KINGDOM OF CAMBODIA

Nation Religion King

Ministry of Mines and Energy

ផែនការសកម្មភាពឆ្លើយតបនឹងការប្រែប្រួលអាកាសធាតុ ក្នុងវិស័យរ៉ែ និងថាមពល ២០១៥-២០១៨

Climate Change Action Plan for Mines And Energy Sectors

Climate Change Working Group for Mines and Energy Sectors 2015

បុព្វកថា

ក្រសួងរ៉ែ និងថាមពល ជាក្រសួងថ្មីដែលបានបង្កើតឡើង ដោយបំបែកចេញពីអតីត ក្រសួងឧស្សាហកម្ម រ៉ែ និងថាមពលនៅចុងឆ្នាំ ២០១៣ ដែលត្រូវបានអនុម័តដោយរដ្ឋសភានីតិកាលទី៥ដែលជាផ្នែកមួយនៃការខិតខំប្រឹងប្រែងពង្រឹងស្ថាបននៅកម្ពុជា ។ ក្នុងពេលជាមួយគ្នានោះដែរអតីតអាជ្ញាធរប្រេងកាតជាតិកម្ពុជា ដែលស្ថិតនៅក្រោមការគ្រប់គ្រងរបស់ទីស្តីការគណៈរដ្ឋមន្ត្រី ក៏ត្រូវបានធ្វើសមាហរណកម្ម ប្តូរមកជាអគ្គនាយកដ្ឋានប្រេងកាតនិងដាក់ឱ្យស្ថិតនៅក្រោមការគ្រប់គ្រងរបស់ក្រសួងរ៉ែ និងថាមពលវិញ ។ បច្ចុប្បន្នក្រសួងរ៉ែ និងថាមពល មានតួនាទី និងបេសកកម្មយ៉ាងសំខាន់ក្នុងការធ្វើឱ្យប្រសើរឡើងក្នុងការអភិវឌ្ឍវិស័យរ៉ែ ថាមពល ប្រេងកាតនិងឧស្ម័នឥន្ធនៈ។ វិស័យទាំងបីនេះបានចូលរួមចំណែកយ៉ាងសកម្មក្នុងការអភិវឌ្ឍសេដ្ឋកិច្ចជាតិ និងការកាត់បន្ថយភាពក្រីក្ររបស់ប្រជាពលរដ្ឋ ឱ្យស្របតាមផែនការយុទ្ធសាស្ត្រអភិវឌ្ឍន៍ជាតិ និងផែនការយុទ្ធសាស្ត្រចតុកោណដំណាក់កាលទី៣របស់រាជរដ្ឋាភិបាល និងគោលដៅអភិវឌ្ឍន៍សហសវត្សរបស់កម្ពុជា ។ ការអភិវឌ្ឍវិស័យទាំងបីនេះបានផ្សារភ្ជាប់ទៅនឹងការគិតគូពិចារណាយ៉ាងល្អិតល្អន់លើគុណភាពសេដ្ឋកិច្ច សង្គម និងបរិស្ថានប្រកបដោយចីរភាពផងដែរ ។

វិស័យថាមពល និងប្រេងកាតបានចូលរួមយ៉ាងសកម្ម ក្នុងការអភិវឌ្ឍនៅ ក្នុងដំណើរការផលិតកម្មនៅក្នុងរោងចក្រ សហគ្រាស ចរាចរណ៍យានយន្ត និងមធ្យោបាយដឹកជញ្ជូនផ្សេងៗ ដើម្បីផ្តល់នូវកំណើនការងារ បង្កើនប្រាក់ចំណូលរបស់ប្រជាពលរដ្ឋ ជួយបង្កើនថវិកាជាតិ ជាពិសេសគឺកំណើនផលិតផលជាតិសរុបសម្រាប់គាំទ្រដល់សេដ្ឋកិច្ច និងសង្គម ។ ជាងនេះទៅទៀតវិស័យថាមពលក៏ជាតម្រូវការចាំបាច់សម្រាប់ជីវភាពរស់នៅប្រចាំថ្ងៃរបស់ប្រជាពលរដ្ឋគ្រប់រូប និងសម្រាប់ការអភិវឌ្ឍវិស័យពាណិជ្ជកម្ម កសិកម្ម សេវាកម្ម និងវិស័យផ្សេងៗទៀតផងដែរ ។

គោលបំណងសំខាន់ក្នុងការអភិវឌ្ឍវិស័យរ៉ែ ថាមពល និងប្រេងកាតគឺត្រូវធ្វើឱ្យមានភាពស៊ីសង្វាក់គ្នា និងមានតុល្យភាពទាំងផ្នែកសេដ្ឋកិច្ច សង្គម និងបរិស្ថានតាមរយៈការទទួលយកនិងការផ្ទេរបច្ចេកវិទ្យាមានមេត្រីភាពនឹងបរិស្ថានក្នុងវិស័យទាំងនេះ ឱ្យមានលក្ខណៈបៃតងជាបណ្តើរៗសំរាប់ពេលអនាគត ។ ការងារទាំងអស់នេះអាចធ្វើបានសំរេចតាមរយៈការពង្រឹងនិងពង្រីកនូវសកម្មភាពមួយចំនួនដូចជាៈ ការអភិវឌ្ឍបច្ចេកវិទ្យាស្អាតតាមរយៈការផ្ទេរបច្ចេកវិទ្យាល្អសម្រាប់បរិស្ថាន ការគ្រប់គ្រងសារធាតុគីមីក្នុងវិស័យរ៉ែនៅតាមស្តានីយប្រេងនិងឧស្ម័នឥន្ធនៈ និងទីតាំងស្តុកទុកប្រកបដោយសុវត្ថិភាព និងការអភិវឌ្ឍថាមពលកកើតឡើងវិញតាមរយៈថាមពលពន្លឺព្រះអាទិត្យ ថាមពលខ្យល់ ថាមពលវារីអគ្គិសនី ថាមពលជីវម៉ាស់ និងថាមពលជីវឧស្ម័នជាដើមដែលជាជម្រើសអាទិភាពចាំបាច់ត្រូវយកមកអនុវត្ត ។

ផែនការសកម្មភាពឆ្លើយតបនឹងការប្រែប្រួលអាកាសធាតុសម្រាប់វិស័យរ៉ែ និងថាមពល២០១៦-២០១៨ ជាឯកសារយុទ្ធសាស្ត្រសម្រាប់ជាផែនទីបង្ហាញផ្លូវជាក់លាក់មួយសម្រាប់អង្គភាពចំណុះក្រសួងរ៉ែ និងថាមពល ដៃគូរអភិវឌ្ឍន៍ វិស័យឯកជន អង្គការមិនមែនរដ្ឋាភិបាល និងភាគីពាក់ព័ន្ធទាំងអស់ដើម្បីប្រើប្រាស់ជាផែនការក្នុងការអនុវត្ត និងចូលរួមដោះស្រាយបញ្ហាប្រែប្រួលអាកាសធាតុដែលកើតមានឡើងតាម

រយៈការប្រើប្រាស់ធនធាន និងការប្រើប្រាស់ថាមពលប្រកបដោយប្រសិទ្ធភាព ការកាត់បន្ថយការបញ្ចេញសំណល់ ការបំពុល និងការផ្លាស់ប្តូរសារធាតុគ្រោះថ្នាក់ទៅជាសារធាតុគ្រោះថ្នាក់តិចតួច រឺសារធាតុដែលគ្មានគ្រោះថ្នាក់នៅតាមស្ថានីយរេរ្យែងនិងឧស្ម័នឥន្ធនៈ ទីកន្លែងកែច្នៃ ធ្វើអាជីវកម្ម ឬប្រព្រឹត្តកម្មធនធានរ៉ែ។ សកម្មភាពទាំងនេះ និងជួយបង្កើនផ្នែកផលិតភាព គុណភាព និងភាពប្រកួតប្រជែងរបស់ម្ចាស់ស្ថានីយ ឬអ្នកផលិតឱ្យមានភាពប្រសើរជាងមុនដើម្បីចូលរួមចំណែកការអភិវឌ្ឍដែលបញ្ចេញកាបូនតិច និងកសាងភាពធន់នឹងការប្រែប្រួលអាកាសធាតុសម្រាប់វិស័យរ៉ែ និងថាមពល។

ក្នុងនាមក្រសួងរ៉ែ និងថាមពល ខ្ញុំសូមឱ្យនាយកដ្ឋានទាំងអស់ ដៃគូអភិវឌ្ឍន៍ វិស័យឯកជន អង្គការមិនមែនរដ្ឋាភិបាលជាតិ និងអន្តរជាតិ ស្ថាប័នពាក់ព័ន្ធទាំងអស់បន្តពង្រឹងកិច្ចសហប្រតិបត្តិការជិតស្និទ្ធជាមួយក្រសួងរ៉ែ និងថាមពលក្នុងការអនុវត្តផែនការសកម្មឆ្លើយតបនឹងការប្រែប្រួលអាកាសធាតុនេះប្រកបដោយជោគជ័យ។

ក្រសួងរ៉ែ និងថាមពល

រដ្ឋមន្ត្រី

ស៊ុយ សែម

Preface

The Ministry of Mines and Energy has been recently established by the 5th National Assembly, at the end of 2013, as part of the ongoing efforts of institutional strengthening in Cambodia. Formerly part of the Ministry of Industry, Mines, and Energy, the Ministry of Mines and Energy now also includes a General Department of Petroleum (the former Cambodian National Petroleum Authority, previously under the Council of Ministers). Currently, the Ministry plays a vital role and an important mission in the development of the Mines, Energy and Petroleum sectors, ensuring a thorough and balanced consideration of economic, social and environmental sustainability dimensions. These three sectors actively contribute to the country's economic development and poverty reduction efforts, in alignment with the Rectangular Strategy-Phase 3 of the Royal Government of Cambodia, the National Strategic Development Plan 2014 – 2018, and Cambodia's Millennium Development Goals.

