the Ministry of Natural Resources and Environment are to improve water storage, to increase water supply and conserve water resource improvement and development for use consistent with ecological matters. The expenses are largely related to land and buildings (61.5%) and personnel (16.7%)

Most mitigation functions of the Ministry of Natural Resources and Environment are in forest conservation areas to manage forest resources effectively and to protect and restore fertility to provide balanced and sustainable use. Activities expenses are operations (22.9%), which are fees for service contracts, repair of motor vehicles, transportation costs, personnel expenses (16.7%), and land and buildings expenses (16.2%).

The adaptation functions of the Ministry of Agriculture and Cooperatives are water distribution for all and to increase water storage and irrigated areas. Expenses are land and buildings costs (68.9%) and personnel expenses (21.0%).

6.9 Public expenditure that leads to increased carbon emissions

The CPEIR methodology aims to identify those expenditures within the national budgetary system that are relevant to improving climate resilience and the mitigation of climate change. Chapter 5 describes the methodology. In the same way, it would be possible to identify those expenditures that reduce resilience or lead to increased carbon emissions. However, the same challenge that exists in identifying climate relevant expenditure would apply: namely to reach consensus as to what constitutes the relevant public expenditures. It is recognised that the level of such expenditure may be significant and therefore warrants attention by policy makers. Two examples highlight some of the major challenges to be faced.

The first example refers to the provision of government subsidies for rubber plantations, which averaged approximately 1,000 million Baht per year between 2009 and 2011. This represents a competing land-use to natural forest cover and, where new planting is undertaken, can lead to deforestation and increased carbon emissions. However, rubber production is a major industry employing about 600 million people and hence the government attaches great importance to the industry. Much of the national rubber production is based on small-holder farming and so is an important income source in many rural areas. Over time, rubber plantations can also sequester carbon – particularly where rubber production replaces rice paddy fields – so detailed data and analysis is required to inform policy development.

The second example refers to road construction in rural areas. Because of the much higher level of expenditure (averaging approximately 61,000 million Baht annually between 2009 and 2011) this warrants further research to improve understanding of the likely consequence on the national carbon budget. Where road construction takes place in rural areas any ensuing forest loss will lead to increased carbon emissions. However, such losses need to be viewed in light of improvements in

the national transportation system, which can be an adaptation strategy to a changing climate by allowing population movement to take place from more to less vulnerable areas (e.g. from the low-lying coastal plain to inland sites). Additional expenditures made to raise road specifications so that they can withstand changing climate conditions (e.g. a greater incidence of storms) can also be viewed as adaptation investments.

As with energy and roads policy in previous CPEIR studies, this illustrates that climate policy, and indeed budgets, compete with economic imperatives in respect of a wider definition of development within public policy and government actions. This evident policy, political and resources dilemma can only be resolved in a rational way by informed decision making. This requires that climate as a policy sphere is set within a financial and performance framework in the government of Thailand and is supported to be considered alongside other aspects of policy.

6.10 Conclusions

The Government budget in Thailand has averaged around 19% of GDP in the period reviewed from 2009-2011 but a significant reduction in the overall budget level was noted in 2010, followed by a sharp increase in 2011. This pattern had significant implications for the climate budget and the key ministries within which the climate budget is held.

On an indicative basis, the climate budget represented around 2.7% of the government total budget. The climate budget was reduced by a greater percentage than the government's budget as a whole in 2010 and increased by a greater percentage in 2011. Economic analysis indicated that the climate budget has a large capital component (45%), which makes deferral or reduction of planned expenditure easier than for recurrent and legally committed or contractual expenditure such as salaries.

The two main Ministries in respect of climate activity are the Ministry of Agriculture and Cooperatives (MoAC) and the Ministry of Natural Resources and Environment (MoNRE), which account for 55% and 29% of the climate budget respectively. In line with the rest of government (with the exception of Public Health) these Ministries experienced sharp reductions in their budgets in 2010 and rapid increases in 2011. In respect of the climate budget within these Ministries, Agriculture's climate budget experienced greater variability, whilst MoNRE's experienced less variability than the government and ministry as a whole. This finding would tend to support the view that the capital intensive cost structure of the climate budget was the main reason for the variability in allocation.

There are 137 agencies involved in the delivery of climate activity in Government. This represents a significant policy and institutional coordination challenge. However, over three quarters of the budget is concentrated in only ten agencies, with two agencies: the Royal Irrigation Department of the MoAC and the National Parks, Wildlife and Plant Conservation Department of the MoNRE making up almost half of the allocated budget for climate related programmes in 2009-2011.

Economic analysis of the climate budget indicates that two key budgets make up most of the planned spend: land and buildings and personnel costs with 45% and 28% of the allocations respectively. As mentioned above, the capital element renders the climate budget susceptible to ready variability as financial resources dictate. This was particularly evidenced in the experience of the budget downturn in 2010.

Adaptation is the single largest component of the national climate budget (making up 68% of the public expenditure budget) and this is consistent with the economic analysis mentioned above in that adaptation in the Thai context is largely capital intensive. Support to mitigation activities comprises another 21% of the climate budget. Relevant capacity building has seen a progressive increase in both activity and budget (up to 9%) in the period reviewed.

In terms of the climate relevance of activity, around 1/5th of the climate budget was allocated to codes that were assessed as being highly relevant to climate change (representing approximately 0.5% of the government budget). This expenditure is supporting specific actions that improve climate resilience or contribute to mitigation, technology transfer and/or relevant capacity building.

The majority of the climate budget was found in mid-relevance programmes. The most financially significant element of the overall climate budget is the mid relevance adaptation component, largely undertaken by the Ministry of Agriculture and Cooperatives through its water distribution and storage programmes. This analysis provides a useful focal point for strengthening the transaction of climate strategy to sector policy and consequently to the recognition of climate activity within mainstream sector activity.

7 SUB-NATIONAL LEVEL ANALYSIS

7.1 Introduction

The sub-national analysis within the CPEIR study aims to complement the national level analysis. The rationale for an explicit local governance component in the CPEIR is that while institutions, policies and financial resources need to be in place to undertake actions aimed to mitigate or adapt to the risks produced by climate change, most of the implementation will take place at the local level and involve local administration units. Moreover, the analysis of the sources of climate finance available at the local level can provide evidence of the strength of the links between national policy and local implementation and provide suggestions on how climate-related investments are translated into local expenditures and actions.

The research methodology adopted for the local government component of the CPEIR is a mix of quantitative and qualitative methods: a review of policies that guide the decentralisation reforms in Thailand, semi-structured interviews with key informants on the understanding of climate change activities and investments, and a mapping of the sources of financing for climate change activities using semi-structured interviews at different levels of the sub-national administration. In addition, the plans, projects and related climate change expenditures have been tagged using the classification developed by Bird et al. (2012).

Data collection was conducted in two case study areas: a Tambon Municipality and a Tambon Administrative Organisation. The choice of these two administrations has been determined by the following considerations: i) the human and financial resources as well as the time available to conduct the investigation; and ii) The decision to investigate sub-national institutions that belong to the category of democratic decentralisation, i.e. where officials are elected and where local institutions have a certain degree of decision making autonomy from the central level.[43] Representatives of relevant line agencies at the provincial level have been interviewed in the two case study areas. Provincial institutions have not been assessed separately because they represent deconcentration or administrative decentralisation where local line agencies have limited autonomy from the central government (ESCAP 2003).

The first case study area, the municipality of Mueng Klang, is located in Rayong province, 215 km southeast from Bangkok. Mueng Klang was upgraded to a Sub-district (Tambon) Municipality in 1981. The municipality area covers 14.5 square kilometres; it has a tropical monsoon climate and is near the sea (Figure 17). The Pra Sae river cuts across the municipality area. The areas to the east of the Pra Sae river are primarily devoted to agriculture. West of the river are located most of the communities, businesses, factories, and government offices. There are 13 communities in the municipality with a total population of 17,254. Most people are engaged in farming (rubber and fruits), fisheries, animal husbandry, and industry (rubber furniture, rubber wood drying, etc.). Mueng Klang was selected because it is explicitly concerned with climate change issues and plans to become a 'low carbon city'. This municipality was also suggested as a best practice example during interviews at the Department of Local Administration (DoLA).

[43] Source: Economic and Social Commission for Asia and the Pacific [ESCAP] (2003): Local Government Structure in Thailand: Local Government Structure and Decentralization of Autonomy. Available at http://bit.ly/Kc6AOH

Figure 17: Mueng Klang

The second case study area, Bang Num Phueng Tambon Administrative Organization (TAO) is located in Prapadaeng district, Samutprakarn province (25 km southeast of Bangkok) and has an area of 3.1 square kilometres. Most of the area is a plain and located along the Chao Pra Ya river (Figure 18). Bang Num Phueng comprises 11 villages, with a total of 4,713 inhabitants who belong mainly to the Thai, Mon and Chinese ethic groups. Most of the inhabitants are farmers engaged with orchards, fish farming, vegetable gardens, etc. Given the proximity to Bangkok, the inhabitants are also employed in factories and private companies as well as in government offices. One of the main attractions of Bang Num Phueng is the weekly floating market which is one of the more famous in the country and attracts about 20,000 visitors each weekend generating approximately 2 million Thai baht which goes mainly to local communities and to support the local agricultural and handicraft products. Due to its location, the TAO administration of Bang Num Phueng is also promoting eco-tourism.

During the planning of the field work and data collection at sub-national level it was challenging to identify a TAO with clear and well defined climate change activities. TAOs usually have limited annual budgets and climate change activities are not their first priority. Bang Num Phueng was selected because the president of the Tambon Administrative Organisation Association of Thailand suggested it since it is located in a rural area and is known to be concerned with protecting the local environment.

Figure 18: Bang Num Phueng

The local government analysis included in this chapter has to be seen in the light of some limitations. The two case study areas are not representative for the whole country. As the research methodology of the local governance component of the CPEIR is evolving, the sub-national analysis of the CPEIR in Thailand has therefore to be seen as a test case that, in addition to the ones of Nepal and Bangladesh, will contribute to strengthen the methodology and framework even further so that it could be applied within a subsequent sampling scheme.

