Ethiopia needs to respond to the opportunities and threats presented by climate change. It needs to become resilient to changing rainfall patterns and warmer temperatures through adaptation. And it needs to seize the transformative potential of carbon neutral growth. This mission statement sets out how Ethiopia is responding to climate change in order to build a carbon neutral climate resilient economy.
1. **Introduction - the purpose and context of this Mission Statement**

This document sets out the challenges and opportunities which climate change brings for Ethiopia. It makes the case for why transitioning to a carbon neutral and climate resilient economy is a priority for the country and for delivery of our Growth and Transformation Plan. It explains what the Environmental Protection Authority is doing on behalf of the Ethiopian government, to lead and coordinate an efficient and effective national response to the issue.

The pillars of Ethiopia’s response to climate change will be described. As illustrated in Figure 1, these are Ethiopia’s Programme of Adaptation to Climate Change (EPACC), and the National Appropriate Mitigation Actions (NAMAs), supported by the National Environmental Policy and the Constitution. Sectoral and Regional Climate Programmes and Action Plans will build from these to facilitate the Carbon Neutral Climate Resilient Economy at the heart of the Growth and Transformation Plan.

Figure 1. The pillars of Ethiopia's response to climate change
The steps required to move towards a carbon neutral and climate resilient economy are described, and the roles and responsibilities of stakeholders within and outside government are clarified.

Finally, an activity matrix is presented which will help map out who is doing what on climate change and which will help flag where gaps remain. This matrix is intended to evolve as a working document to track and coordinate the rapidly developing landscape of domestic and international initiatives on the issue.

Through this mission statement, the Environment Protection Authority aims to bring increased coherence, collaboration and communication among the many interested parties working on or affected by climate change in Ethiopia. In particular, we will ensure that external support is focused and efficient and we will guide new activities and channel investment to target Ethiopia’s priorities.

Figure 2 presents the conceptual basis for this mission statement. It shows the added value and accelerated progress which will be brought by a strategically coherent and coordinated response to climate change.

**Figure 2. Progress towards a low carbon, climate resilient economy in Ethiopia through strategically coherent and coordinated external support**
Table 1. Ethiopia’s changing climate

<table>
<thead>
<tr>
<th></th>
<th>Temperature</th>
<th>Rainfall</th>
<th>Extreme events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historical trend†</td>
<td>Mean temperature increased</td>
<td>Highly variable from year to</td>
<td>Regular severe flood and drought events</td>
</tr>
<tr>
<td></td>
<td>by 1.3°C from 1960 - 2006</td>
<td>year, season to season, decade to</td>
<td>No evidence of changes in frequency or</td>
</tr>
<tr>
<td></td>
<td>More hot days and nights,</td>
<td>decade</td>
<td>intensity of extremes</td>
</tr>
<tr>
<td></td>
<td>fewer cold days and nights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2020’s</td>
<td>+ 1.2 °C</td>
<td>+0.4%</td>
<td>Greater increases in rainfall in Oct-Dec,</td>
</tr>
<tr>
<td></td>
<td>(0.7 - 2.3°C)</td>
<td></td>
<td>especially in the south and east.</td>
</tr>
<tr>
<td>2050’s</td>
<td>+ 2.2 °C</td>
<td>+1.1%</td>
<td>Heavier rainfall events.</td>
</tr>
<tr>
<td></td>
<td>(1.4 - 2.9°C)</td>
<td></td>
<td>Uncertain future El Nino behaviour brings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>large uncertainties.</td>
</tr>
<tr>
<td>2090’s†</td>
<td>+ 3.3 °C</td>
<td>Wetter conditions</td>
<td>Flood and drought events likely to increase</td>
</tr>
<tr>
<td></td>
<td>(1.5 – 5.1°C)</td>
<td></td>
<td>Heat waves and higher evaporation</td>
</tr>
</tbody>
</table>

Notes: Data drawn from Conway and Schipper 2010 which draws on the results of 18 GCMs for Ethiopia. Data marked † drawn from UNDP 2008. Data expressed as changes to annual mean and rainfall figures as multi-modal mean.