Energy and Petroleum sectors have actively contributed to the development of production processes in factories and businesses, as well as to transport, which has led to increased job creation, people's income, national revenue, and Gross Domestic Product in particular, and has thus contributed to the overall social and economic wellbeing of the nation. Moreover, energy is indispensable to the daily lives of each individual, as well as to the development of every business, be it commerce, agriculture or other economic activity.

The main goals which drive the development of the Mines, Energy and Petroleum sectors must harmonize and balance social, economic and environmental aspects through technology transfer and the adoption of environmentally sound technologies, so that these sectors can become gradually greener in the near future. This needs to be achieved by scaling up activities such as cleaner technology development and transfer, safe chemical management in the Mine and Petroleum Sectors, and renewable energy development, including solar, wind, hydropower, biomass and biogas energy, which are key priorities for implementation.

The present Climate Change Action Plan 2016 – 2018 for Mines and Energy constitutes a roadmap for government agencies, development partners, NGOs, and other relevant stakeholders, and in particular to the different units of the Ministry, to implement actions that will contribute to address climate change issues. At the same time, this Action Plan will also serve as a roadmap for the private sector, pointing to ways in which businesses can become successful through, for example, the adoption of specific energy and resource efficiency measures, the design of new environmental friendly products, the minimization of waste, pollution and use of hazardous chemicals in gas stations, recycling stations, and mining sites. As a result of the implementation of these actions, quality, productivity, and overall competitiveness of businesses will increase, helping the country to move towards a low carbon resilient economy.

On behalf of the Ministry of Mines and Energy, I would like to urge all departments, development partners, private sector, local and international NGOs, and other relevant stakeholders to continue and strengthen the collaboration with Ministry of Mines and Energy to implement this CCAP successfully.

Ministry of Mines and Energy

Minister

Suy Sem

Acknowledgement

The Climate Change Action Plan (CCAP) 2016 – 2018, developed under the overall coordination of the Ministry of Mines and Energy, counted with the active participation of its multiple departments and with the invaluable guidance from National Council for Sustainable Development. Their participation made the action plan more strategic, coherent and aligned both with the ministry's programs, plans and policies, and with national and sector development goals. The suggestions and comments received from peer reviews and from numerous stakeholders provided further strategic inputs to the development of the CCAP 2016 – 2018. A wide range of technical support was provided by several national and international climate change experts to the development of the CCAP.

The Ministry of Mines and Energy wishes to expresses its deepest gratitude to the National Council for Sustainable Development for their guidance, to all the stakeholders for their valuable input during consultations, and to all the Ministry's departments who have work tirelessly to assist in the preparation of the Climate Change Action Plan 2016 – 2018.

The development of the CCAP was also made possible with the financial and technical support from the Department of Climate Change, General Secretariat, National Council for Sustainable Development/ Ministry of Environment through the Cambodia Climate Change Alliance (CCCA) Program, funded by the European Union (EU), the Swedish International Development Cooperation Agency (Sida) and the United Nations Development Programme (UNDP).

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Abbreviations

ADB	Asian Development Bank
AF	Adaptation Fund
CBA	Cost Benefit Analysis
CCAP	Climate Change Action Plan
CCCA	Cambodia Climate Change Alliance
CCCO	Cambodian Climate Change Office
CCCSP	Cambodia Climate Change Strategic Plan
CCSP	Climate Change Strategic Plan
CDM	Clean Development Mechanism
CIF	Climate Investment Funds
CO_2	Carbon Dioxide
DCC	Department of Climate Change
DH	Department of Hydroelectricity
DNRE	Department of New and Renewable Energy
EAC	Electricity Authority of Cambodia
EDC	Electricité du Cambodge
EDD	Energy Development Department
EU	European Union
EUEI-PDF	EU Energy Initiative Partnership Dialogue Facility
FCPF	Forest Carbon Partnership Facility
GHG	Greenhouse Gas
GDMR	General Department of Mineral Resources
GDP	Gross Domestic Product
GDP	General Department of Petroleum
GEF	Global Environment Facility
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
IGES	Institute for Global Environmental Strategies
IPCC	Intergovernmental Panel on Climate Change
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
LDCF	Least Developed Countries Fund
M&E	Monitoring and evaluation
MEF	Ministry of Economy and Finance
MoE	Ministry of Environment
MoP	Ministry of Planning
MIH	Ministry of Industry and Handicrafts
MIME	Ministry of Industry Mines and Energy
MME	Ministry of Mines and Energy
M&E	Monitoring and Evaluation
MPWT	Ministry of Public Works and Transport
MRV	Monitoring, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Action
NAPA	National Adaptation Program of Action to Climate Change
NCSD	National Council for Sustainable Development
NIP	National Implementation Plan on the Environment in the Transport Sector
NSDP	National Strategic Development Plan
ODA	Official development assistance
PIP	Public Investment Plan
PPCR	Preparation of a Strategic Pilot Program for Climate Resilience
QA	Quality Assurance
REDD+	Reducing Emissions from Deforestation and Forest Degradation
REF	Rural electrification fund
RGC	Royal Government of Cambodia
SCCSP	Sectoral Climate Change Strategic Plan
SE4ALL	Sustainable Energy for All
SHSs	Solar Home Systems
SIDA	Swedish International Development Cooperation Agency
SNC	Second National Communication
SOPs	Standard Operating Procedures
SSGM	Small Scale Gold Mines
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation
USAID	United States Agency for International Development

I. Background

Energy and Mines are key sectors for Cambodia's social and economic development, playing an important role in poverty reduction efforts in particular, through infrastructure development and job creation. The Ministry of Mines and Energy (MME) is the governmental institution mandated to oversee the two sectors, being responsible for establishing the relevant policy and legal and regulatory frameworks, as well as for planning, programming and developing infrastructure and foster the development of the sectors building cooperation with diverse partners.

In 2013, the Royal Government of Cambodia (RGC) launched the Cambodia Climate Change Strategic Plan 2014-2023 (CCCSP), providing an overall framework for climate change response and the integration of climate change issues into development planning at national and sectoral levels. As a result, technical line ministries have developed climate change action plans to operationalize the CCCSP in their respective sectors, thus contributing to a coordinated effort to address climate change issues in Cambodia.

The Ministry Mines and Energy has developed the Climate Change Action Plan (CCAP) for 2016-2018 following guidance from the Council of Ministers, and with the support from the National Council for Sustainable Development (NCSD) and technical and financial support from Cambodia Climate Change Alliance (CCCA). The process for developing the CCAP involved a series of consultations with all technical and planning departments of MME, as well as with other ministries, development partners, private sector and other relevant stakeholders, ensuring alignment with the sectors' strategies, policies and plans, as well as with national development goals.

The present CCAP defines concrete actions and resources needed for the operationalization of the MME's response to climate change for the period 2016-2018, providing direction on a number of issues which are critical to the sectors' development, including climate proofing of existing and future energy infrastructure, decoupling economic growth and sectors' future development from GHG emissions, and how to build the sector's capacity to meet the country's commitments on the Sustainable Energy for All (SE4ALL) [1].

A. Policy

In 2007, the Rural Electrification by Renewable Energy Policy was integrated into the government's overall agenda for the energy sector. Providing reliable, affordable and adequate supply of electric power for the consumers can be pointed out as the prime focus of this national policy. Moreover, promoting private ownership of electrical facilities and encouraging competition among the companies in the energy sector is another focus of the national policy on energy [2].

Enabling 70% of rural households to reach reliable electricity services by 2030 is one of the long-term targets of the RGC. The government focuses on providing energy services and improving the quality of life for the rural population in two main policies: Energy Sector Development Policy and Rural Electrification Policy. Development of renewable energies is one of the approaches adopted to meet the mentioned objective. Rural Electrification Fund (REF) subsidy and investment incentives are two main policy instruments to support implementation of the Energy Sector Development and Rural Electrification Policies financially. Based on the REF documents among the renewable technologies, the only Solar Home Systems (SHSs) and mini/micro hydropower are qualified for subsidies scheme [3 – 6]. In order to reach the long-term goal, a 10-year target was developed as the medium term to connect 25% of households to the electrical service. It can be clearly observed that the development of electricity generation and transmission was taken into account from 1994 by electricity sector development policy. The electrification trend was followed by several policies with the main objective of rural electrification. Some of the

determined targets by the electrification policies and programs are short-term goals as the one in the master plan or in the initial stage of the rural energy strategy program, whilst in other programs (rural electrification plan) the long-term goals are taken into account.