7.2 Decentralisation reforms in Thailand

The local government structure in Thailand started to be defined in 1932 when the constitutional monarchy was introduced. However, a series of military coups prevented a full decentralisation process until 1997. Prior to that Thailand's public administration was highly centralized with decision making authority at the centre and a public administration organized in three main layers: the central, regional, and local levels.[44]

The Constitution of the Kingdom of Thailand of 1997 introduced major changes in the local government structure and organisation. The Constitution included provisions for local authorities that have led to the passing of various Local Government Acts and the introduction of the Decentralisation Plan and Process Act in 1999, known as the Decentralisation Act of 1999 (Government of Thailand, 1999). This Act established the National Decentralisation Committee (NDC) to lead decentralisation reform in Thailand. This an inter-ministerial body led by the Prime Minister.[45] As mandated by the Decentralisation Act of 1999 and Act No.2 of 2006 the role and responsibility of the NCD is to design decentralisation policies and define intergovernmental transfers to the local administrations. Specific responsibilities include drafting of decentralisation plans as a guideline for the devolution of functions and central personnel to local governments; the design of revenue assignment and the intergovernmental transfer formula; and monitoring and evaluating the devolution process and its impacts on local constituencies.

The 1999 Decentralisation Act was intended to limit the Ministry of Interior's (MoI) influence on local governments and encourage greater local autonomy. The Act set a fiscal decentralisation target of the share of local revenues over the total net revenues of 20% by 2001 and 35% by 2006. This target has not been reached and remains an unresolved problem for policy makers. The interim government led by General Surayud Chulanont between 2006 and 2008 amended the Decentralisation Act of 1999 and passed the Decentralisation Act No. 2 (Government of Thailand, 2006). While the target of 35% of local revenues remained, the new Act did not set a deadline to achieve that target. The new Act (ibid.) states that the share of local revenues (i.e. locally levied revenue + revenue sharing from the central government + grants) to the total central government net revenues shall not be less than 25%. Moreover, the amount of funds transferred from the centre shall correspond to the activities of local governments.

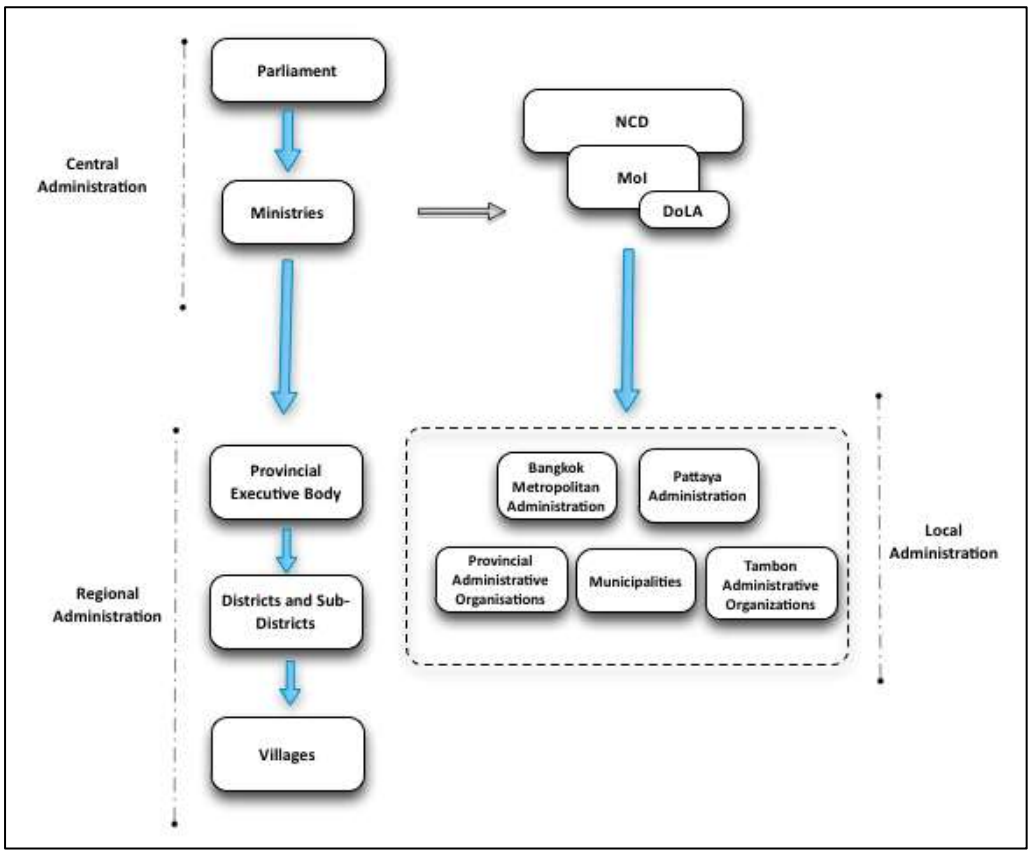
[44] Fiscal data from the Ministry of Finance indicated that in 1998 central revenues represented over 85 % of the total public revenues while sub-national level revenues were 10 % of the total public revenues. Moreover, local expenditures accounted for about 15 % of total public spending.

[45] Other members of the NCD are: the Minister of Interior, the Minister of Finance, the permanent secretaries of the Ministry of Interior, Ministry of Finance, Ministry of Health Care and the Ministry of Education, the Secretary General of the Council of State, the Secretary General of the Civil Service Commission, the Secretary General of National Economic and Social Development Board, the Director of the Budget Bureau, the Director-General of the Department of the Local Administration, twelve local government representatives and twelve scholars.

The structure of public administration in Thailand

The Thai public administration is organized at three administrative levels: the Central Administration, the Regional Administration, and the Local Administration (Figure 19).

Figure 19: Central, regional and local administrations



Source: adapted from the Constitution of Thailand 1997.

The Central Administration is led by the Prime Minister's Office who line manages ministries and departments. There are 20 ministries (including the Prime Minister's Office) that form the government of Thailand.

The Regional Administration covers provinces, districts and sub-districts, and villages. Line agencies operate at these various levels with different responsibilities. This can be seen as the administrative extension of the Central Administration at the provincial level (i.e. deconcentration). The provincial governor who is appointed by the Ministry of the Interior (MoI) oversees, but does not lead, the task and activities of the line agencies and is accountable to MoI. The heads of line agencies at provincial level are accountable to their respective ministries with their staff appointed by the ministries.

The third level, the Local Administration, has been designed as a two-tier system independent from each other. At the upper level are the Provincial Administrative Organizations (PAOs) that coordinate and assist local government units within each province in delivering key public services. The other local administration organisations include municipalities and Tambon Administration Organizations (TAOs) that enjoy a good degree of decision making autonomy and are responsible for the provision of services and support to their constituencies. There is therefore not a strict hierarchy between provinces, municipalities and Tambons. Urbanised areas are called municipalities and are led by mayors and municipal councils, which are elected every four years. There are 2,082

municipalities in Thailand. Rural areas are divided in TAOs. TAOs are led by a TAO leader elected every four years. Currently there are 5,693 TAOs in the 76 provinces of Thailand. Large urban areas such as Bangkok Metropolitan Administration (BMA) and Pattaya City have an ad hoc administration. Overall, there are total of 7,853 units of local government in Thailand as of December 2011.[46]

As mandated by the Decentralisation Act of 1999 and Act No.2 of 2006, the NDC designs the main policies that define the role and responsibilities of the Local Administrations. The reform programme has yet to resolve the tension between the role assigned to the NCD and the role of DoLA, which has traditionally overseen the activities of local administration organizations and is required to provide training and guidance to local administrations on a wide range of issues, such as budgeting and planning. This results in overlaps between the two agencies which lead to tensions over decision making.

As noted by Lee (2011), the Ministry of Natural Resources and Environment (MoNRE) is identified by most local stakeholders as the focal point for climate change in Thailand. However, it is widely recognized that MoNRE has limited experience of working with local administrations and therefore has not been able to establish a credible working relationship to support local administrations on climate change. It is also perceived that MoNRE may focus too much on textbook policy rather than the practice of programme implementation.

Sub-national fiscal management

The government of Thailand has adopted a 'revenue sharing approach' in allocating fiscal revenues from central government to local administrations, where the share of local government revenues relative to the central government total net revenues should be at least 25% (with a stated goal of 35%). However, the share of locally levied revenues relative to the transfers from the central administration remains low so that the central government continues to provide a large amount of grants to local governments.

The local government revenues structure is formed by three main sources:

Locally levied revenues: consists of taxes such as a property tax on buildings and land, and a land development tax. A special characteristic of locally levied tax revenues is the uniformity across the country of the tax rate determined by the central government. Non-tax revenues are also included in this category and all local government administrations are entitled to collect license fees and fines, retain income from their assets, collect revenues from utility provision and other miscellaneous fees. The drawback is that local governments in Thailand have been given limited power to raise their own tax revenues. Within the limits of their power, they appear reluctant to collect or suggest new local taxes as this can be politically risky.

Shared taxes: a proportion of some taxes collected by central government (e.g. Value Added Tax), are returned to local administrations based on the contribution by local administration in their collection.

Grants: these are transfers from the central government based on a formula designed by NCD that reflects population size as well as other factors such as needs for specific social services. In addition there are so called specific grants, which are also allocated by the DoLA for specific purposes such as

[46] Source: Department of Local Administration, Ministry of Interior.

basic education. Specific grants are approved following parliamentary debates and are perceived to be susceptible to political influence.

The distribution of revenues among the different types of local administration is summarized in Table 26. Most of locally levied taxes are revenue of municipalities, TAOs, BMA and Pattaya city. Except the taxes on the retail sale of cigarettes, tobacco and gasoline and hotel rental tax are collected by PAOs. For shared taxes, the value added tax and the mineral and petroleum tax are sources of revenue of all LAOs. PAOs only receive motor vehicle tax and they do not receive any other shared taxes. Airport fees are a source of revenue for municipalities, TAOs and BMA. Moreover, underground water fee, royalty fee for forestry and royalty fee for fishery are TAOs' revenue.

Table 26: Revenues' assignment to local administrations

	PAOs	Municipalities	TAOs	Bangkok	Pattaya
Locally levied taxes					
Building an Land tax		**X**	**x**	**X**	**x**
Land Development tax		**X**	**x**	**X**	**x**
Signboard tax		**X**	**x**	**X**	**x**
Animal slaughter tax		**X**	**x**	**X**	**x**
Bird nest collection tax		**X**	**x**	**X**	**x**
Retail sale of cigarettes, tobacco, gasoline	**X**				
Hotel rental tax	**X**				
Shared taxes					
Value added tax	**X**	**X**	**x**	**X**	**x**
Specific business tax		**X**	**x**	**X**	**x**
Excise tax		**X**	**x**	**X**	**x**
Liquor tax		**X**	**x**	**x**	**x**
Motor vehicles tax	**X**				
Mineral and petroleum tax	**X**	**X**	**x**	**x**	**x**
Gambling tax		**X**	**x**	**x**	**x**
Fee, Fines, and Charges					
Underground water fee			**x**		
Royalty fee for forestry			**x**		
Royalty fee for fishery			**x**		
Airport fee		**X**	**x**	**x**	

Source: National Decentralization Committee

Table 27 (below) shows that the ratio of local revenues to the government net revenues has remained constant between 2008 and 2011 at around 25 – 26 %. This is up from about 20 % in the early 2000s. The trend of over the last ten years shows an increase and consolidation of the contribution that locally raised taxes make to local expenditures. Shared taxes and grants remain the larger sources of revenues compared to the locally levied taxes and have increased over time. The outcome is that the central government has to pay/transfer a considerable share of the local

administrations' budgets, which contradicts the objectives of fiscal decentralisation and local revenues generation.