Notes: Trends in annual and seasonal mean temperature and monthly precipitation for the recent past and projected future shown as anomalies relative to the 1970-1999 mean climate. Black curves show the mean of observed data from 1960 to 2006. Brown curves show the median (solid line) and range (shading) of model simulations of recent climate across an ensemble of 15 models. Coloured lines from 2006 onwards show the median (solid line) and range (shading) of the ensemble projections of climate under three emissions scenarios. Coloured bars on the right-hand side of the projections summarise the range of mean 2090-2100 climates simulated by the 15 models for each emissions scenario. Source: UNDP 2008
1.1 Ethiopia’s changing climate

To set the context, here we set out the scientific consensus of how Ethiopia’s climate has changed in the past and of how it is projected to change over the next 20, 40 and 80 years. This current understanding of Ethiopia’s changing climate is summarized in Table 1, and is drawn from the results of two recent studies which synthesize the results of multiple General Circulation Models (GCMs)\(^1\,^2\).

Like much of Africa, Ethiopia has become warmer over the past century and human induced climate change will bring further warming over the next century at unprecedented rates. Climate models suggest that Ethiopia will see further warming in all seasons of between 0.7°C - 2.3°C by the 2020’s and of between 1.4°C - 2.9°C by the 2050s. It is likely that this warming will be associated with heat waves and higher evapotranspiration.

Although most models show a tendency for higher mean annual rainfall and for wetter conditions in particular during October, November and December, there is much uncertainty about the future distribution, timing and intensity of rainfall. More regular heavy rainfall events are expected and this is likely to result in increased flooding. However, changes in the severity and frequency of droughts and flood events are difficult to project, because these events are influenced by the El Nino Southern Oscillation and sea surface temperatures in the Indian Ocean, and are difficult to model with certainty.

*It is important to stress that uncertainty about the exact nature of future change must not be interpreted as uncertainty in the need to act now to minimize future damage.*

1.2 The policy and institutional context

Climate change is of critical strategic importance to Ethiopia. It has the potential to hold back economic progress, or reverse the gains made in Ethiopia’s development and could exacerbate social and economic problems. Climate change also has the potential to destabilize the Horn of Africa and bring more fierce competition for water throughout the Nile Basin.

At the same time, climate change and the international response bring opportunities for Ethiopia. A changed climate may bring benefits for agricultural and livestock production or it may enable higher value crops to be grown, or more hydro-electric power to be generated. In addition, new financial support from industrialized countries for low carbon and climate resilient development, such as for reduced emissions from deforestation and degradation (REDD), are likely to become available. There is enormous potential for action on climate change to deliver multiple co-benefits for the well-being of the

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\(^1\) McSweeney, New and Lizcano, 2008. UNDP Climate Change Country Profiles, Ethiopia. UNDP, School of Geography and Environment, University of Oxford and Tyndall Centre for Climate Change Research. http://country-profiles.geog.ox.ac.uk

\(^2\) Conway, D and Schipper, EL, 2010. Adaptation to climate change in Africa: Challenges and Opportunities identified from Ethiopia, Global Environmental Change, in press
population and the economy. Ethiopia can therefore benefit from charting a low carbon development path in an increasingly ‘carbon constrained’ world.

In order to minimize the impacts and maximize these opportunities, Ethiopia must plan and prepare. These far reaching implications of climate change require a robust and well coordinated response. Reference to the policy and institutional framework in Ethiopia places this formidable responsibility and the mandate for coordinating this response with the Environment Protection Authority.

Through the leadership of Prime Minister Meles Zenawi, Ethiopia is taking a leading role in the regional and global response to climate change. Through effective coordination of the domestic response the Environmental Protection Authority (EPA), aims to help Ethiopia achieve the ambitious objective of a carbon neutral climate resilient economy by 2025. In doing so we aim to set an example to other nations and so further build Ethiopia’s leadership role.