Cambodian Law on the Management and Exploitation of Mineral Resources (Mining Law) in 2001 provides the framework for all mining licenses in Cambodia. Article 2 of this law asserts that all mineral resources are considered to be property of the state and that all mining activities are considered illegal unless permission is granted by the ministry in charge of the mineral sector. Article 11 further states that the artisanal license may be issued only to persons of Khmer nationality for the purpose of conducting the exploration and exploitation of mineral resources by using locally available common instruments and their own labour with the help of family with no more than seven persons. This article provides opportunities to bring some of the illegal ASM gold activity into a regulated framework. However, at the moment, this legal clause has not been developed as an active policy tool yet.

The Climate Change Strategic Plan(CCSP) [7]provides a strategic framework for the mining and energy sectors and sets specific strategic objectives for addressing both climate change adaptation and mitigation. This sectoral Climate Change Action Plan (CCAP) identifies measures which contribute to the achievement of the strategic objectives set out in the CCSP, promoting the development of the mining and energy sectors while addressing climate change effectively. The CCAP outlines the actions and activities to be implemented during a three-year period (2016-2018).

B. Situation

The mining and energy sectors are, on the one hand, vulnerable to climate change, particularly to the damages from natural disasters on energy infrastructures and mining activities, and on the other hand, they can contribute to climate change through the emission of greenhouse gas (GHG) from fossil fuel power plants and mining activities.

Climate Change Vulnerability:

The mining and energy sectors, especially the latter, are vulnerable to climate change and extreme weather. Three major climate hazards are relevant to the energy sector:

- Increasing temperature
- Increasing frequency and intensity of drought in some regions and seasons
- Increasing frequency and intensity of storms and floods

Increasing of temperature, frequency and intensity of drought, storms, and floods will each independently, and in some cases in combination, affect the ability of Cambodia to produce and transmit electricity from both fossil and renewable energy sources (such as hydropower, biomass, biogas, solar and wind energy). Climate change may also affect the nation's demand for energy.

An assessment of impact is necessary to inform forward-looking efforts to enhance energy security, mining condition and fuel handling safety. Based on experience of the MME, significant findings include:

- Renewable energy resources, particularly hydropower, bio-energy and solar power, can be affected by changing precipitation patterns, increasing frequency and intensity of drought and floods, and increasing temperatures.
- Electricity transmission and distribution systems carry less current and operate less efficiently when ambient air temperatures are higher, and they may face greater risks of physical damage from more intense and frequent storm and flood events.

- Higher temperature will increase electricity demand for cooling system used in residential, commercial and industrial premises.
- Illegal mining, by using environmentally toxic substances to extract precious metals, ends up polluting the landscape that is home to humans, animals and plants, causing various health issues and ecosystem degradation.
- Clearing landscapes for mining activities release carbon stored in the earth crust and biomass into the atmosphere.
- Unregulated fueling stations, lubricant changing stations and street-stand fuelling vendors face higher risk of leaking fumes, fire hazard, and improper disposal of used oil, releasing a tremendous amount of GHG and causing local air pollution.

Contribution to Climate Change:

Environmental changes caused by clearing forests to build roads for heavy machinery to enter mining sites, extraction activities, unmanaged energy-product wastes (light bulbs, electrical wires, battery plastics, etc.),and GHG emissions from burning fossil fuel in transportation, all contribute significantly to climate change. According to the CCSP for Energy, GHG emissions for Cambodia are currently extremely low compared to regional and global averages. According to the Statistical Year Book for Asia and the Pacific 2012 [8], the 2009 total carbon dioxide emissions for Cambodia was about four million tons. In the same year, in regards to energy consumption, the highest GHG emission was registered in residential areas, followed by the transport sector. The increasing demand for energy brought about by the country's rapid urbanization (around 4 percent annually) and the booming construction sector in major cities of Cambodia, together with the growth in transport, are the two major contributors to GHG emissions of the energy sector. Thus, it is timely to invest in measures which can increase the efficiency of energy consumption and production in order to reduce GHG emissions. Similarly, the untapped mine resources in Cambodia have attracted many investments in exploration and extraction, and these also require measures to ensure that activities are climate and environmental friendly, so that the country can keep on a sustainable development path.

Existing Initiatives:

The former Ministry of Industry, Mines and Energy (MIME) had been engaged in a number of efforts to respond to climate change, including Climate Change Strategic Plan (CCSP) for the industry and energy sector, the National Green Growth Strategic Plan [9], the Cambodia Sustainable Energy for All Readiness Plan[1] and the Energy Efficiency Policy, Strategy and Action Plan [10]. These policies, strategies and action plans will continue to play an important role in developing the mining and energy sectors while at the same time addressing the mitigation aspect of climate change response through green energy production (renewable energy sources) and sustainable mining.

C. Priority Issues

During the work leading up to MME's CCAP, a number of priority issues for the mining and energy sectors have been identified and are listed below, some of which were already included as priorities for the sector in the NSDP 2014-2018.

- Identify environmental friendly technology in the extraction of metallic mineral from ore with the analysis of mitigation potential in the mining sectors.
- Formulate and analyse the emission base line with the implementation of adaptation and mitigation measures in the energy and mines sectors.
- Encourage efficient use of energy with minimal impact on the environment.

- Undertake climate change vulnerability assessment of the energy infrastructures with adaptation measures.
- Increase institutional capacity for adaptation and mitigation response, including risk assessment, legal framework, institutional arrangement, technology transfer, human capacity building, and research and development.
- Develop a legal and regulatory framework for the energy sector to ensure efficient management and use of resources.
- Strengthen capacity to mitigate environmental impacts and to address safety issues related with Petroleum businesses.
- Increase electricity supply capacity and reducing tariff to an appropriate level, while the strengthening institutional mechanisms and management capability.
- Ensure reliability of electricity supply to attract investment in the user sectors to foster economic development.
- Promote the exploration of energy sources such as hydropower, natural gas, and coal for the electricity generation.
- Ensure stability in electricity supply to facilitate investment and socio-economic development.
- Encourage the private sector to invest in energy, including in generation, transmission and distribution.
- Further foster development of all types of renewable energy such as biomass, biogas, bio-fuel etc., and enhance the efficiency of energy through the use of energy-saving stoves, to reduce the use of fuel, firewood, charcoal, etc.
- Promote regional energy trade through bi-and multi-lateral cooperation.

II. STRATEGIES

There are six strategic objectives in the Climate Change Strategic Plan for Manufacturing Industry and Energy published in 2012 by former Ministry of Industry, Mines and Energy (MIME) [7]. Four of these are related with industry sector, and two are related with energy sector. Base on the needs and discussions during the development of the Climate Change Action Plan 2016 -2018, two additional strategies have been added. The four strategies are as the following:

Strategic objective 01: Policy Development in Energy Sector to meet SE4ALL target for Cambodia
Strategic objective 02: Promote the energy infrastructures to be climate proof or climate resilient
Strategic objective 03: Implementation of the GHG emission management approach for the energy sector
Strategic objective 04: Improve capacities, knowledge and awareness for climate change response

III. ACTION PLAN

A. Summary Scope of Planning

The Climate Change Action Plan for the Mines and Energy Sectors focuses on enhancing climate change adaptation and mitigation through building institutional capacity of MME and its staff, setting necessary policy and guidelines, implementing needed actions and cooperating with relevant stakeholders to cope with issues arising from a changing climate and extreme weather events such as floods, storms, droughts, as well as rising temperatures. The Action Plan will continues to scale up existing actions and propose new dedicated actions most relevant to climate impacts on energy infrastructure and environmental friendly development.