Table 27: Sources of Local Administrative Revenue (Fiscal years 2008-2011)

Sources of Revenues	**2008** (1,000,000 Baht)	**%**	**2009** (1,000,000 Bhat)	**%**	**2010** (1,000,000 Bhat)	**%**	**2011** (1,000,000 Bhat)	**%**
1. Locally levied revenues	35,223	9.4	38,746	9.4	29,110	8.5	38,746	8.9
2. Shared taxes	193,676	51.4	212,579	51.3	171,990	50.4	218,609	50.8
3. Grants	147,840	39.2	163,057	39.3	139,895	41.1	173,900	40.2
4. Total Local Revenue	**376,740**	**100**	**414,382**	**100**	**340,995**	**100**	**431,255**	**100**
5. Net Government Revenues	**1,495,000**		**1,604,640**		**1,350,000**		**1,650,000**	
4 / 5 (%)	**25.2**		**25.8**		**25.3**		**26.1**	

Source: Office of Decentralization to Local Government Organization Committee, Office of the Permanent Secretary, The Prime Minister's Office.

An additional and growing source of revenue for local administrations are external funds that are outside the government fiscal transfer system. These funds are received from international development partners, the private sector and NGOs, and are usually earmarked to the implementation of specific programmes and projects. For example, the Royal Embassy of Denmark has provided funding to the municipality of Nonthaburi to support 75 per cent of its expenditure on wastewater management. Another example refers to Bangkok where Bangchak Petroleum Public Co. Ltd is collaborating with the Bangkok Metropolitan Administration on a project to pilot the conversion of used cooking oil into biodiesel. Other examples of external sources of climate investments which go to local administrations and their intended use to delivering climate activities are listed in Table 28.

Table 28: Some external sources of climate investments

Sources of climate investments	**Climate activities**
United Nations Environment Programme (UNEP)	Awareness raising, guideline development, climate change assessment report, sustainable social housing initiative
French Development Agency (AFD)	Building local administration's capacity to implement climate change activities
Japan International Cooperation Agency (JICA)	Training local administration's staff to develop understanding of, and capacity to, address climate change
Clinton Climate Initiative	Supporting energy efficient building through a retrofitting programme
World Bank	Support through the Global Environmental Facilities (GEF) Capacity building on auditing, technical support on feasibility study, implementation of coastal adaptation strategy
Private sector investments	Supporting the conversion of used cooking oil to biodiesel Developing waste recycling systems in universities and collection of recyclables from villages

Source: Lee, 2011.

As noted by Lee (2011), external funding is a popular choice of climate investment for local administrations. However, the time-bound nature of the funding makes this source highly

unsustainable, which presents a challenge for climate change activities that require longer term planning and budgeting.

Overall, and despite these reforms, the perception is that Thailand remains a highly centralized country with limited mandate and powers bestowed on elected local administrations. The Law governing the roles and responsibilities of local administrative organizations gives limited autonomy in setting plans and programs. The outcome is that policies that require integrated implementation at the local level (such as on climate change) are difficult to achieve.

With regard to financing, the largest share of the local administration revenues is from centrally shared revenues and government grants. Locally generated revenues and external funding while promoting local ownership and innovation, are only a small proportion of the local administration's overall revenues. A significant source of local finance which remains to be explored are the revenues that line agencies and departments receive from line ministries to implement sector specific programme and projects.

7.3 Understanding of climate change at the sub-national level

The results of our interviews show there are differences in the understanding of what constitutes climate change activities in the two case study areas. While the mayor of the municipality of Mueng Klang is clear on what mitigation and adaptation activities are, the leaders of the Bang Num Phueng TAO referred to climate change and environmental protection activities as being synonymous. This result is slightly different from the results of the study conducted by Lee (2011) who found that 'the terms 'climate change', 'sustainable development' and 'environmental protection' are often used interchangeably … and …, 'some local authorities consider their sustainable environmental management plan as the local climate change plan.' The result of our investigation confirms that urban areas, such as the municipality of Mueng Klang, mitigation activities are more visible than adaptation and, as explained by the mayor, it is not difficult to convince people to take mitigation actions as these are related to everyday life.

The tambon municipality of Mueng Klang

The tambon municipality of Mueng Klang started to be concerned with climate change issues in 2001. It has therefore acquired considerable experience in planning and implementing activities that tackle the negative effects of climate change. The Thailand Environment Institute Foundation selected Mueng Klang to be one of their two pilot cities to adopt the ISO 14001 certification for the management of the local administration. The ISO 14001 certification has created the incentive to set a yearly mitigation goal (e.g. reduced waste, increased green areas and environmental friendly mass transportation). The International Council for Local Environmental Initiatives has also selected Mueng Klang to be one of five pilot cities to join their reducing global warming project. In addition, the mayor of Mueng Klang, Mr. Somchai Jariyacharoen, has been invited to join conferences and field studies such as the World Asian Urban conference in China and field studies in Canada and South Africa.

As mentioned by the mayor, climate change activities in his municipality can be divided into five main categories:

1. Waste management: the municipality manages the separation of waste from ten nearby local administrations before it is sent to land-fill sites. Separated waste is converted into a source

of energy to produce electricity and biogas. Organic waste is used to produce organic fertilizers (Figure 20).

Figure 20: Biogas storage system, waste separation, organic fertilizer

2. Reduced food transportation: an assessment conducted by the municipal administration found that farmers had planted many rubber trees and had allocated too little space for rice production generating only two percent of the local demand for rice. This resulted in rice, as well as vegetables and fruit, being transported from outside the municipality. The municipality has therefore undertaken campaigns to encourage farmers to cultivate more food crops, which will contribute to reduced food transportation distances and the mitigation of the carbon emissions of transportation.
3. Monitor traffic flows and provision of public bus services: with support from the International Council for Local Environmental Initiatives, the municipality conducted a survey of the traffic flows which concluded the vehicle density in the roads of the city was too high. This has led to the introduction of a traffic scheme in 12 out of 13 communities of the municipality which consists of a mix of traffic control ordinances (Tes Sa Ban Yut), agreements with the private sector that all new buildings should provide parking areas, and the provision of public transportation to citizens, particularly elderly and students.

Figure 21: Provision of public transportation

4. Energy savings: municipal buildings have energy usage monitoring systems certified under the ISO 14001 scheme. Moreover campaigns about energy saving and the promotion of environmentally friendly and efficient electric appliances are also being conducted. A public learning center has been established in Mueng Klang and a second learning center is under construction with financial support provided by Toyota Corporation, Thailand Green House Gas Management Organization, and the Thailand Environment Institute Foundation.
5. Expansion of green areas: the municipal administration aims to provide more green spaces to it citizens. Currently the largest open space in the area is 132 rais (or 19 hectares) and is used as a public park and a sports field.

Overall, the municipal administration of Mueng Klang, led by a climate change conscious mayor, who has been elected over three consecutive terms and has a good understanding of climate change activities, which in this urban area refer mostly to mitigation actions. In particular, the activities related to waste management and composting have proven to be a source of additional revenues for the municipality which, according to the mayor, has already helped to cover the investments in dedicated technology for methane production, biogas, compositing, and waste separation.

The Tambon Administration Organisation of Bang Num Phueng

The chief executive of the TAO of Bang Num Phueng, Mr. Sumnua Rasmitat, and his administrative team told us that Bang Num Phueng suffers from two main problems: 1) Businessmen buy land from residents as an investment but leave it vacant and unproductive; 2) The waste that flows with the Chao Pra Ya river to the TAO area.

This is a very environmental conscious TAO which derives a considerable income from the floating market activities at weekends and has also received an environmental award. Community meetings facilitated by the TAO staff have led to agreements not to cut any trees in the area unless authorisation is provided by the administration. Moreover, farmers in the TAO are trying to replace chemical fertilizers and pesticides with organic fertilizer and pesticides. The medium term goal is to make Bang Num Phueng an eco-tourism destination.

Figure 22: Organic fertilizers, fruits plantation, waste water filter



The respondents listed the following climate change related activities during interviews which show that the main concerns currently are about environmental protection:

1. Reforestation: recently the Kasikorn Bank has provided more than one million THB to the Bang Num Phueng administration for the Kon Rux Pa Project (People love and take care of the forest project).

2. Wastewater treatment: there are 11 large wastewater treatment ponds in the TAO area. some were built with financial support from the Kasikorn Bank (1,500 THB each). Thirty small wastewater treatment ponds have been supported by the Chaipattana foundation. Floating market sellers generate about 200 liters per week of greasy water when cleaning dishes and pots. This cleaning now occurs in dedicated areas where the wastewater is collected and sent to land-fills.
3. Waste management**:** the Bangchak Petroleum Company (BCP) has provided financial support to develop waste separation facilities and microbe waste treatment

7.4 Mapping of climate change investments at sub-national level

Local administrations are developing climate plans and budgets, particularly through 'greening' their on-going service provision (Lee, 2011), yet these administrations have limited autonomy and discretion to plan activities and mobilize their funds for climate change issues. At the same time, as noted by Lee (ibid.), when plans are implemented locally they are too localized and unsustainable. Local administrations are now beginning to demand better national guidelines and a clearer definition of climate change.

The tambon municipality of Mueng Klang

Most of the municipal budget allocated to climate change related activities in Mueng Klang comes from the current budget. For example, the budget for planting trees comes from the agriculture materials budget. The budgets for climate change activities are also complemented by income generated by municipal climate change programs such as the production and sale of manure and organic fertilizer as well as the recycling and separation of plastic bags, milk and juice boxes. This can generate approximately 100,000 Baht each month. The municipality administration uses this income to support climate change activities and technology such as waste separation belts.

The projects implemented by the municipality of Mueng Klang in the fiscal years from 2009 to 2011 have been categorized following the classification used for the national budget of this CPEIR study: adaptation activities, mitigation activities, capacity building activities and technology transfer activities. In each category climate change related activities are further classified for their relevance to climate change: highly relevant (more than 75 %), medium relevance (50 % - 75 %), low relevance (25 % - 49 %), and marginal relevance (less than 25 %) (see Chapter 5). The detail of the project classification is shown in appendix 6. The tables below summarise the result of the categories in each fiscal year from 2009 to 2011.