The policy and legal context for this mission statement and the EPA’s role as Ethiopia’s lead agency on climate change are drawn from the National Environmental Policy 1997, and the Environmental Protection Organs Establishment Proclamation No. 295/2002. The most relevant provisions with regard to the climate change response within the Environmental Policy, and the statutory mandate and powers to coordinate the national response to climate change in the founding articles of the EPA are set out in Figure 3.

Although ‘environmental’ policy and law set out the basis for dealing with climate change it is vital to recognize that the implications of climate change and the steps required for an effective response go well beyond environmental management. Climate change must not be considered as a narrow sectoral issue, and rather a multi and cross-sectoral response is essential. The response will require cooperation, planning and action across government sectoral Ministries and agencies, from finance to agriculture, from education to foreign affairs; Regional government and Woreda administrations; and outside government, by civil society, religious groups, the private sector, communities, academic and research institutions, international and national NGOs and development partners. With so much complexity, and the need for involvement of so many different actors, the response needs strong strategic leadership. The EPA will fulfill this role and this mission statement is an important step in communicating the Ethiopian government’s approach to climate change and in strengthening cooperation amongst actors and stakeholders.
Figure 3. Provisions within the Environmental Policy of 1997 which guide Ethiopia’s response to Climate Change

Consistent with Article 44 of the Constitution all people have a fundamental right to an environment adequate for health and wellbeing.

The requirement to explicitly plan over 5, 10, 50 and 100 year timescales

Federal to community level bodies handle issues identified by ministries, and authorities and use existing structures to integrate environment and development planning.

The conditions for formulating, reviewing and updating sectoral regulations on and procedures for sustainable use of resources should be created.

Need for cross sectoral environmental policies; for attention on education and tackling poverty, the empowerment of women and promotion of income generation.

A broad framework for incentives and punitive measures for sustainable resource management is to be developed; including assessment of the needs for and development of charging schemes for natural resource access, or subsidies and taxes and tax concessions, and development of the capacity of government to use such financial mechanisms.

Community participation will play a central role in sustainable resource management and requires the formulation of environmental education campaigns to initiate, encourage and support the involvement of local community and religious leaders in programmes to promote environmental awareness.

Requirement that federal, regional, and community strategic land use plans are in place which define broad land use categories and recommendations that can be used to guide resource management plans.

The policy specifically covers soil husbandry; forestry; genetics; biodiversity; water resources; energy; minerals; human settlement; sanitation; industry and trade; culture and natural heritage and atmospheric pollution and climate change. Within which it:

a. Promotes a climate monitoring programme
b. Recognises the need for control measures for green house gases and use of renewable energy
c. Calls for maximising standing biomass and seeking of financial support from industrialised countries

Statutory objectives of the EPA and powers and duties relevant to the climate change response

To formulate policies, strategies, laws and standards which foster social and economic development in a manner which ensures the welfare of humans, environmental sustainability and safety and to spearhead their effective implementation.

Duties and powers

- Coordinate measures to ensure that the principles set out in the Environmental Policy are realized
- Prepare, review, update or propose new policy, strategy and law in consultation with competent agencies and the public, and monitor and enforce implementation
- Prepare a State of the Environment report for Ethiopia
- Devise incentive systems and support capacity development
- Cooperate to combat desertification and drought
- Take part in negotiations of international environmental agreements
- Advise on measures to cope with environmental emergencies
- Coordinate, promote and carry out research; advise government; support the regions; delegate powers; promote and provide education; and provide financial and technical and support for management and protection of the environment
2. Towards a climate resilient economy for Ethiopia

Climate resilience is the ability to cope with, and manage the change brought by climate stresses and shocks. A climate resilient economy is one which is protected against climate events and climate change so that the well-being of the people and the economic growth and prospects of the country are not damaged. Building a climate resilient economy is therefore about adapting effectively to climate change to minimize the potential damage and maximize potential benefits. Adaptation actions are required irrespective of a deal on global green house gas emissions. The green house gases emitted already by the industrialized nations are already causing dangerous climate change that Ethiopia will need to adapt, or adjust to.