B. Action Plan Matrix

The MME has proposed actions to address concerns related to climate change issues in the mining and energy sectors. These are summarized in the table below

Table 1: Matrix planning

CCCSP Strategy #	CCSP Strategy #	Action Number	MME Actions	Category of action	Responsible department(s)	Preliminary Estimated budget (USD)			
						2016	*2017*	*2018*	*Total*
1			**Promote climate resilience through improving food, water and energy Security**						
	1		**Policy Development in Energy Sector to meet SE4ALL target for Cambodia**						
		1	Finalize and disseminate national policy, strategy and action plan on energy efficiency in Cambodia	Modi-fied	DNRE	129,043	10,479	10,479	150,000
		2	Develop renewable energy promotion strategy and action plan	Modi-fied	DNRE	89,034	92,167	18,799	200,000
2			**Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts**						
	2		**To promote the energy infrastructures to be climate proof or climate resilient**						
		3	Conduct climate risk analysis for the existing electricity infrastructures and provide recommendations	Dedi-cated	EDD	-	106,646	63,354	170,000
4			**Promote low-carbon planning and technologies to support sustainable Development**						
	3		**Implementation of the GHG emission management approach for the energy sector**						
		4	Establish GHG inventory system for the energy sector	Dedi-cated	EDD	187,678	124,763	137,559	450,000
		5	Conduct Technology Needs Assessments for GHG emissions reduction in the energy sectors	Modi-fied	EDD	-	113,710	36,290	150,000
		6	Development of a NAMA for the energy sector, based on the study of mitigation potentials and CBA	Dedi-cated	EDD	200,000	200,000	200,000	600,000
		7	Monitoring and inspection on fuel installation and handling of oil terminal, fuel service stations and fuel street vendors	Dedi-cated	GDP	165,479	34,521	-	200,000
5	4		**Improve capacities, knowledge and awareness for climate change response**						
		8	Raise awareness about environmental friendly for small scale gold mining.	Re-scaled	GDMR	1,000,000	1,000,000	700,000	2,700,000
		9	Improve capacity for hydro power project appraisal in the context of climate change.	Dedi-cated	DH	100,169	55,499	244,332	400,000
Grand Total						**1,871,403**	**1,737,784**	**1,410,813**	**5,020,000**

C. Implications for Expenditure in the Ministry

N/A

D. Expected Benefits from the Implementation of the Action Plan

The CCAP would enhance the capacity of the ministry for effective response to climate change nationally. Also, the CCAP would generate evidence based implementation to inform future climate change interventions through better policy, climate change proofing and resiliency, GHG emission management and natural resources and capacities, knowledge and awareness for climate change response improvement. The expected results of this action plan implementation will have both short and long-term benefits.

Short-term benefits could include:

- Increased capacity of technical staff of the Ministry and partners involved in implementing the action(s) to address climate change adaptation and mitigation (e.g. through training of trainers with new methods and approaches);
- Institutional and legal arrangements: legal measures and policy developed, ministerial CCAP's integrated into the National Strategic Development Plan (NSDP), technical manual or guidelines developed;
- In-flow of soft and hard technology transfer from developed countries to Cambodia;
- Gradual changes in behaviour of different vulnerable target groups for adaptation and mitigation;
- Commitment and contribution by different stakeholders to addressing climate change, especially government institutions, private sector and development partners;

Long-term benefits will focus on:

- Environmentally sound economic, with poverty gradually reducing (productivity and quality of life will be improved, as will the environment in which we are living);
- Natural resources are conserved for sustainable development;
- Long-term investment and proactive measures will be taken into account;
- Environmentally sound society (gradually the emission of greenhouse gases and other waste and pollutants will be reduced);
- Long-term savings in terms of capital, water, energy and other scarce resources

IV. MANAGEMENTAND FINANCING MECHANISM

A. Analysis of Existing Management and Financing Mechanisms

The Figure 1 below illustrates the structural management of the Ministry of Mines and Energy.

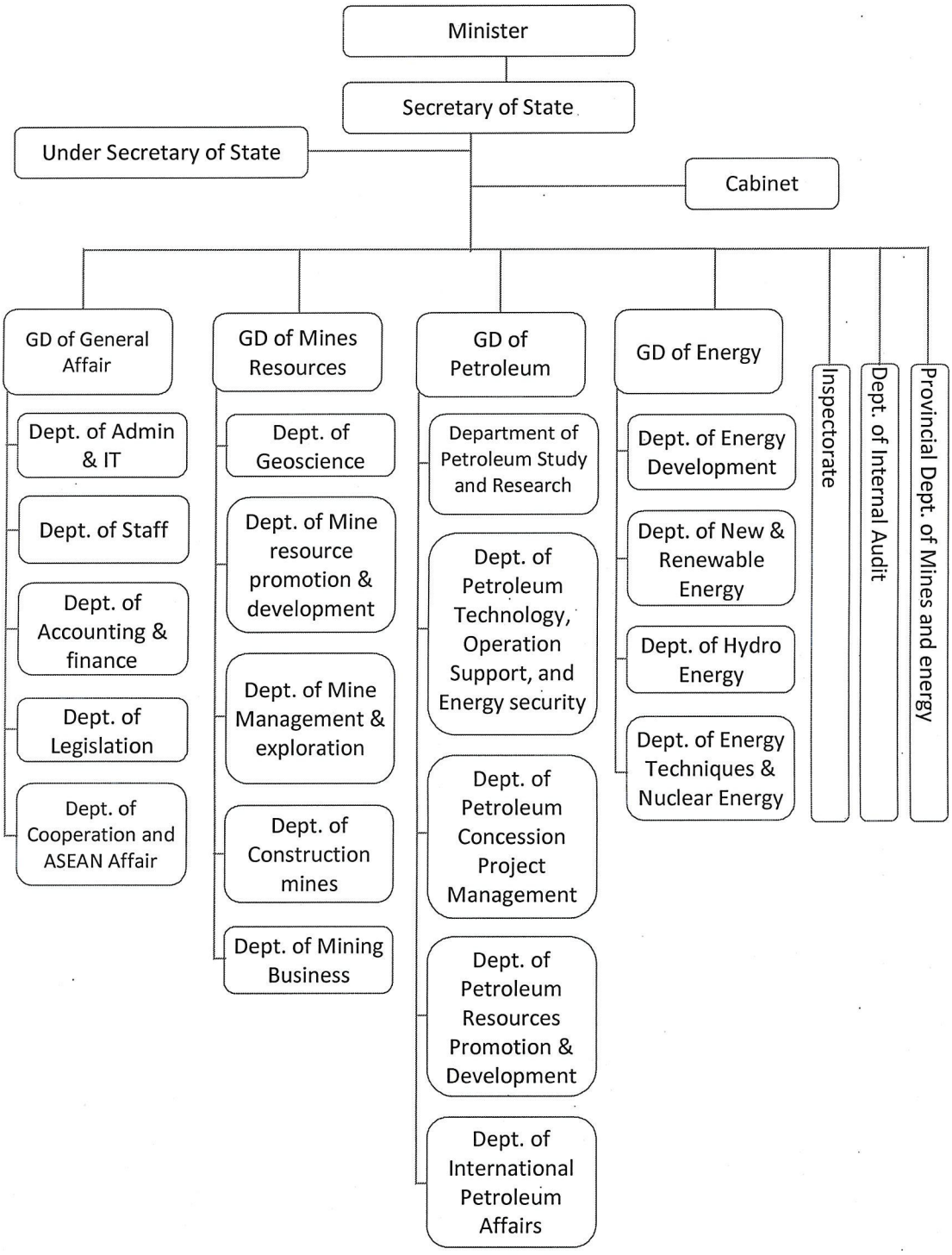

Figure 1: Structure of Ministry of Mines and Energy

The Ministry of Industry, Mines and Energy was recently split into two ministries: Ministry of Mines and Energy (MME) and Ministry of Industry and Handicrafts (MIH). Each ministry has formed a Climate Change Working Group for the respective ministry with representatives from relevant departments who will take the lead to promote CCAP implementation in their respective sectors, and coordinate where required.

B. Analysis of Potential Sources and Volume of Finance for Climate Change Actions

i. Budgeting of MME

Until 2015 that the MME was not able to calculate actual amount of expenses made by the ministry on climate change as there was a lack of clear climate change actions for the Ministry of Mines and Energy, and lack of a programme based budget.

ii. Financial Mobilisation Mechanism

Aside from the national budget, MME has already established partnerships with a number of donors and development partners on climate change related issues. The work of financial mobilisation is led by the respective general directors and approved by the Minister.

iii. Potential Sources and Volume of Finance Climate Change Actions

The present CCAP is estimated to be 5,020,000 USD over a 3-year period. Large part of the funds for the CCAP will be financed through the current development partners of MME. The multi-donor modality consisting of SIDA, UNDP and EU is supporting the Cambodia Climate Change Alliance with total current funding of USD 12.8 Million for 2014-19. The dedicated/global funds for climate change i.e., CIF, GEF, LCDF, AF, FCPF, and UN-REDD are potential sources of finance for implementing CCAP of MME. Dedicated/global funds for climate change are expected to play a more important role as their funding scales are expected to get larger. In addition, key bilateral partners supporting MME on climate change work are Germany (through GIZ), USAID, JICA, KOICA, UKAID, and SIDA.

Alternatively, co-funding may be sought from specialized climate funds (Adaptation Fund, Green Climate Fund, GEF/LDCF, Nordic Development Fund), to cover the climate-proofing of traditional projects, or dedicated climate change projects. UN agencies, such as UNIDO, may be in a position to support resource mobilization for some of the 'soft' activities, and provide technical and capacity development services. Several NGOs are also very active in the renewable energy sector. Policy and capacity development support, as well as funding for innovative activities, maybe be mobilized through the Cambodia Climate Change Alliance, or the Global Green Growth Institute. The potential for carbon-credit financing of mitigation initiatives should also be explored, with technical support from the Climate Change Department of the General Secretariat of the National Council for Sustainable Development.

iv. Entry Points for Climate Change Mainstreaming in Management and Financing

Dedicated CCAP actions will be included in the annual revision of the PIP, starting in 2016 for the 2016-2018 PIP. MME Climate Change Working group will be in charge of this.