In 2009, there were 22 projects related to climate change which can be clustered as follows:[47]

[47] The sum of adaptation, mitigation, capacity building and technology transfer project is greater that 22 because some of the project have included in more than one category.

Table 29: Classification of climate change projects in Mueng Klang in 2009

Adaptation projects:	18	High relevance	1
		Medium relevance	4
		Low relevance	1
		Marginal relevance	12
Mitigation projects:	5	High relevance	0
		Medium relevance	3
		Low relevance	1
		Marginal relevance	1
Capacity building projects:	11	High relevance	1
		Medium relevance	4
		Low relevance	1
		Marginal relevance	5
Technology transfer projects:	1	High relevance	0
		Medium relevance	1
		Low relevance	0
		Marginal relevance	0

The total municipal budget allocated to climate change related activities in 2009 was 15,298,984 Baht or 16% of the municipality total budget. The share of the budget for adaptation activities was 1,935,697 Baht, equal to 12.7 % of the climate change budget. Mitigation interventions had the largest budget allocation with 7,875,226 Baht or 51.5 % of the climate change related budget. Capacity development initiatives were funded with 223,039 Baht or 1.5 % of the climate change budget; and technology transfers were funded with 5,265,022 Baht, 34.4 % of the climate change budget.

In 2010, there were 22 projects related to climate change which can be classified as follows:

Table 30: Classification of climate change projects in Mueng Klang in 2010

Adaptation projects:	18	High relevance	1
		Medium relevance	4
		Low relevance	1
		Marginal relevance	12
Mitigation projects:	5	High relevance	0
		Medium relevance	3
		Low relevance	1
		Marginal relevance	1
Capacity building projects:	11	High relevance	1
		Medium relevance	4
		Low relevance	1
		Marginal relevance	5
Technology transfer project:	1	High relevance	0
		Medium relevance	1
		Low relevance	0
		Marginal relevance	0

The total budget allocated for 2010 for the activities included in table 24 was slightly higher than in 2009 at 15,488,768 Baht, but a slight decrease of the percentage of the overall municipality budget (from 16.0% in 2009 to 15.7% in 2010). Of this total, the budget for adaptation was 928,364 Baht or 6.0% of the climate change budget. Mitigation remained the highest share of the budget on climate change with 8,518,571 Baht (55.0%). The allocation for capacity building initiatives increased in 2010 to 254,919 Baht or 1.6 % of the climate change budget. Technology transfer remained the second

largest item in the climate change activities with 5,786,914 Baht or 37.4 % of the climate change related budget.

In 2011, there were 23 projects related to climate change activities which can be classified as follows:

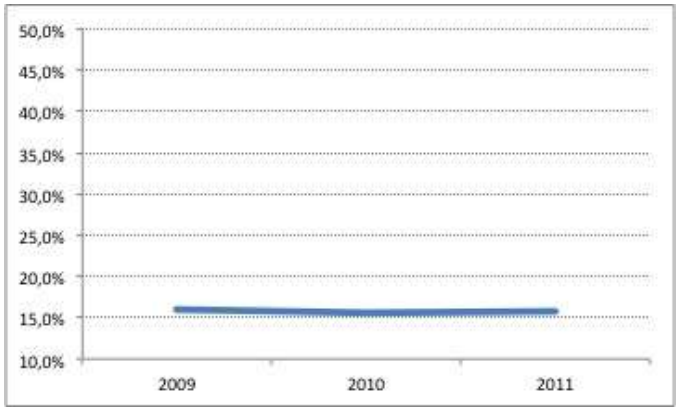
Table 31: Classification of climate change projects in Mueng Klang in 2011

Adaptation projects:	19	High relevance Medium relevance Low relevance Marginal relevance	1 4 1 13
Mitigation projects:	5	High relevance Medium relevance Low relevance Marginal relevance	0 2 1 2
Capacity building projects: 11		High relevance Medium relevance Low relevance Marginal relevance	1 4 1 5
Technology transfer project: 1		High relevance Medium relevance Low relevance Marginal relevance	0 1 0 0

The total budget allocated to climate change activities was 14,853,766 Baht or 15.9 % of the annual municipality budget, a decrease both in the total amount as well percentage compared to 2010. The budget for adaptation initiatives was 1,403,136 Baht (9.4%) while for mitigation activities it was 8,044,080 Baht or 54.2%; for capacity building it was 247,418 Baht or 1.7%; and for technology transfer it was 5,159,133 Baht or 34.7 %.

Overall, the investment in climate change as a percentage of the annual municipality budget has remained constant in Mueng Klang between 2009 and 2011 at around 15.5 %.

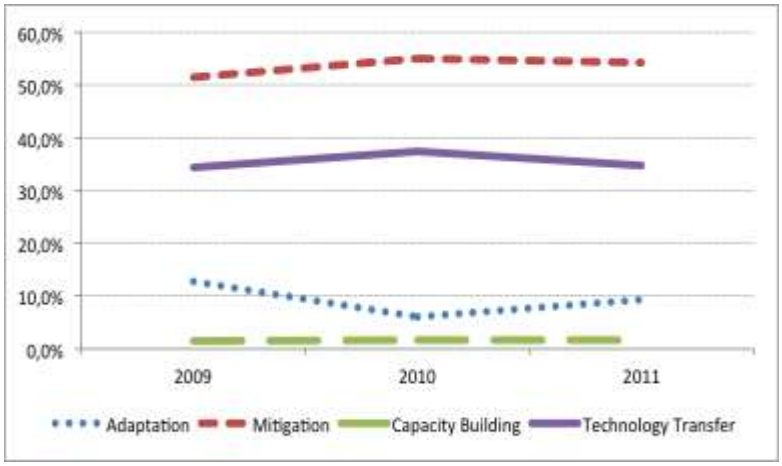
Figure 23: Climate change investments in Mueng Klang
(as a percentage of the municipality total budget)



Source: Mueng Klang Sub-district Municipality Annual Budget for fiscal years 2009- 2011

During the same period, investments in mitigation projects have continued to represent the largest share of the climate change budget followed by technology transfer, adaptation and capacity development.

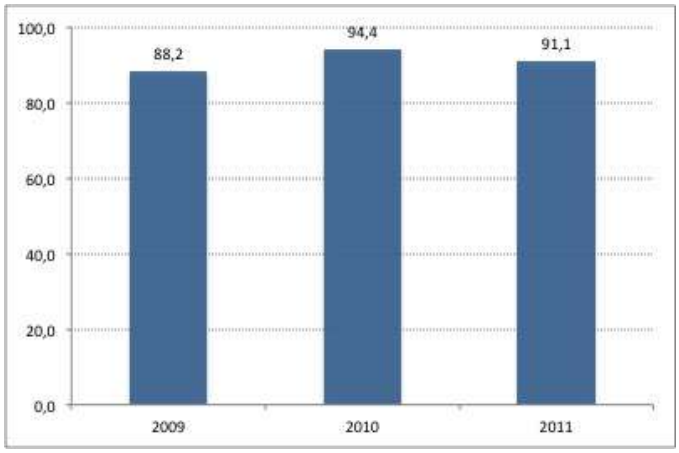
Figure 24: Distribution of climate change investments (2009-11)
(as a percentage of the municipality climate change budget)



Source: Mueng Klang Sub-district Municipality Annual Budget for fiscal years 2009-2011

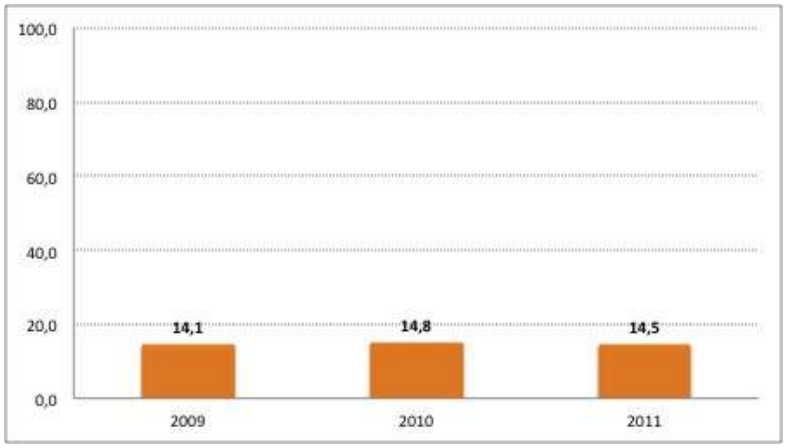
The classification of the climate change expenditures for the municipality of Mueng Klang (Tables 29, 30, 31) has shown that in the three years from 2009 to 2011 there has been a mix of highly relevant and medium relevant climate change investments. Figure 25 below shows the trend of high and medium relevant investments over the three years from 2009 to 2011 as a percentage of the annual climate change municipality budget. The trends show that in the case of Mueng Klang most of the climate change investments (mainly mitigation) have been consistently highly or medium relevant.

Figure 25: Trend of annual high and medium relevance climate change expenditure
(as a percentage of the annual climate change budgets)



When we compare the high and medium relevant climate change investments to the annual municipality budget (Figure 26) we find that these investments have been around 14 % of the annual municipality budget, evidence that the municipality administration has maintained its commitment towards climate change investments.

Figure 26: Trend of annual high and medium relevance climate change expenditure
(as percentage of the annual municipality budgets)



The Tambon Administration Organisation of Bang Num Phueng

Most of the budget available to Bang Num Phueng administration is allocated to infrastructure construction and/or maintenance. The analysis of the annual budgets from 2009 to 2011 shows that approximately 5% or less (ca. 1,000,000 Baht) of the TAO annual budget of 20 million Baht is allocated towards climate change related activities. While a small percentage of this budget comes from donations from people of the TAO area, the majority is derived from the private sector. Each year, the TAO receives financial support from BCP of around 2 million Baht, 1-2 million Baht from PTT, and 200,000 Baht from TNT for climate change related activities. The Kasikorn Bank supports 200,000-300,000 Baht per project, and various schools provide 400,000-500,000 Baht for bio fertilizer and tree planting. The chief executive of the TAO mentioned that he is not aware of government funding on climate change and how the TAO can apply for it.

In 2009, there were 8 projects related to climate change can be classified as follows:[48]

Table 32: Classification of climate change projects in Bang Num Phueng in 2009

Adaptation projects:	5	High relevance Medium relevance Low relevance Marginal relevance	0 1 2 2
Mitigation projects:	2	High relevance Medium relevance Low relevance Marginal relevance	0 2 0 0
Capacity building projects:	1	High relevance Medium relevance Low relevance Marginal relevance	0 0 1 0
Technology transfer projects:	1	High relevance Medium relevance Low relevance Marginal relevance	0 0 1 0

[48] The sum of adaptation, mitigation, capacity building and technology transfer projects is greater than eight because some of the projects are included in more than one category.