A recent study by the World Bank\(^3\) projects that unless steps to build resilience are effective, climate change will reduce Ethiopia’s GDP growth by between 0.5 and 2.5% each year. *As a worst case scenario, in 25 years time, Ethiopia will have only half the potential total GDP it could have attained because of the negative impacts of climate change.* Building resilience to avoid this damage to our economy depends on understanding the threats and the priority areas for focusing adaptation efforts.

2.1 Understanding the threats

Ethiopia’s economy and social wellbeing are already very exposed to climate variability and extremes. Agriculture, primarily rain-fed and highly sensitive to fluctuations in rainfall forms the basis of the economy providing approximately 46% of GDP and provides jobs for 80% of the working population\(^4\). Chronic food insecurity affects 10% of the population and even in average rainfall years these households cannot meet their food needs, and rely partly on food assistance. Droughts can result in sharp reductions in agricultural output, and related productive activity and employment, with multiplier effects on the monetary economy\(^5\). Floods regularly cause crop and infrastructure damage and widespread suffering and hardship, with for example, several tens of thousands of people displaced and over ten thousand hectares of cropland inundated by flooding in Afar and Amhara Regions in 2010.

The close links between climate and Ethiopia’s economy are reflected in Figure 4 which shows a strong tracking relationship where GDP growth rate follows rainfall variability.

**Figure 4. Rainfall variatiability and GDP growth in Ethiopia (Source World Bank 2006)**

Because Ethiopia’s economy and the wellbeing of our people are closely linked to agriculture and the use of natural resources – water, land, soil, forests, biodiversity and fisheries – adaptation and action towards climate resilience will come in part through focusing on improving performance and management in these areas with future

\(^3\) World Bank 2008
\(^4\) World Bank 2008, figures for 2007/8
\(^5\) Benson and Clay 1998
climate change in mind. Ethiopia is also vulnerable to the health impacts of climate change, and through climate induced damage to infrastructure and transport routes. The implications of future climate change will be felt through these particularly vulnerable sectors, although secondary impacts will be felt more widely, for example in education and gender equity. The threats posed to the most vulnerable sectors are explored in more detail here.

**Agriculture:** Greater total or more intense rainfall across Ethiopia will increase soil erosion and crop damage. Ethiopia is particularly vulnerable to accelerated soil erosions because of existing pressures and degradation on our land area, 79% of which has a slope of greater than 16%, with 25% having a slope of greater than 30%. There will also be changes in production system viability; cropland area and cropping patterns; pest and disease frequency and distribution brought by changes in seasonality; timing and distribution of rainfall; higher evapotranspiration; drought and flood damage.

Livestock yields will be impacted directly through temperature effects on annual growth, milk and wool production and reproduction; and indirectly by changes in the quantity and quality of pasture, forage, grass and disease and parasites.

The interactions between these problems and potential benefits of greater CO2 ‘fertilization’ are largely unknown.

**Health:** The health impacts of climate change will be felt through six mechanisms:

i) morbidity and mortality through temperature extremes;
ii) increases in vector borne diseases, such as malaria and bilharzia;
iii) increases in non-vector borne diseases related to weather conditions, for example diarrhoeal disease and cholera associated with both floods and drought;
iv) health problems associated with weather related air quality;
v) injury and mortality through floods and storms;
vi) impacts of climate related influences on food and water supply, for example, malnutrition.

In a 2004 study (McMichael et al. 2004) it was calculated that 36 000 lives were already being lost each year across East Africa (including Ethiopia) because of climate change. The same study calculates that the greatest future health risks associated with climate change in 2030 will be flooding, followed by malaria, diarrheal disease, malnutrition and cardiovascular diseases.

According to the World Health Organisation, 68% of Ethiopians are already living in areas at risk from Malaria where transmission is unstable and characterized by large scale epidemics. For example, in 2003 large scale epidemics resulted in 2 million confirmed cases and 3000 deaths.