At project level, a key action will be to ensure that the screening criteria for any new project development in MME include an assessment of climate relevancy, and if the project is found to be climate relevant, they need to ensure that specific measures are included in the project design to contribute to mitigation or adaptation objectives. Advocacy on this issue will target both technical and planning departments involved in the review and formulation of new projects.

There is currently no significant domestic capital budget (except for counterpart funds) allocated to the mining and energy sectors. When MME adopts a program based budget, CCAP actions shall be included in the program budgets for co-funding through the national budget.

V. MONITORING AND EVALUATION

Monitoring and evaluation (M&E) of this CCAP is aligned with Cambodia's M&E Framework for Climate Change, established by the CCCSP, as well as with the NSDP indicators on climate change. The framework encompasses four main types of indicators, which will be measured on a yearly basis, as indicated in the table below.

Indicator Type	Purpose	Frequency
1. CCAP delivery and mainstreaming	Tracking the progress off undamental aspects of MME CCAP's implementation, such as fund mobilization	Annual
2. Institutional readiness[1]	Tracking progress in improving institutional capacities including the ability to mainstream CC into the MME's broader policy and planning instruments	Annual
3. Results	Assessing the results of actions	Annual, or depending on the nature of the action[2].
4. Impact	Assessing the progress towards ultimate climate policy and development objectives	Annual, ad-hoc for indicators that require specific studies

Note that CCAP delivery indicators, though partially overlapping with other institutional readiness and result indicators part of the M&E framework, provide a summary view of MME' success in implementing CCAP and they also facilitate a comparison with CCAP implementation across sectors.

The full set of indicators which are part of this CCAP's M&E framework is presented below.

MME CCAP M&E System		
	Indicator	**Units**
1. CCAP delivery		
	Total funding mobilized/total CCAP budget[3]	%
	Actions successfully funded	number
	Degree of inclusion of CCAP actions into PIPs	number
2. Institutional readiness		
	Status of development of climate robust energy and mining policy and planning	% (ladder approach)
	Coordination of CC response and CCAP implementation	% (ladder approach)

[1]These indicators will be using a qualitative assessment based on score cards.

[2]Given that most actions will require formulation of project proposals to access the funds required for implementation, the indicators identified are preliminary and will be adjusted to reflect the actual scope of the action. Only indicators related to actions that have been funded for implementation will be monitored.

[3] This indicator will be calculated annually as the proportion of actual funds allocated and the budget indicated in the planning matrix of this CCAP.

	Status of climate-related information management	% (ladder approach)
	Climate integration into Financing	% (ladder approach)
3. Result indicators		
Action 1 *Finalize and disseminate national policy, strategy and action plan on energy efficiency in Cambodia*	• Degree implementation of the policy and action plan for energy efficiency	score card (ladder approach) [combines measures of stakeholder involvement, including other government agencies and the private sector, and estimated energy savings/emission reductions from the implementation of policy and action plan]
Action 2 *Develop renewable energy promotion strategy and action plan*	• Proportion of renewables in the energy mix • Number of producers of renewable energy feeding into national and mini grids	• % • number
Action 3 *Conduct climate risk analysis for the existing electricity infrastructures and provide recommendations*	• Number of infrastructures where action has been taken to follow up on recommendations from risk assessments	number
Action 4 *Establish GHG inventory system for the energy sector*	• Level of capacity of MME to manage the GHG inventory system for the energy sector • Number of cost-effective mitigation options identified	• score card (ladder approach) • number
Action 5 *Conduct Technology Needs Assessments for GHG emissions reduction in the energy sectors*	• Level of knowledge of available low carbon technologies in the energy sector	Survey
Action 6 *Development of a NAMA for the energy sector, based on the study of mitigation potentials and CBA.*	Number of NAMAs under implementation	number
Action 7 *Monitoring and inspection on fuel installation and handling of oil terminal, fuel service stations and fuel street vendors*	Number and magnitude of accidents in fuel facilities and terminals due to incorrect handling	number
Action 8 *Raise awareness about environmental friendly for small scale gold mining*	Level of knowledge of environment and health impacts from current small scale gold mining practices and of alternative good and less harmful practices	survey [involving local schools in monitoring (e.g. developing and delivering surveys) is a complementary, and usually effective way to raise awareness]
Action 9 *Improve capacity for hydro power project appraisal in the context of climate change*	Level of capacity of government and academic institutions on hydropower development	• score card (ladder approach)
4. Impact		
1	Public awareness of CC/Energy issues	survey
2	Mainstreaming climate change/energy issues into national and subnational plans	number
3	Vulnerability Index	-

4	Sector's carbon intensity (carbon intensity of energy supply)	CO_2/Btu
5	Carbon credits issued from carbon offset projects	number

Additional result indicators for monitoring progress in the implementation of specific actions is provided in the action fiches presented in Annex.

The full development of MME's CC M&E Framework, including baselines and targets for indicators for CCAP delivery and mainstreaming, and for impact indicators, will be established at the start of 2016 and will be included in the first CCAP progress report (end of 2016). Baselines and targets for result indicators will be adjusted as the actions are financed.

Progress on the implementation of the CCAP will be reviewed on an annual basis through the framework of the Annual Progress Review established by MME; a specific chapter reviewing CCAP progress will be included. The CCAP indicator framework will be integrated within the indicator framework of the ministry; relevant indicators for climate change will be also included in the NSDP submission.

A final evaluation will be conducted in mid-2018, to inform the development of the next round of the CCAP. The evaluation will assess the progress in implementing the CCAP and CCSP and its relevance and contribution to addressing climate change impacts on the mines and energy sectors, as well as alignment with and contribution to achieving the objectives set in the CCCSP[4]. The evaluation will also provide recommendations for future adjustment of the policy response. It will be important that evaluations identify lessons learned and, if needed, entry points for improving policies and actions. A precondition for organizing quality evaluations at program (CCAP) and action levels will be that sufficient resources for M&E are budgeted in the actions.

The Department of Energy Development (DED) in MME will be responsible for the regular monitoring, reporting of CCAP's implementation (with at least one M&E report per year), with technical support from an interdepartmental Climate Change Working Group, which will be formally established at the start of CCAP planning period to drive its implementation. DED will carry out M&E with support from and in coordination with the Department of Climate Change (DCC) of the General Secretariat of the National Council for Sustainable Development (GSSD) and Ministry of Planning (MoP).

The interdepartmental CC Working Group will be responsible for sharing information within MME, the GSSD, key line ministries and other stakeholders. They will also promote inclusive discussions to extract lessons from the implementation of MME's CCAPs. Their work will enable continued learning and timely adjustment of activities, potentiating a more effective climate change response.

VI. LEGAL REQUIREMENTS

To fulfil the mandates of Ministry of Mines and Energy, a number of legal provisions have been developed to ensure effective leading and management of mines and energy sectors including petroleum, natural gas,

[4]The national framework for M&E of climate change response foresees the establishment of a long-term national evaluation program. Evaluations of the CCAP as a whole and of specific actions will be organized in coordination with the national evaluation program.

and electricity of Cambodia. In 2001, Law on Electricity of Cambodia aimed to govern and to provide a framework for the electric power supply and services throughout the Kingdom of Cambodia. This law covers all activities related to the supply, the provision of services and uses of electricity and other associated activities of power sector. The Article 4 of this law states that the ministry should promote efficiency in generation, transmission, distribution and consumption of electricity, and take action to create a Comprehensive Electricity Conservation Program for Cambodia, as well as electricity sector emergency and energy security strategies. This article supports the reduction of GHG emissions through improving energy efficiency which is directly linked to the CCAP.

The second supporting legal framework for the implementation of this CCAP is the law on Mineral Resource Management and Exploitation. The purpose of this law is to determine the management and exploitation of mineral resources, and all activities relating to the mining operation in the Kingdom of Cambodia, with the exception of the mining operations of petroleum and gas, which are under a separate law. Article 21 specifies environment protection requirements while undertaking the mines' exploration and operation, as per the requirement of the Law on Environment Protection and Natural Resource Management, an environmental impact assessment and study, an environmental management plan, a mines site restoration and rehabilitation, and financial guarantees. This contributes to the sustainable mining practices.

In addition to the existing supporting regulations, the implementation of CCAP will possibly require adjustments in the existing legal framework and/or the development of new regulations based on the need and evidence from implementation. For example, Action Number 7 will require to revise the Prakas (Proclamation) of fuel storage and handling by integrating the safety inspection as a mandatory. Another potential regulation development is on Renewable Energy and Energy Efficiency to boost GHG emission reductions and to increase equity on energy accessibility.