The total budget which is allocated to climate change related projects is 745,000 Baht or 2.7% of the total budget. Of this money, the budget for adaptation was 540,000 Baht (72.5 %); for mitigation 165,000 Baht (22.1%); for capacity building 20,000 Baht (2.7%); and for technology transfer it was 20,000 Baht (2.7%).

In 2010, there were nine projects related to climate change activities can be classified as shown in Table 33 below:

Table 33: Classification of climate change projects in Bang Num Phueng in 2010

Adaptation projects:	6	High relevance Medium relevance Low relevance Marginal relevance	0 1 3 2
Mitigation projects:	2	High relevance Medium relevance Low relevance Marginal relevance	0 2 0 0
Capacity building projects:	3	High relevance Medium relevance Low relevance Marginal relevance	0 1 2 0
Technology transfer projects:	2	High relevance Medium relevance Low relevance Marginal relevance	0 1 1 0

The total budget which was allocated to climate change projects was 741,000 Baht or 3.2% of the total budget. Of this budget, the budget for adaptation was 300,000 Baht (40.5%); for mitigation it was 189,500 Baht (25.6%); for capacity building it was 67,000 Baht (9%); and for technology transfer it was 184,500 Baht (24.9 %).

In 2011, there were 16 projects related to climate change:

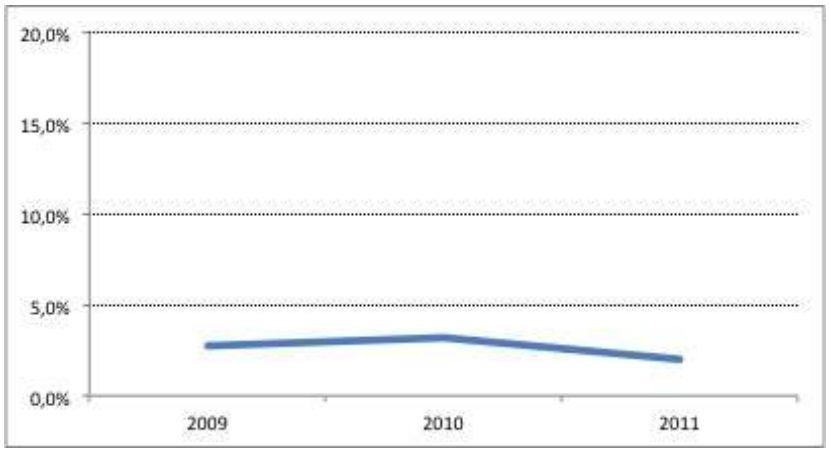
Table 34:Classification of climate change projects in Bang Num Phueng in 2011

Adaptation projects:	15	High relevance Medium relevance Low relevance Marginal relevance	0 5 1 9
Mitigation projects:	3	High relevance Medium relevance Low relevance Marginal relevance	0 2 0 1
Capacity building projects:	8	High relevance Medium relevance Low relevance Marginal relevance	0 4 1 3
Technology transfer projects:	0	High relevance Medium relevance Low relevance Marginal relevance	0 0 0 0

The total budget which was allocated to climate change projects was 470,100 Baht or 2% of the total budget. Of this money, the budget for adaptation was 241,343 Baht (51.3 %); for mitigation it was 33,914 Baht (7.2%); and for capacity building it was 194,843 Baht (6,400 USD) (41.4 %).

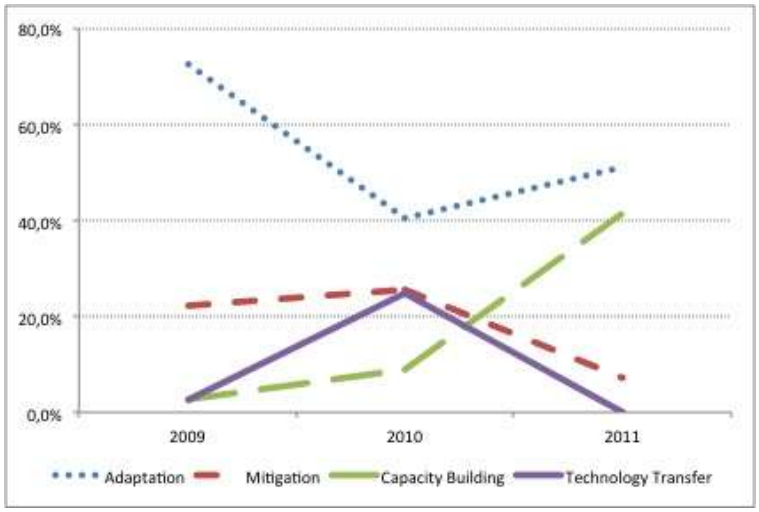
Overall, the investment in climate change as a percentage of the annual municipality budget has remained constant in Bang Num Phueng between 2009 and 2011 at around 2.6 % of the annual TAO budget, with a slight decrease in 2011. The detail of the project classification is shown in appendix 7.

Figure 27: Climate change investments in Bang Num Phueng (as % of annual TAO budget)



During the same period, as shown in Figure 28, investments in adaptation (linked to environmental conservation and waste water management) have continued to represent the largest share of the climate change budget. The budget on capacity building has increased considerably in 2011 compared to the other budgets and has corresponded with a decrease in budget allocated to technology transfer and mitigation activities. The variability of budget availability between years shows the difficulty that TAO face when planning multi-year activities.

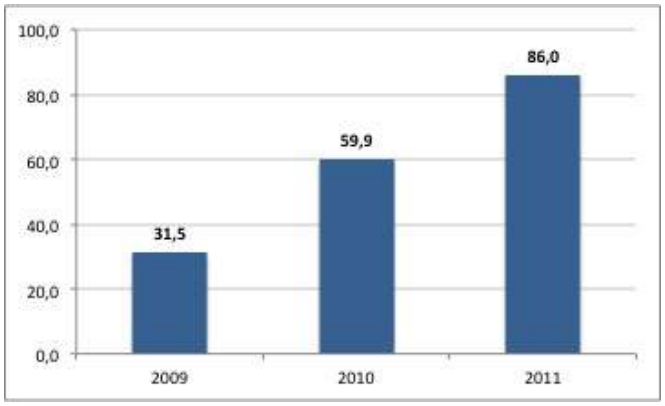
Figure 28: Distribution of climate change investments in Bang Num Phueng (as % of climate change TAO budget)



The classification of the climate change expenditures for the TAO of Bang Num Phueng (Tables 32, 33, 34) has shown that in the three years from 2009 to 2011 no highly relevant climate change investments were made in the TAO. However, there have been medium relevant investments which

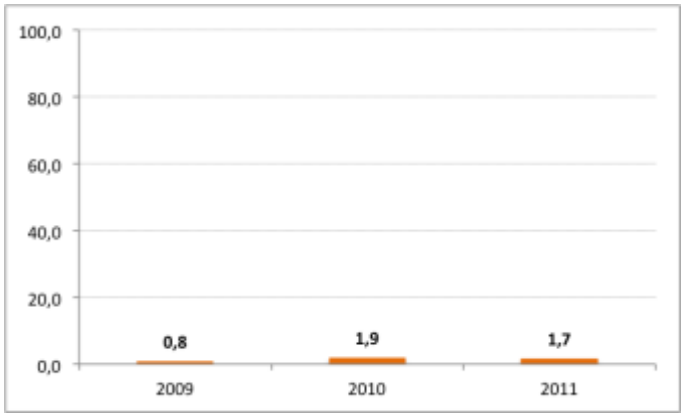
in Figure 29 are analysed as a percentage of the total annual climate change TAO budget. The trend shows same variability between the years and results in an average for medium relevant investments over the three years of 59.1% of the annual TAO climate change investments.

Figure 29: Trend of annual medium relevance climate change expenditure
(as a percentage of the annual climate change budgets)



When we compare the medium relevant climate change investment to the annual TAO budget we can see how negligible these climate change investment still are (Figure 30).

Figure 30: Trend of annual medium relevance climate change expenditure
(as a percentage of the annual TAO budgets)



In the next section we move to the third area of analysis of the CPEIR sub-national analysis and look at local planning processes in the two case study areas to assess the characteristics of the technical input and support provided to local administration by line agencies.

7.5 Local planning processes and the interaction between elected sub-national bodies and key line agencies

As noted by Lee (2011), sub-national institutions are already addressing climate change to varying degrees. However, there is some confusion about the roles, responsibilities, and budget allocations vis-a-vis the central government. A key feature of local government in Thailand (as well as other countries in the region) is the dual structure of the local administration and provincial offices of line Ministries and Departments. Local administrations are directly elected and are considered to be the

key service provider for communities. Provincial offices of line Ministries and Departments are implementing agencies of central government.

The aim of this section is to assess the extent of technical support and input on climate change that line agencies and departments provide to elected bodies when they design their development plans. The assumption is that elected representatives may not have (and are not required to have) the knowledge necessary to define technically sound activities and that this advice is part of the role of line agencies.

The tambon municipality of Mueng Klang and the link with the line agencies in the province of Rayong

The DoLA is the central government department responsible for overseeing the activities of local administrations. However, with regard to climate change they do not have specific programs or projects to assist local administrations. The climate change activities in Mueng Klang originate from the municipality's administrative team. The mayor mentioned that he obtained his knowledge mostly through research on the Internet. Moreover, the municipality staff receive very limited support in designing climate change activities from line agencies at the provincial level.

Interviews conducted with provincial line agencies and the Provincial Administrative Organisations (PAO) in Rayong (to which the municipality of Mueng Klang belongs) show that climate change activities pursued at provincial level are reforestation, planting or mangroves in coastal areas, planning energy generation from waste management, and conducting awareness campaigns for reforestation. The interviews confirm that the issue of climate change is not well understood among provincial staff though there is a growing interest around waste management, natural resource conservation and pollution management. The PAO currently invests approximately 10% of its annual budget on climate change activities. As for Mueng Klang, the budgets for climate change activities by the provincial administration is very limited and comes mainly from private sector groups such as Siam Cement Group (SCG), Petroleum Authority of Thailand (PTT), etc.

<u>The Provincial Environment and Natural Resources Office</u>

The Provincial Environment and Natural Resources Office (PENRO) has the responsibility to develop a provincial natural resources and environment development plan every five years. Local administrations, such as municipalities and TAOs, then adapt the plans to their own needs and request funding to the Decentralisation to Local Government Organization Committee (DLOC).[49] Projects that can request budgets from the DLOC include wastewater management, waste management, and expansion of green areas. With these types of project, PENRO conducts trainings of LAO staff on planning and provides them with access to academic knowledge. PENRO does not provide direct funding to local administrations though there can be collaboration and sharing on specific activities. Moreover, PENRO does not have specific climate change policies to follow.