The 4th report of the IPCC reports that by the 2050s Malaria will have incurred into the highland areas of Ethiopia and that by 2080 conditions will be highly suitable for malaria transmission.

**Natural resources:** Water, soil, land, forests and biodiversity are the foundations of Ethiopia’s economic development, food security and livelihood sustenance and each face additional pressures through climate shocks and stresses. Climate change impacts on natural resource security; equity of tenure and access; ecosystem range; niche viability and patterns of use threaten long term degradation and depletion.

Effective adaptation to climate change and the construction of a climate resilient economy will depend on improved management and use of our natural resource assets.
**Energy:** 95% of Ethiopia’s national energy needs are derived from fuel wood, crop and animal waste and human and animal power. Only 5% comes from electricity and 95% of this is generated by hydropower. The World Bank suggest that only 2% of Ethiopia’s hydro-power potential is developed. This energy mix greatly increases the country’s vulnerability to climate change. For example, our reliance on fuel wood and charcoal brings widespread land degradation, exposing bare soil to erosive rainfall and gulley erosion. As climate impacts increase, there is likely to be a higher reliance on forest products for livelihoods.

Energy generated by hydro-power is also highly vulnerable to fluctuations in rainfall, temperature and evaporation. For example, reduced power production during drought years already takes a significant toll on the economy. In 2002/3 power supply was lost one day a week over four months because of drought. It was calculated that each day of no power saw a 10-15% reduction in GDP generation. Loss of electricity also impacts on basic services like schools and hospitals.

Ethiopia plans to significantly increase its hydro-electric power production in order to supply our neighbours. Whilst these plans offer huge potential to power low carbon growth in Ethiopia and beyond, they need to carefully consider the implications of future climate change so that benefits can be sustained and conflicts with other water users are avoided.

**Transport:** Although improvements have been made to Ethiopia’s transport infrastructure and road network, of the 56 113 km road network in the country, only 15% is paved and the remaining 85% is unpaved (Ministry of Transport 2008). Improvement and maintenance of transport links between urban centres, to and from ports of export and import, and in particular to rural areas are strongly related to economic development. However transport links and both paved and unpaved roads are highly vulnerable to increases in rainfall and temperature which are projected for Ethiopia, with heavy rainfall washing out roads and high temperatures damaging to road surfaces.

A World Bank study projects that climate change will increase the maintenance costs of the country’s road network by between $10 million to $21 million, depending on the climate model used. These costs will be reduced and transport links maintained if road, drainage and bridge designs are adapted to new climatic conditions. Maintenance costs of unpaved roads are also high and extending the network of paved roads is likely to be economically beneficial.

### 2.2 Adaptation through community ownership and national development

The areas of vulnerability listed above are considered to be significant for the country’s future economic growth, however the impacts of climate change reach across almost all aspects of social and economic activity. Climate resilience will therefore need to be embedded across Ethiopia’s national development agenda. In particular, a key route to climate resilience is increased income and more diverse livelihoods; better healthcare and education; better access to technology and agricultural inputs; and greater social equity particularly for women and marginalized groups. Successful delivery of the Growth and Transformation Plan is therefore dependent on action to build resilience, whilst greater resilience will also be a product of the benefits brought by national economic and social development.
This far reaching nature and need for adaptation means that communities across Ethiopia need to take ownership and responsibility for appropriate action to build resilience. The EPA and our National and Regional government partners are dedicated to supporting this community owned adaptation, as well as to guiding government action and the enabling environment towards greater resilience. These aspirations will be delivered through delivery of Ethiopia’s Programme of Adaptation on Climate Change.