VII. CONCLUSION

The Ministry of Mines and Energy highly appreciates the Climate Change Action Plan 2016-2018 as a basis for national policy implementation on climate change for the mines and energy sectors. Based on the priority strategies defined above, there are specific strategies and actions which will support the achievement of the national strategic plan, vision, goal and missions of climate change for the two sectors. These strategies also indicate the importance of triple-dimension approaches to benefit to society, the economy and the environment as a whole.

At the end of the implementation period, the evaluation of the performance will be conducted to document lessons learnt and to identify new areas of intervention in the mining and energy sectors.

Annexe: Action Fiches

MME ACTION FICHE No 1

Action	**Finalize and disseminate the national policy, strategy and action plan on energy efficiency**
CCCSP and Sector CCSP Strategic Objective	CCCSP S01: Promote climate resilience through improving food, water and energy Security CCSP01: Policy Development in Energy Sector to meet SE4ALL target for Cambodia
Rationale	- Energy efficiency plays an important role in strengthening energy security, reducing production and service costs, especially, reduction of pollution and GHG emission which cause global warming and climate change. - Energy efficiency policy, strategy and action plan can be a roadmap to improve the energy use for energy saving, energy security as well as competitiveness and environmental issues.
Category of climate change action	☐ Cat 1 – Re-scaled ☑Cat 2 – Modified ☐Cat 3 – Dedicated
Type of action	*Mitigation*
Short description of the action and expected results and benefits	*Short description:* The draft of national policy, strategic and action plan on energy efficiency in Cambodia has been developed by EUEI-PDF, covering the following areas: - Energy efficiency in industry - Energy efficiency of end-user products, including labelling program - Energy efficiency in buildings - Energy efficiency for rural electricity generation and distribution - Efficient use of biomass resources for residential and industrial purposes. The focus this action is to finalize and disseminate the policy, strategic and action plan on energy efficiency, and includes the following activities: - Review and finalize the current draft with the support of an (international) expert. o Update the data and consumption projections of future scenarios o Identify policy and capacity gaps to help implementation - Establish a working group to review and finalize the draft (supported by the international expert) and to disseminate energy efficiency policy, strategy and action plan - Organize consultation workshops to receive comments and suggestions from various institutions and development partners. - Publish and prepare the communication materials for the national policy, strategy and action plan on energy efficiency

	- Organize dissemination workshops nationwide on the energy efficiency policy, strategy and action plan. *Expected results and benefits:* - Policy, strategy, and action plan to guide the development on energy efficiency will be available for government's institutions and relevant stakeholders, raising awareness and guiding efforts nationally on promotion of energy efficiency - It will significantly contribute to GHG emission reduction (projections point to a 15% reduction of the total energy demand compared with business as usual if energy efficiency actions are implemented)
Cost effectiveness of the action	Based on the draft of National Policy, Strategy and Action Plan on Energy Efficiency in Cambodia, it is estimated that the country will achieve in 2035 an overall reduction of the CO_2 emissions around 15% (approximately 2 million tons of CO_2-eq) and an overall reduction in energy demand about 850 ktoe, compared to MME's business as usual.
Preconditions needed for successful implementation	- Data availability such as total primary energy supply (TPES) from industry, transportation, commercial and residential sector. - The capacity of ministry staff and expert to project the energy demand in various scenarios to reduce energy intensity. - Level cooperation from different stakeholders - Timely financial and technical support
Indicator(s) of success	- Progress of Policy, strategy and action plan development and approval. - Number of dissemination workshops conducted and communication materials on document produced.
Implementation arrangements	- Energy Efficiency office of Department of New and Renewable Energy, Ministry of Mines and Energy (MME) in collaboration with other stakeholders
Estimated total cost	150,000 USD
Possible funding sources	ODA, Adaptation Fund, Green Climate Fund, Nordic Development Fund and other.
Timeframe	2016 to 2018

MME ACTION FICHE No 2

Action	**Develop renewable energy promotion strategy and action plan**
CCCSP and Sector CCSP Strategic Objective	*CCCSP SO1*: Promote climate resilience through improving food, water and energy Security *CCSP SO1*: Policy Development in Energy Sector to meet SE4ALL target for Cambodia

Rationale	Promotion of renewable is the win-win strategy for Cambodia to meet the development vision towards a green, low-carbon, climate-resilient, equitable, sustainable and knowledge-based society. In 2007, the Royal Government of Cambodia approved the policy and the master plan on rural electrification by renewable energy. This action will directly contribute to the implementation of the existing policy and the achievement of the country's targets of 100% of villages with access to electricity in different form by 2020, and 70% of rural households by 2030. The action aims at developing a strategy and action plan for Cambodia to promote the generation and use of renewable energy, contributing to Sustainable Energy For All vision "by 2030 the people of the Kingdom of Cambodia will have sufficient and efficiently produced and consumed sustainable energy that will contribute to making Cambodia healthy, prosperous and more equitable nation".
Category of climate change action	☐ Cat 1 – Re-scaled ☑Cat 2 – Modified ☐Cat 3 – Dedicated
Type of action	*Mitigation*
Short description of the action and expected results and benefits	*Short description:* - Assess the progress on the implementation of the policy and the development of the strategy and action plan. - Develop the strategy to promote renewable energy - Formulate action plan for renewable energy including small scale hydropower, solar, and offshore wind power development - Conduct the necessary assessments to inform policy and the development of the action plan, including: o Study on establishment of feed-in-tariffs to promote renewable energy o Study on effectiveness of the micro-credit mechanisms to promote the generation and use of renewable energy in rural area. - Disseminate the strategy and action plan to relevant stakeholders - Provide technical assistance to subnational government and key stakeholders on planning and implementing renewable energy programs (aiming at increasing access to and use of clean/renewable energy) *Expected results and benefits:* The action will contribute significantly to reduction of greenhouse gases from the energy sector. It can also result in poverty reduction as well as overall economic improvement. It also increases the level of competitiveness of the private sector because the cost of the energy is cheaper. The action also contributes to Cambodia's energy security.

Cost effectiveness of the action	Having clear and comprehensive strategies and action plan on renewable energy promote support the Royal Government of Cambodia to achieve the goal as a green, low carbon and climate resilient economy society. The action will also attract both financial and technical support from developed countries as well as the private sectors to invest in renewable energy in Cambodia.
Preconditions needed for successful implementation	- Availability of the data necessary for the preliminary study - Timely technical and financial support - Cooperation of relevant stakeholders
Indicator(s) of success	- Percentage of renewable energy in the energy mix - Number of subnational governments engaged in the implementation of the action plan - Level of involvement from relevant stakeholders in the development of strategic and action plan
Implementation arrangements	Renewable energy office of Department of New and Renewable Energy, Ministry of Mines and Energy (MME), in coordination with NCSD Secretariat (DCC/GSSD), EDC, EAC, and other relevant stakeholders
Estimated total cost	200,000 USD
Possible funding sources	UNIDO, UNEP, GEF, Green Climate Fund, Nordic Development Fund, and others.
Timeframe	2016– 2018

MME ACTION FICHE No 3

Action	**Conduct climate risk analysis for the existing electricity infrastructures and provide recommendations**
CCCSP and Sector CCSP Strategic Objective	CCCSP SO2: Reduce sectoral, regional, gender vulnerability and health risks to climate change impacts CCSP SO2: Promote the energy infrastructures to be climate proof or climate resilience
Rationale	Given the high cost of electricity infrastructures and high demand for energy in Cambodia, conducting risk assessment and identifying prevention measures are contributing to the achievement of government's energy policy.
Category of climate change action	☐ Cat 1 – Re-scaled ☐Cat 2 – Modified ☑Cat 3 – Dedicated
Type of action	*Mitigation and adaptation*

Short description of the action and expected results and benefits	*Short description:* - Assess risks of existing electricity infrastructures in particular those located in the climate-hazard prone areas and provide policy recommendations - Build capacity on inspection procedures aiming at reducing climate risks of infrastructures and conduct site inspections - Develop national guidelines on the climate proof of electricity infrastructure development - Disseminate the assessment results and guidelines to the owners of the electricity infrastructures and relevant stakeholders. *Expected results and benefits:* Policy and decision makers, as well as investors will have a better understanding of the level of climate risk on electricity infrastructures and will be able to implement measures to address those risks (also contributing to better planning and design of future infrastructure development).
Cost effectiveness of the action	The climate risks analysis will provide overall potential impacts of climate change on electricity infrastructures, which could be translated into preventive measures, and thus in avoided costs.
Preconditions needed for successful implementation	- This action relies on results from the national climate change vulnerability assessment. - Capacity of the MME's staff to comprehend climate change risks and potential impacts on infrastructures is essential to successful implementation of the action. - Cooperation with the owners of electricity infrastructures is needed to conduct the assessments.
Indicator(s) of success	- Number of infrastructures assessed - Level of implementation of the risk assessment recommendations - Level of dissemination of guideline on the climate proofing of electricity infrastructures
Implementation arrangements	The executing agent is the Energy Development Department in MME in coordination with NCSD Secretariat (DCC/GSSD), EAC, EDC and other development partners
Estimated total cost	170,000 USD
Possible funding sources	CCCA, UNIDO, KOICA and JICA
Timeframe	2017 – 2018