Respondents mentioned the following climate change activities implemented by PENRO:

- Sustainable natural resources and environment conservation by promoting mangrove forest plantation, expanding green areas in cities, and lowering carbon emissions.

[49] Small size projects are usually funded through the LAO budget. Larger projects can access the provincial development budget which is controlled by the Ministry of Interior though the provincial governor.

- Discussions with citizens in Rayong who have requested the establishment of a pollution control zone and the creation of a pollution reduction plan.

The collaboration with Mueng Klang was mentioned by the respondents of PENRO as a positive experience. Despite limited funding, the interviewers mentioned that if the government were to establish a national climate change fund they would worry about the definition of the criteria for selecting projects and activities.

Provincial Energy Office

The Provincial Energy Office (PEO) of Rayong implements the following climate change related activities:

1. Capacity development on for designing community energy plans: e.g. demand for and supply of energy and the energy accounting.
2. Providing technical knowledge on energy saving to citizens and community members.
3. Implementing pilot projects such as providing energy saving light bulbs to citizens.

The PEO does not provide budget support to local administrations except to the ones that join its pilot projects. The PEO transfers know-how to local administrations who are then responsible to translate this into concrete activities.

Two more line agencies that were visited during the interviews at provincial level are the District Agriculture Office and the DoLA, but neither provides support to the local administration on climate change related activities. In Rayong there are some environmental conservation groups which are active, though it was not possible to identify NGOs working on climate change issues either independently or in collaboration with the local administration. The academic institutes of the province conduct campaigns on the problems caused by pollution problem, but there are no specific campaigns on climate change.

The Tambon Administration Organisation of Bang Num Phueng

The respondents in Bang Num Phuneg confirmed that the TAO has not received support from line agencies to plan climate change projects. The activities that have been implemented have all been planned independently and have received funding from either locally generated resources or private companies and foundations. The argument brought forward is that the TAO prefers not to receive support from government line agencies as this would introduce more bureaucracy. The TAO is quite happy with the freedom they currently enjoy to design and plan their own activities according to local people's needs. They would however welcome more technical input from line agencies. At the moment the technical know-how of the TAO is mainly the result of exchange and sharing with local researchers and the staff of private companies.

There are no NGOs involved in climate change activities in the TAO area, though, as we have seen in the previous section, there are foundations that support environmental activities.[50].

The interviews conducted with the Natural Resources and Environment Section of the PAO of the province of Samutprakarn (to which Bang Num Phueng belong) show that the provincial administration is engaged with the following climate change activities:

[50] For example the Royal Initiative Discovery foundation, the Chaipattana foundation, the Laem Pak Bien foundation, the Crown Property Bureau.

- Campaigning to increase people's awareness of the importance of reducing global warming though trainings and field study trips.
- Trainings and study trips for students and provincial officials to learn about the importance of mangrove forests.
- Campaign for planting tree and regenerate forest areas.
- Subsidies to provincial natural resources and environment offices for activities to be implemented in the whole province.

The Provincial Environment and Natural Resources Office

PENRO does not implement specific climate change projects or provides support to TAOs and municipalities in the province. The reasons given are: i) PENRO does not have a specific budget for climate change activities; ii) in Samutprakarn the air quality is considered good and that is the sign that the climate change problems are limited. PENRO propose projects and make budget requests from the provincial administration. It therefore coordinates with local administrations to develop plans and solve specific problems which concern in most cases wastewater pollution caused by factories. The coordination between PENRO and villages is managed through a village natural resources and environment focal point person in each village. PENRO provides training to the focal points on how to protect natural resources and promote public awareness of natural resource conservation.

The Provincial Energy Office

The PEO of Samutprakarn is engaged in the following climate change related activities:

- Change energy usage behavior by applying new technology such as effective charcoal burning technology
- Support the production of biogas from organic waste

The PEO has an annual budget for each TAO of around 300,000 THB, which is usually spent on training and supporting TAOs with materials. The PEO of Samutprakarn province has collaborated with the TAO of Bang Num Phueng in developing technology plans that have included:

- Charcoal kilns
- Know-how on how to make water filter machines

The District Agriculture Office

The respondents at the District Agriculture Office (DAO) of Samutprakarn province mentioned that they have not yet received specific guidelines from the Ministry of Agriculture concerning climate change activities. Most TAOs are linked to District Transfer Technology and Service Centres which were established under the Decentralization Act of 1999. Each Centre has a committee composed of villager representatives, an agricultural officer and a representative from the LAO. The committee holds monthly or bi-monthly meetings. Agricultural officers recommend projects to the committee which are the discussed and selected. The main climate change-related activity managed by the Centre referred to is the planting of fruit trees such as mangoes, coconuts and limes, etc.

An important role of the DAO is to act as an intermediary of knowledge and know-how with communities and TAOs. The respondents mentioned that during the last three years they have not received from their ministries any specific budget to fund climate change activities.

7.6 Conclusions

In this chapter we have analysed the role of sub-national institutions with regard to climate change activities and investments. The review has also described the fiscal transfer mechanisms between the central administration and the sub-national institutions. It is important to the note that the conclusions have to be seen within the limitations of the field data collection, which has been conducted in only two case study areas which represent different layers of the Thai local governance environment and is therefore not representative for the whole country.

There appears to be a gap between what higher levels of government are mandated to do on climate change and what municipalities and TAOs receive in terms of support. Local official have some awareness about climate change. However, in the absence of a clear definition of climate change activities (and expenditures) agreed at the national level, and with limited support provided by technical ministries and line agencies, the clarity about what climate change activities and investments are needed depends on the level of knowledge and awareness that local leaders possess. The outcome is that the two local authorities reviewed in this study work almost independently. For example, in the case of the tambon municipality of Mueng Klang, the local administration has pursued a clear strategy of strengthening and expanding mitigation activities and investments, as these result in a) political benefits (the mayor has been elected for three consecutive terms), and b) additional revenues to the municipality. Mueng Klang is however known to be an example of best practice and is not representative for most municipalities or LAOs. In the case of the TAO of Bang Num Phueng climate change interventions are synonymous with environmental protection and conservation.

In both case study areas it was not difficult to access the annual plans and budgets that were used to map and classify the climate change activities and investments. Interviews with provincial and district line agencies were also easily organised and have confirmed that line agencies provide limited or no technical support on climate change during local planning activities. Provincial or district line agencies do conduct training and facilitate the process of receiving proposals for funding but they are themselves not clear on what climate change activities are and are waiting for their respective ministries to instruct them with specific policies and guidelines.

This limited clarity is not negative *per se* and can also have a positive influence. The experience of the tambon municipality of Mueng Klang shows that they also have a certain degree of freedom, in a relatively centralised administration system such as the one of Thailand, which enables local leaders with the necessary knowledge and know-how to pilot and develop locally suited interventions with external funding from NGOs, foundations, and the private sector.

This poses a dilemma for national policy makers: how to design policies and guidelines that provide the necessary clarity in defining climate change adaptation and mitigation activities and investments and, at the same time, preserve the incentives and entrepreneurship spirit that has motivated local administrations to gather knowledge and know-how to design activities which are both technically sound and politically feasible.

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กิตติ ลิ่มสกุล (2553) รายงานสนับสนุนด้านเศรษฐศาสตร์ โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก , ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

ชวลิต เนื่องดี (2553) รายงานสนับสนุนด้านป่าไม้ โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

ปัทมา ศิริธัญญา (2553) รายงานสนับสนุนก๊าซเรือนกระจกในระบบการผลิตข้าว โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

ดาวัลย์ วิวรรธนะเดช และคณะ (2553) รายงานสนับสนุนด้านพลังงาน โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

สุจริต คูณธนจุลวงศ์ และ คณะ (2553) รายงานสนับสนุนด้านอุทกศาสตร์ โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

สุภกร ชินวรรโณ (2553) รายงานสนับสนุนด้านการสร้างขีดความสามารถของชุมชนในการรับมือกับผลกระทบฯ โครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

อรรถชัย จินตะเวช (2553) รายงานสนับสนุนด้านผลกระทบต่อภาคเกษตรและการปรับตัวโครงการจัดทำแผนแม่บทรองรับการเปลี่ยนแปลงของสภาวะภูมิอากาศของโลก การผันผวนของราคาพลังงาน และวิกฤตอาหารของโลก, ศูนย์บริการวิชาการแห่งจุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

Appendix 1: The regulation of budget expenditure transfer (Budget Procedures Act, B.E. 2502)

Expenditure fixed for any official agency or state enterprise under the Annual Budget Expenditure Act or Supplementary Budget Expenditure Act, cannot be transferred or used by another government agency or state enterprise except under the following cases:

(1) Existence of an Act permitting transfer or usage;

(2) In case of having Royal Decree included or merging official agencies and setting up a new official agency or not, in which case budget held by the agency that is transferred or merged may be transferred to the official agency or organization, the receiver or one that is merged or official agency set up anew, whether the case being as per prescription in the Royal Decree."

"**Clause 19.** Expenses stated in any item for an official agency or state enterprise or state enterprise governed by Annual Budget Expenditure Act, Supplementary Budget Expenditure Act, Budget Expenditure Transfer Act or Royal Decree as per clause 18(2) cannot be transferred or used by another official agency, except by permission from the Director who could not give permission in case of increasing amount of expenses such as secret funds or a new project, except by permission of the Cabinet.

Expense items stated in the Central Fund shall be within the power of the Director to allocate to official agencies and state enterprises directly as per dictates of necessity.

In a necessary case, the Director, by approval of Prime Minister may transfer any item from the Central Fund to enhance another item, within the same kind of budget."

Appendix 2: Public Debt Management Act B.E. 2549 (amended by the Public Debt Management Act (Vol.2) B.E. 2551)

Clause 20. The Ministry of Finance shall raise loan for the following purposes:

(1) financing budget in the case of deficit or where the expenditure exceeds the revenue;
(2) economic and social development;
(3) restructuring public debt;
(4) on-lending to other government agency;
(5) domestic bond market development.

Thai baht or foreign currency received from the raising of loan under (2) to (5) shall be used in accordance with the purpose of loan raising or the approval of the Council of Ministers without having to remit to the Ministry of Finance under the law on budgetary procedure and the law on treasury balance.

In order to keep fiscal discipline, the Clause 21 of Public Debt Management Act B.E. 2548 states that the Ministry of Finance can raise loan for financing budget deficit only by borrowing from domestic sources, i.e., loan must be in Thai baht.

Clause 21. In each fiscal year, the raising of loan by the Ministry of Finance for financing budget in the case of budget deficit or where the expenditure exceeds the revenue shall be in Thai baht and the aggregate amount of loan shall not exceed:

(1) twenty per cent of the existing annual budgetary appropriation and the additional budgetary appropriation;
(2) eighty per cent of the budgetary appropriation as set out for repayment of principal."

Appendix 3: Public Debt Management Act B.E. 2548 (Clause 22)

Clause 22. "The raising of loan for economic and social development shall be made if it is necessary to spend money *apart from the annual budgetary appropriation* and such money is foreign currency, or there is necessary to raise loan so as to strengthen national financial security. In this case, the Ministry of Finance shall raise loan in foreign currency and the aggregate amount of loan shall not exceed ten per cent of the annual budgetary appropriation.

In raising of loan under paragraph one, the clarified purpose for spending shall be specified in accordance with rule, procedure and condition specified by the Minister as approved by the Council of Ministers.

There are the approval criteria for project loan specified by the Public Debt Management Regulation B.E. 2549 of Ministry of Finance. Namely, the project loan must be:

(3) a project in accordance with country's economic and social development strategy;

(4) a project with technical, economic, social, environmental and financial feasibility studies;

(5) a project approved by the Minister or the National Economic and Social Development Board (NESDB) or project under consideration of NESDB and expected to be implemented in that fiscal year;

(6) an investment which generates returns in foreign currency, or can save foreign money, or efficiently generates economic and social returns. Also, the foreign exchange risk must be taken into consideration.

(7) State enterprises and government financial institutions that want to raise loan must have strong financial position or be capable of repaying debts. Furthermore, the ratio of revenue performance to debt burden must be at least 1.5.

(8) official agencies, state enterprises, and government financial institutions must be able to operate projects and loan plan as proposed and must have manpower and matching grant budget readiness."

Appendix 4: Funds and Revolving Funds

Ministry	Department	Fund / Revolving Fund
Ministry of Agriculture and Cooperatives	Royal Irrigation Department	Revolving fund for Irrigation
		Land Readjustment Fund
	Department of Agriculture	Plant Varieties Protection Fund
	Cooperative Promotion Department	Cooperative Development Fund
	Office of Agricultural Economics	Fund for Restructuring of Agricultural Production to Improve Competitiveness
		Fund for Farmers Rehabilitation and Development
	Agricultural Land Reform Office	Fund for Agricultural Land Reform
	Office of the Permanent Secretary, Ministry of Agricultural and Cooperatives	Revolving Fund for Lending to Farmers and Poor
Ministry of Labour	Department of Employment	Alien Repatriation Fund
		Fund for Home Piecework Contractors
	Department of Skill Development	Skill Development Fund
	Department of Labour Protection and Welfare	Fund for Labourers
		Employee Welfare Fund
	Social Security Office	Workmen' s Compensation Fund
		Fund for Social Security
Ministry of Defence	Defence Industry Department	Battery Factory Revolving Fund
		Defence Battery Factory Revolving Fund
	Quartermaster Department Royal Thai Army	Tanning Factory Revolving Fund
	Office of the Permanent Secretary, Ministry of Defence	Defence Pharmaceutical Factory Revolving Fund
Ministry of Finance	The Comptroller General's Department	Fund for Farmers Assistance
	Office of Insurance Commission	Life Insurance Fund
		General Insurance Fund
	State Enterprise Policy Office	Fund for State Enterprises' Employees Affected from the Privatisation Programme
	Public Debt Management Office	Fund for Management of Loans for Public Debt Restructuring and Development of Market for Domestic Debt Instruments
	The Comptroller General's Department	Student Loans Fund
		Income Contingent Loan Fund
Ministry of Tourism and Sports	Sports Authority of Thailand	Fund for Boxing
		Fund for National Sports Development
		Fund for Professional Sports Promotion
	Office of the Permanent Secretary, Ministry of Tourism and Sports	Fund for Thai Tourism Promotion
	Office of Tourism Development	Fund for Protection of Tourism Business

Ministry	Department	Fund / Revolving Fund
Ministry of Social Development and Human Security	Office of the Permanent Secretary, Ministry of Social Development and Human Security	Fund for Preventing and Suppressing Human Trafficking
		Fund for Children Protection
		Fund for Senior Citizen
		Fund for Promotion of Social Security
	National Office for Empowerment of Persons With Disability	Fund for Revitalization of the Disabled
Ministry of Transport	Department of Land Transport	Road Safety Fund
Ministry of Natural Resources and Environment	Department of Mineral Resources	Fund for Management of Antiquities
	Department of Groundwater Resources	Fund for Groundwater Resources Development
	Office of Natural Resources and Environmental Policy and Planning	Environmental Fund
Ministry of Energy	Energy Fund Administration Institute	Oil Fund
	Energy Policy and Planning Office	Energy Conservation Promotion Fund
Ministry of Commerce	Department of International Trade Promotion Ministry of Commerce, Royal Thai Government	Fund for International Trade Promotion
Ministry of Justice	Office of the Permanent Secretary, Ministry of Justice	Fund of Justice
Ministry of Culture	Department of Religious Affairs	Fund for Promotion and Propagation Buddhism on the Auspicious Occasion of His Majesty the King's 80th Birthday Anniversary
		Fund for the Haj Pilgrims
	Department of Cultural Promotion	Fund for Promoting Culture
		Fund for Promoting Provincial Culture
Ministry of Science and Technology	National Institute of Metrology (Thailand)	The Fund for National Metrology System Development
	National Science and Technology Development Agency	Fund for Science and Technology Development
Ministry of Public Health	Department for Development of Traditional and Alternative Medicine Ministry of Public Health	Fund for Wisdom on Thai Traditional Medicine
	Emergency Medical Institute of Thailand	Fund for Emergency Medicine
	National Health Security Office Thailand	Fund for the National Health Security
Ministry of Education	Office of the Basic Education Commission	Fund for Promoting and Developing Education for the Disabled
	Office of the Higher Education Commission	Revolving Fund for Development of Private institute of Higher Education

Ministry	Department	Fund / Revolving Fund
	Office of the Permanent Secretary, Ministry of Education	Revolving Fund for Solving Teachers' Debt Problems
		Primary School Lunch Fund
		Fund for Welfare
		Fund for Promoting School in the Formal System
Ministry of Industry	Department of Industrial Works	Fund for Alleviation of Repercussion from the State's Liquor Liberalisation Policy
	Department of Industry Promotion	Revolving Fund for Cottage Industry and Thai Handicraft
	Office of The Cane and Sugar Board	Fund of The Cane and Sugar
	Office of Small and Medium Enterprises Promotion	Fund for Small and Medium Enterprises Promotion
Independent Public Agencies	King Prajadhipok's Institute	Fund for Democracy Development and Propagation
	Office of the Election Commission	Fund for Political Party Development
	Royal Thai Police	Fund for Criminal Investigation
	Political Development Council	Fund for Development of Civil Politics
The Prime Minister's Office	The Secretariat of The Cabinet	Village and Town Community Fund
	Office of the Thailand Research Fund	The Research Fund
	Thai Health Promotion Foundation the Sustainability of Well-Being for Thai People	Thai Health Promotion Foundation the Sustainability of Well-Being for Thai People Fund

Appendix 5: Aggregated Financial Data High and Mid Relevance Climate Budget

Ministry	Adaptation	Mitigation	Capacity Building	Technology	Aggregated High and Mid Relevance Climate Total
Ministry of Agriculture	68,900,842,335		5,700,000	76,719,300	**68,983,261,635**
Ministry of Transport		2,730,543,400			**2,730,543,400**
Ministry of Natural Resources and Environment	17,314,542,140	24,204,778,825	1,985,369,530	14,400,000	**43,519,090,495**
Department of Energy	320,310,900	3,278,072,000			**3,598,382,900**
Ministry of Interior	2,565,639,755		223,333,500		**2,788,973,255**
Ministry of Science and Technology			250,534,245		**250,534,245**
Ministry of Education			5,000,000		**5,000,000**
Province and the province	15,000,000	500,000			**15,500,000**
Prime Minister	42,743,005				**42,743,005**
High and Mid Relevance Total	**89,159,078,135**	**30,213,894,225**	**2,469,937,275**	**91,119,300**	**121,934,028,935**

Appendix 6: Project Classification of Tambon Municipality of Mueng Klang 2009-2011

Project Classification of Tambon Municipality of Mueng Klang 2009

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**95,543,380**							
Programme: General Administration	**17,627,800**							
Section - General Administration	**11,733,600**							
Participation in Lively & Sustainable Municipality Contest		40,000	low				30%	12,000
Workshop in municipal energy saving		100,000		low	high		80%	80,000
Section - Statistics Planning and Academic	**2,550,520**							
Data Survey for Community Plans		25,000	marginal				10%	2,500
Programme: Public Safety	**5,459,760**							
Section - Public Disaster Prevention and Conflagation Control	**5,459,760**							
Accident and Disaster Fighter Drills		100,000	medium		medium		50%	50,000
Accident and Disaster Fighter Trainings		10,000	medium		medium		50%	5,000
Grants for accident and disaster responses		70,000	medium				50%	35,000
Programme: Healthcare	**4,429,280**							
Sector - Healthcare service and other healthcare-related activities	**1,002,280**							
Seminar in Disease Vulnerable Groups (incl. climate sensitive disease)		60,000	medium		medium		50%	30,000
ISO 14001 Monitoring		30,000	medium				50%	15,000
Campaign for Energy and environmental awareness		150,000		marginal	medium		60%	90,000
River Prasae Conservation Project		150,000	high				80%	120,000
Sector - Healthcare Service Center	**2,825,500**							
Improvement of Municipality Basic Healthcare Service		80,000	marginal				20%	16,000
Support Physical Exercises & Sports		218,200	marginal		marginal		20%	43,640
Programme: Housing and Community	**42,141,420**							
Section - Street Light	**21,219,200**							
Construction/Rebuild/Repair of infrastructure		16,142,000	marginal				10%	1,614,200
Section - Municipality Park management	**5,087,200**			medium			50%	2,543,600
Section - Waste Management	**15,042,920**			medium		mid	70%	10,530,044
Programme: Community Strengthening	**2,109,110**							
Section - Promotion of Community Strengthening	**2,109,110**							
Data Collection on Subsistent Needs in the Municipality		50,000	marginal				10%	5,000
Community career building		200,000	marginal		marginal		10%	20,000
Sufficient Economy promotion		100,000	low	marginal	low		30%	30,000
Joint Financial Support for Regional and Local Social Welfare		20,000	marginal				10%	2,000
Financial Support on Basic Education for Vulnerable Students		100,000	marginal		marginal		10%	10,000
Programme: Religion, Culture, and Recreation	**10,370,880**							
Section - General Administration	**10,370,880**							
Art Activities for Youth to combat against drug abuse and to raise awareness in natural resources and environment conservation		150,000		marginal	low		30%	45,000
Total								**15,298,984**