MME ACTION FICHE No 4

Action	**Establish GHG inventory system for the energy sector**
CCCSP and Sector CCSP Strategic Objective	CCCSP S04: Promote low-carbon planning and technologies to support sustainable development CCSP 03: Development Implementation of the GHG emission management approach for the energy sector
Rationale	As a Party to the UNFCCC, Cambodia is obligated to report on its GHG emission. Developing GHG inventories is an essential first

	step toward reporting on GHG and managing emissions. A GHG inventory in energy sector is also an element of the required National Communications to the UNFCCC, and is part of the National GHG Inventory which is going to be developed. This action is designed to establish GHG inventory system for the energy sector (stationary combustion and mobile sources) and to identify the opportunities reduce greenhouse gas emissions.
Category of climate change action	☐ Cat 1 – Re-scaled ☐Cat 2 – Modified ☑Cat 3 – Dedicated
Type of action	Mitigation
Short description of the action and expected results and benefits	*Short description:* - Develop capacity of the Energy Development Department's staff (MME) for the design and development of the inventory system (including SOPs, data collection and quality assurance (QA) protocols, etc.) - Provide on the job training on 2006 IPCC Guidelines for National Greenhouse Gas Inventories - Identify and acquire hardware and software (including training on the use of software) - Conduct inventory data collection(stationary combustion and mobile sources) including improving data compilation, data gaps and analysis - Conduct studies to develop emission factors for energy sector. - Identify financing options necessary for ensuring sustainability of GHG inventory activities for the energy sector - Share information via workshops to engage other ministries and relevant stakeholders. - Provide timely reporting to the national focal point for the GHG Inventory at the NCSD Secretariat - Study mitigation options (including CBA), including the promotion of technologies aiming at increasing efficiency or replacing fuel wood or charcoal such as efficient cook stoves, biodigesters, solar lanterns, wind water pumping, and ceramic water filters. *Expected results and benefits:* The action will result in reliable, good quality activity and emission data, enabling better estimations of future energy demand and emissions and identification of opportunities for emission reductions from the sector.
Cost effectiveness of the action	It is mandatory for Cambodia as a Party to UNFCCC. Furthermore, the GHG inventory will help Cambodia to manage GHG emissions from the energy sector more effectively, providing useful information to policy makers and investors on potential areas for low carbon development planning and investment. It will also help Cambodia to attract for climate funding year marked for mitigation projects, as well as to

	mobilize support from developed countries in terms of technical assistance and technology transfer.
Preconditions needed for successful implementation	The Active cooperation between Ministry of Mines and Energy (MME), the Ministry of Public Works and Transports (MPWT)and NCSD Secretariat.
Indicator(s) of success	- GHG Inventory system for energy sector established - Formulation of the baseline emissions between the year 2016 and 2050 based on the most recent available data and projections of future demand - Number of mitigation options identified - Level of capacity improved in GHG inventory system
Implementation arrangements	The executing agent is the Energy Development Department in MME in coordination with MPWT, NCSD Secretariat (DCC/GSSD), EAC, EDC and other development partners
Estimated total cost	450,000 USD
Possible funding sources	Bilateral donors, USAID, UNDP, JICA, ADB, UNEP, UNFCCC, IGES, GEF, and CCCA
Timeframe	2016–2018

MME ACTION FICHE No 5

Action	**Conduct Technology Needs Assessments for GHG emissions reduction in the energy sector**
CCCSP and Sector CCSP Strategic Objective	CCCSP S04: Promote low-carbon planning and technologies to support sustainable CCSP 03: Development Implementation of the GHG emission management approach for the energy sector
Rationale	The reduction of GHG emissions from the energy sector require the use of low carbon technologies. Up-to-date studies and technology assessments are crucial instruments for the energy sector in the context of Cambodia situation. This assessment will provide the energy sector with updated information on the opportunities available in terms of new low carbon technologies. This assessment will provide useful information for the private and public sectors, including: - Identifying the technical criteria for utilization of technologies. - Studying the technical, economic and environmental feasibility of utilization of the technologies.
Category of climate change action	☐ Cat 1 – Re-scaled ☑Cat 2 – Modified ☐Cat 3 – Dedicated
Type of action	Mitigation
Short description of the action and expected results and benefits	*Short description:* - Recruit the consultant team to conduct the study - Conduct survey on present situation of technologies in Cambodia energy sector - Review and consult with relevant stakeholders regarding technology needs in specific areas, providing up-to-date

	information on low carbon technologies relevant for energy sector in Cambodia. - Prioritize the technologies in term of their applicability in Cambodia's energy sector - Disseminate the findings to other government institutions, investors, NGOs and other development partners. *Expected results and benefits:* - The findings are necessary for policy makers, investors and other relevant stakeholders to adopt low carbon technologies. - Low carbon technologies will not only reduce GHG emissions but will also improve the competitiveness of the private sectors, often offering other co-benefits (e.g. improved health of energy industries' workers, or overall health of health of Cambodian families).
Cost effectiveness of the action	Adoption of low carbon technologies results in both economic and environmental benefits. The technologies can help reduce the operating cost and improve energy efficiency, and it can also reduce the GHG emission and other pollution. Availability of the low carbon technology document will support the decision making process of policy makers and private investors, facilitating adoption of low carbon development in the energy sector.
Preconditions needed for successful implementation	- Timely financial and technical support - Good cooperation from all stakeholders
Indicator(s) of success	- Number of low carbon technologies in energy sector identified and published
Implementation arrangements	- The executing agent would be the Energy Development Department in MME, in coordination with EDC, EAC, NCSD Secretariat (DCC/GSSD), MPWT, Private Sector, government institutions, and development partners
Estimated total cost	150,000 USD
Possible funding sources	EU,UNDP, JICA,Global Green Growth Institute, GEF
Timeframe	2017 – 2018

MME ACTION FICHE No 6

Action	**Development of a NAMA for the energy sector, based on the study of mitigation potentials and Cost Benefit Analysis.**
CCCSP and Sector CCSP Strategic Objective	CCCSP S04: Promote low-carbon planning and technologies to support sustainable development. CCSP 03: Development Implementation of the GHG emission management approach for the energy sector
Rationale	The total emission of GHG in Cambodia reached 221 Gg in 2000, from a negative 5,143 Gg in 1994, with the highest emissions being generated by the agricultural and energy sectors. However, Cambodia is committed to decoupling carbon emissions from economic growth and is making efforts to keep on the path of

	low carbon resilient development, thus generating additional sustainable development gains. In order to promote GHG emission reduction, Cambodia is actively engaged in establishing the enabling conditions necessary for the functioning of a number of market-based, carbon offset credit mechanisms which have been established under The UNFCCC, including the Clean Development Mechanism (CDM) first established by the Kyoto Protocol. Other project and program carbon finance crediting mechanisms include the Joint Crediting Mechanism (JCM), Reducing Emissions from Deforestation and Forest Degradation (REDD+), and Nationally Appropriate Mitigation Actions (NAMA). In the energy sector, there is potential to develop NAMA project including hydro, biomass (waste agricultural biomass to energy, brick kiln, cook stove, industrial stoves efficiency), solar energy, biogas energy, wind, clean coal technology, combined heat power generation, municipality waste management, addressing electricity distribution losses, etc.
Category of climate change action	☐ Cat 1 – Re-scaled ☐Cat 2 – Modified ☑Cat 3 – Dedicated
Type of action	*Mitigation*
Short description of the action and expected results and benefits	*Short description:* This action will focus on the establishment of NAMAs in the energy sector, each specific field in the energy sector requires technical expertise with analytical capacity at national level, which in part can be supplemented by harnessing domestic technical institutions and experts. This action comprises the following activities: - Assess framework conditions and strategies and identify mitigation opportunities in the mines and energy sectors (in coordination with the implementation of Action 4) - Evaluate technical emission reduction potential, co-benefit & co-costs - Select NAMA ideas - Identify NAMA objectives and select mix of instruments - Define baselines - Design MRV Plan - Detail the NAMA planning - Identify needed resources - Support to NAMA implementation & MRV - Evaluate and Communicate *Expected results and benefits:* The action is expected to attract the technical and financial support from developed countries and from private investors towards low carbon development. It will also improve better planning of low carbon energy development in Cambodia.