Source: Tambon Municipality of Mueng Klang Annual Budget 2009 and classified by authors

Project Classification of Tambon Municipality of Mueng Klang 2010

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**98,642,450**							
Programme: Administration	**20,738,520**							
Section - General Administration	**12,973,100**							
Workshop in municipal energy saving		140,000		Low	high		80%	112,000
Section - Statistics Planning and Academic	**2,644,580**							
Data Survey for Community Plans		30,000	marginal				10%	3,000
Conduct of Strategic Plan & 3-years Development Plan		10,000	marginal				20%	2,000
Programme: Public Safety	**4,848,300**							
Section - Public Disaster Prevention and Conflagation Control	**4,848,300**							
Accident and Disaster Fighter Trainings		15,000	medium		medium		50%	7,500
Programme: Healthcare	**5,566,220**							
Section - Healthcare service and other healthcare-related activities	**980,600**							
ISO 14001 Monitoring		60,000	medium				50%	30,000
Campaign for Energy and environmental awareness		150,000		Medium	medium		60%	90,000
River Prasae Conservation Project		150,000	high				80%	120,000
Section - Healthcare Service Center	**3,486,660**							
Health Promotion Campaign		50,000	marginal		marginal		20%	10,000
Supervision of Basic Healthcare Service		70,000	marginal				20%	14,000
Workshop for Local Volunteers on Basic Healthcare Service		270,000	marginal		marginal		20%	54,000
Aids for local basic healthcare service		15,000	marginal				20%	3,000
Seminar for Infectious Disease Vulnerable Groups (incl. climate sensitive disease)		50,000	medium		medium		50%	25,000
Dengue Fever Prevention and Control		30,000	medium		medium		50%	15,000
Improvement of Basic Healthcare Service		130,000	marginal				20%	26,000
Health Promotion Campaign for Patients with Noninfectious Diseases		40,000	marginal		marginal		20%	8,000
Health Promotion for Senior Citizen		150,000	marginal		marginal		20%	30,000
Sponsoring Physical Exercises & Sports		280,000	marginal		marginal		20%	56,000
Programme: Housing and Community	**35,522,420**							
Section - Street Light	**12,872,100**							
Construction/Rebuild/Repair of infrastructure		5,999,000	marginal				10%	599,900
Section- Municipality Park management	**5,295,080**			Medium			50%	2,647,540
Section - Waste Management	**16,534,040**			Medium		medium	70%	11,573,828
Programme: Community Strengthening	**1,895,160**							
Section - Promotion of Community Strengthening	**1,895,160**							
Data Collection on Subsistent Needs in the Municipality		20,000	marginal				10%	2,000
Sufficient Economy promotion campaign		200,000	low	marginal	low		30%	60,000
Total								**15,488,768**

Source: Tambon Municipality of Mueng Klang Annual Budget 2010 and classified by authors

Project Classification of Tambon Municipality of Mueng Klang 2011

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**93,509,140**							
Programme: Administration	**17,931,760**							
Section - General Administration	**11,544,800**							
Workshop in municipal energy saving		100,000		low	high		80%	80,000
Section - Statistics Planning and Academic	**2,467,100**							
Data Survey for Community Plans		10,000	marginal				10%	1,000
Conduct of Annual Plan		2,000	marginal		marginal		20%	400
Conduct of 3-years Development Plan		5,000	marginal		marginal		20%	1,000
Programme: Public Safety	**5,620,680**							
Section - Public Disaster Prevention and Conflagation Control	**5,620,680**							
Accident and Disaster Fighter Trainings		17,000	medium		medium		70%	11,900
Accident and Disaster Fighter Drills		70,000	medium		medium		70%	49,000
Programme: Healthcare	**4,747,920**							
Section - Healthcare service and other healthcare-related activities	**737,000**							
ISO 14001 Monitoring		60,000	medium				50%	30,000
Campaign for Energy and environmental awareness		100,000		marginal	medium		60%	60,000
River Prasae Conservation Project		150,000	high				80%	120,000
Section - Healthcare Service Center	**3,206,120**							
Supervision of Basic Healthcare Service		30,000	marginal				20%	6,000
Workshop for Local Volunteers on Basic Healthcare Service		250,000	marginal		marginal		20%	50,000
Dengue Fever Prevention and Control		30,000	medium		medium		50%	15,000
Aids for local basic healthcare service		100,000	marginal				20%	20,000
Improvement of Basic Healthcare Service		130,000	marginal				20%	26,000
Capacity Building in Healthcare Service		150,000	marginal		marginal		20%	30,000
Health Promotion Campaign for Patients with Noninfectious Diseases		40,000	marginal		marginal		20%	8,000
Health Promotion for Senior Citizen		150,000	marginal		marginal		20%	30,000
Sponsoring Physical Exercises & Sports		280,000	marginal		marginal		20%	56,000
Programme: Housing and Community	**36,722,780**							
Section - Street Light	**15,542,600**							
Construction/Rebuild/Repair of infrastructure		10,543,000	marginal				10%	1,054,300
Section - Municipality Park management	**5,683,400**			medium			50%	2,841,700
Section - Waste Management	**14,740,380**			medium		medium	70%	10,318,266
Programme: Community Strengthening	**1,867,440**							
Section - Promotion of Community Strengthening	**1,867,440**							
Data Collection on Subsistent Needs in the Municipality		2,000	marginal				10%	200
Sufficient Economy promotion campaign		150,000	low	marginal	low		30%	45,000
Total								**14,853,766**

Source: Tambon Municipality of Mueng Klang Annual Budget 2011 and classified by authors

Appendix 7: Project Classification of Bang Num Phueng TAO 2009-2011

Project Classification of Bang Num Phueng TAO 2009

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**27,996,040**							
Programme: General Administration	**13,810,540**							
Contribution for Data Collection of Households' Basic Needs		100,000	marginal				10%	10,000
Programme: Healthcare	**360,000**							
Expense for Waste Management		200,000		medium			70%	140,000
Programme: Housing and Community	**6,178,500**							
Park Management		50,000		medium			50%	25,000
Contribution to Metropolitan Electricity Authority		1,000,000	marginal				20%	200,000
Contribution to Metropolitan Waterworks Authority		1,000,000	marginal				20%	200,000
Programme: Community Strengthening	**660,000**							
Expense for Setting up the Rescue Squad		60,000	medium				50%	30,000
Subsidy to the Agriculture Technology Transfer Center		100,000			medium	medium	40%	40,000
Programme: Central Budget	**1,764,000**							
Reserve Money (Emergency budget)		1,000,000	marginal				10%	100,000
Total								**745,000**

Source: Bang Num Phueng TAO Annual Budget 2009 and classified by authors

Project Classification of Bang Num Phueng TAO 2010

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**23,388,600**							
Programme: Administration	**10,834,500**							
Section - Statistics Planning and Academic								
Contribution for Data Collection of Households' Basic Needs		30,000	marginal				10%	3,000
Programme: Healthcare	**678,500**							
Section - Healthcare Service and Other Healthcare-related Activities								
Campaign for Prevention of Dengue Fever, Rabies, and Other Infectious Diseases		100,000	medium		medium		50%	50,000
Subsidy for Healthcare-related Projects or Activities in BNP sub-district		110,000	low		low		40%	44,000
Programme: Housing and Community	**4,826,000**							
Park Management		50,000		medium			50%	25,000
Section - Street Light								
Contribution to Metropolitan Electricity Authority		300,000	marginal				20%	60,000
Section - General Management								
Contribution to Metropolitan Waterworks Authority		700,000	marginal				20%	140,000
Section - Waste Management								
Expense for Waste Management		470,000		medium		medium	70%	329,000
Programme: Agriculture	**100,000**							
Section - Agriculture Promotion								
Subsidy to the Agriculture Technology Transfer Center		100,000			medium	medium	40%	40,000
Programme: Central Budget	**2,854,600**							
Reserve Money (Emergency Budget)		500,000	marginal				10%	50,000
Total								**741,000**

Source: Bang Num Phueng TAO Annual Budget 2010 and classified by authors

Project Classification of Bang Num Phueng TAO 2011

Projects	Budget (THB)		Project Strategy				%wt	wt.Budget (THB)
			Adaptation	Mitigation	Capacity Building	Technology Transfer		
All Projects	**23,386,820**							
Programme: Administration	**10,825,000**							
Section - General Administration								
Subsidy to Samutprakarn Province		5,000	marginal				10%	500
Section - Statistics Planning and Academic								
Data Survey and Records of Households' Basic Needs		22,000	marginal				10%	2,200
Programme: Public Safety	**520,000**							
Section - General Administration								
Accident and Disaster Fighter Drills		200,000	medium		medium		70%	140,000
Programme: Healthcare	**1,789,920**							
Section - Healthcare Service and Other Healthcare-related Activities								
Healthy life for Happy life		25,000	marginal		marginal		20%	5,000
Child Nutrition Promotion		20,000	marginal		marginal		20%	4,000
Well-being Improvement for Happy life		50,000	marginal				10%	5,000
Health Promotion for Mother and Child		25,000	marginal		marginal		20%	5,000
Infectious Disease Prevention and Control		60,000	medium		medium		70%	42,000
Programme: Housing and Community	**3,800,760**							
Section - Community Strengthening Promotion								
Tree Planting and Conservation		30,000	medium	medium			70%	21,000
Section - Waste Management								
Sanitary Waste Container		100,000	marginal				10%	10,000
Sustainable Waste Segregation in Community		62,000		medium	medium		70%	43,400
Programme: Religion, Culture, and Recreation	**830,000**							
Section - Religion and Local Culture								
River Awareness in Loi Krathong Festival		120,000	marginal				10%	12,000
Section - Planning and Promote Tourism								
Sustainable Eco-tourism Promotion in BNP sub-district		200,000	medium		medium		70%	140,000
Section - Sports and Recreation								
Sport Competition for health Development and Anti-Drug		50,000	marginal				20%	10,000
Programme: Agriculture	**70,000**							
Section - Agriculture Promotion								
Sufficient Economy Promotion Campaign		40,000	low	marginal	low		30%	12,000
Buy water pump for agriculture		30,000	medium				60%	18,000
Total								**470,100**

Source: Bang Num Phueng TAO Annual Budget 2011 and classified by authors