Cost effectiveness of the action	This action is part of Cambodia's commitments under the UNFCCC, and it is expected that it will contribute to attract funding for the implementation of NAMA projects (both from domestic and international sources), as well as support from developed countries in terms of technical assistance and technology transfer. Thus it is expected that gains from setting up monitoring, reporting and verification (MRV) system will far outweigh the investment made.
Preconditions needed for successful implementation	Leadership and commitment of MME to promote and achieve low carbon development objectives, placing high on the agenda the approval of the legal framework for GHG emission reduction mechanisms and the establishment of a quality MRV and Registry system. Progress made in the establishment of the GHG Inventory System Capacity building of the staff of MME Timely technical and financial supports
Indicator(s) of success	- GHG emissions avoided - Number of NAMA projects developed - Low carbon energy integrated in national energy balance and outlook
Implementation arrangements	- The executing agent would be the Energy Development Department in MME, in coordination with NCSD Secretariat (DCC/GSSD), Private Sector, government institutions, and development partner
Estimated total cost	600,000 USD
Possible funding sources	ODA, UNDP, GEF, Green Climate Fund, Nordic Development Fund and JICA, KOICA and other development partners.
Timeframe	2016 – 2018

MME ACTION FICHE No 7

Action	**Monitoring and inspection of fuel installations and handling of oil terminals, fuel service stations and fuel street vendors**
CCCSP and Sector CCSP Strategic Objective	*CCCSP S04:* Promote low-carbon planning and technologies to support sustainable development CCSP 03: Implementation of the GHG emission management approach for the energy sector
Rationale	Improper handling of the fuel stations and terminal leads to accidents or increase likelihood of accidents, which may lead to emission of GHG and serious environmental impacts. This action aims to increase the safety of fuel stations, handling and transportation, and fuel street venders in 25 provinces through strengthening monitoring and inspection of these facilities. The work to be conducted will also provide recommendations on good practices to the petroleum businesses to help prevent accidents and improve safety in fuel station installation/facilities and handling. Data of the explosions and fire in related to fuel facilities in

	Cambodia clearly shows the relevance and need for urgently addressing this safety issue, with 7 cases in 2010, 2 cases in 2011, 17 cases in 2012, 42 cases in 2013, and 27 cases in 2014, in a total 95 incidents. These numbers could increase if no preventive measures are taken. This action is expected to contribute in a significant way to address the current problem.
Category of climate change action	☐ Cat 1 – Re-scaled ☐Cat 2 – Modified ☑Cat 3 – Dedicated
Type of action	Mitigation
Short description of the action and expected results and benefits	*Short description:* - Develop the safety guideline for fuel station, street vendors, terminal, and fuel handling and transportation. - Develop inspection guideline for inspectors - Disseminate and awareness raising for all stakeholders - Onsite inspection of fuel station, street vendors, terminal, and fuel handling and transport operations with corrective actions. - Inform petroleum business on the fuel safety circular, issued by MME, aimed at preventing the risk from petroleum fire - Publish the Safety Handbook for Oil and Gas Handling - Revise the Prakas by integrating the safety inspection as a mandatory *Expected results and benefits:* - Around 1885 fuel station will received training and support on safety issue; fuel street vendors will also be targeted in awareness raising efforts on safety related issues. It is expected that this action will lead to a reduction in the number and severity of fuel handling related accidents.
Cost effectiveness of the action	The number and location of oil terminal and fuel service stations in Cambodia is estimated at 1885[5](not including the fuel street vendors), with a record of 95 accidents during the period 2010-2014 (averaging around 23 per year). Although the total economic loss from these accidents has yet to be estimated, it is believed to be significant, with some of accidents registering loss of lives. The action targets a 20% reduction in the number of accidents, and is believed to be cost-effective given the high costs of inaction. The action will also contribute to the safety improvement and environmental protection in 25 provinces and expected to reduce the risk from the petroleum fire and consequent GHG emissions.
Preconditions needed for successful implementation	- Timely financial support - Technical support Legal supporting and enforcement - Cooperation from private sector and local authorities
Indicator(s) of success	- Amount of GHG emission reduced

[5] AREA Survey Data of oil terminal and fuel service station locations in Cambodia in 2014.

	- Number of accident reduced
Implementation arrangements	General Department of Petroleum in MME
Estimated total cost	200,000 USD
Possible funding sources	CCCA, JICA, and Other development partners
Timeframe	2016 to 2017

MME ACTION FICHE No 8

Action	**Raise awareness about environmental friendly for small scale gold mining.**
CCCSP and Sector CCSP Strategic Objective	*CCCSP SO5 and CCSP 04*:Improve capacities, knowledge and awareness for climate change responses
Rationale	This action is designed to promote private sector participation in addressing climate change issues. It raises awareness of small scale gold miners to promote environmental friendly processing aiming to reduce GHG emissions and air pollution (from gold burning with strong acid), and to reduce other environmental impact from small scale mining such as the clearing the forest (reducing the ability to reduce emissions through this type of carbon sink). Small scale gold mining also uses mercury which can cause serious environment and human health impacts. Awareness raising efforts are key to change current practices of small scale miners, and can contribute to lowering the impact to the environment and to human health.
Category of climate change action	☑Cat 1 – Re-scaled ☐Cat 2 – Modified☐Cat 3 – Dedicated
Type of action	Mitigation and Adaptation
Short description of the action and expected results and benefits	*Short description:* - Situation analysis of current practice of the small scale mining - Develop the training and awareness raising materials to match the practical needs. - Train the trainers of Ministry of Mines and Energy - Dispatch trainers to different selected communities to provide training to 5100 small scale miners in 8 sites in 6 different provinces - Piloting the sustainable and environmental friendly small scale gold mining in 8 sites - Monitoring and evaluation of the projects - Develop case studies or lessons learnt (posters, videos, guidance handbooks, etc.,) for all piloting units to share with others miners. - Mainstream sustainable development and environmental safeguards in the mining law and related regulations. *Expected results and benefits:* - 5100 miners (direct impact) with more than 50000 people (indirected impact) will improve or switch to sustainable mining practice, benefiting from this project due to reduced impact

	from the use of harmful chemicals (with expected health benefits in particular from prevention of mercury contamination); - Local communities in the vicinity or downstream of small scale mining activities will benefit from a less polluted environment (especially those where water, fish, and aquatic vegetation are used for daily consumption); - Improvement of overall environmental quality and possible reduction of forest clearance, thus helping secure carbon sinks (i.e. emission removals by forests).
Cost effectiveness of the action	- The full cost to the environment and to human health from small scale gold mining activities is yet to be estimated. However, given the severe impacts that these current practices are known to cause, and the positive results obtained through the implementation of similar awareness raising activities in other countries facing similar problems, investments in this action are expected to be cost-effective.
Preconditions needed for successful implementation	- Financial and technical support from relevant stakeholders - Commitment and participate on from all concerned stakeholders including local authorities, miners and the communities - Cooperation of staff from state institutions and local authorities, with additional consultancy inputs.
Indicator(s) of success	- Number of small scale gold miners in 8 sites across six provinces trained every year on management of harmful substances from mining activities and on mitigation of impacts on the environment and people's health. - Amount of harmful gas (acid gas) emission and mercury from small scale mining activities reduced and managed - Number of sites piloted
Implementation arrangements	GDMR (General Department of Mineral Resources), MME, in coordination with development partners and other stakeholders.
Estimated total cost	2,700,000 USD
Possible funding sources	UNIDO, UNDP, UNEP, Oxfam, UN agencies, GIZ
Timeframe	2016 – 2018

MME ACTION FICHE No 9

Action	**Improve capacity for hydro power project appraisal in the context of climate change.**
CCCSP and Sector CCSP Strategic Objective	*CCCSP SO5&CCSP SO4*: Improve capacities, knowledge and awareness for climate change responses
Rationale	The action aims to improve capacities of government and academic institutions related to hydroelectricity development, which is classified as one of the low-carbon power generators. The action helps to ensure minimization of the environmental impacts and can contribute to reducing vulnerability of local communities.

Category of climate change action	☐Cat 1 – Re-scaled ☐Cat 2 – Modified ☑Cat 3 – Dedicated
Type of action	Mitigation and adaptation
Short description of the action and expected results and benefits	*Short description:* - Training needs assessment - Develop training program including training materials about climate change in the hydro power project appraisal - Implement training programs, both locally and abroad, for 70 people including ministry staffs and academic lecturers as a result from need assessment. *Expected results and benefits:* - Availability of training materials related to climate change in the ministry and academic institutions. - Ministry staff and lecturers from academic institutions with greater knowledge on how to improve hydroelectricity development so that environmental impacts are minimized, thus allowing for increased hydropower development and reduced demand of non-renewable sources to generate power. - Enable ministry staff to explore other potential locations in Cambodia for hydroelectricity development. - Capacity improved for project appraisal (including dam safety)
Cost effectiveness of the action	Capacity development is a cost effective way to improve human resources competency for the need in the area of hydroelectric development. At a cost of $400,000 training material on climate change will be developed and TOT conducted, enabling to scale up this activity in a cost effective manner (with training materials and resource persons to be as used as reference in the ministry and academic institutions).
Preconditions needed for successful implementation	- The executing agency would be the Department of Hydroelectricity in MME. - Level of cooperation between the MME and academic institutions - Timely technical and financial support
Indicator(s) of success	- Number of training material produced - Number of trainee received training
Implementation arrangements	Department of Hydroelectricity in MME and academic institutions
Estimated total cost	400,000 USD
Possible funding sources	UNDP, UNEP, UNIDO, ADB, world bank and other development partners
Timeframe	2016– 2018

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