2.3 Ethiopia’s Programme of Adaptation on Climate Change

Ethiopia’s Programme of Adaptation on Climate Change (EPACC) is a programme of action to build a climate resilient economy through support for adaptation at sectoral, regional and community levels. The EPACC updates and replaces Ethiopia’s National Adaptation Programme of Action (NAPA) which was formulated in 2007 and submitted it to the UNFCCC Secretariat. The May 2010 Report of the UNFCCC’s Least Developed Countries Expert Group encouraged the updating of NAPAs, suggesting that a more programmatic approach could be more effective than the project approach of the NAPAs. In line with this suggestion Ethiopia has reformulated its Programme of Adaptation to Climate Change. Ethiopia’s NAPA contained detailed descriptions of some larger adaptation projects, but the formulation of those projects was not as ambitiously participatory as the present EPACC attempts. Nevertheless, the contents of the first version of Ethiopia’s NAPA have helped in developing the present EPACC.

The EPACC includes 29 components (see Annex 1) reflecting the 29 objectives presented in Figure 5.

The programme of implementation has been based on an open-ended iterative, participatory process which will work primarily across three dimensions, horizontally across sectors, vertically from federal level to local communities, and through time, to gather and disseminate the learning developed to deepen benefits and widen coverage. As shown in Figure 6 the programme will reach from the federal level through all levels of administration down to sample local communities in each Regional State. Each local community will formulate its own work programmes and by-laws to guide and govern the actions of its members towards greater climate resilience. From an initial sample focus of 64 Woredas (12% of the total) the lessons learnt will be scaled up.

The second dimension of EPACC is to reach throughout government sectors to ensure that mainstreaming of climate change is embedded within government policies and plans through Sectoral Climate Programmes and Action Plans. Following a workshop called by the EPA which provided advice on the formulation and content of Sectoral Climate Programmes, five draft plans gave been produced (see Figure 7 summarises the example provided by the Health Sector). Sectoral adaptation plans will need to be produced to a high standard to stand the best chance of receiving funding and stakeholder support and the EPA with development partners will assist and help build the capacities required for this.
Figure 5. The objectives of Ethiopia’s Programme of Adaptation on Climate Change

**Overarching objective:**

To contribute to the elimination of poverty and to lay the foundation for a climate resilient path towards sustainable development.

**29 specific objectives:**

1. Involve the whole population in the planning and implementation of actions for adaptation to climate change.
2. Forecast climate change through country-level and sub-country level climate change modeling.
3. Identify and prevent worsening and emerging human diseases.
4. Identify and prevent worsening and emerging animal diseases.
5. Identifying and prevent worsening and emerging crop and wildland plant diseases and pests.
6. Prevent land degradation and thus reduce soil loss to its natural equilibrium rate of equaling the rate of soil formation from bedrock.
7. Reduce biodiversity loss to achieve an equilibrium with the natural rate of diversification.
8. Prevent biomass and soil nutrient accumulation in urban areas as waste by taking the waste back to farmlands as fertilizer.
9. Counter the agricultural productivity reduction that emanates from climate change through effective research and development.
10. Manage water effectively to make it always available to humans, animals and crops.
11. Reduce the impacts of severe droughts by cloud seeding to induce rain.
12. Establish building and construction codes that will ensure that structures withstand extreme weather events.
13. Store food and feed in good years for use in bad years.
14. Ensure that transportation access to disaster prone areas is always available.
15. Develop an insurance scheme for compensation from damage from bad weather.
16. Organize and train local communities for quick response to extreme weather events.
17. Resettle people from disaster prone areas before disasters materialize.
18. Shift homesteads to using renewable resources of energy.
19. Shift from fossil fuel to renewable energy for running engines for transportation and other purposes.
20. Ensure that gender equity is achieved.
21. Ensure that the physically handicapped are enabled to fend for themselves.
22. Prepare to receive and cater for environmental refugees driven away by climate change.
23. Map and delineate areas likely to suffer from climate change and especially from extreme weather events.
24. Develop an accessible information network on climate change.
25. Develop an early warning system to alert people of impending extreme weather events.
26. Mainstream awareness on climate change into development and service activities.
27. Mainstream adaptation to climate change into education curricula.
28. Ensure that research and development efforts in all sectors focus also on adaptation to climate change.
29. Establish an effective monitoring and evaluation system for the Implementation of the Programme of Adaptation to Climate Change.
Figure 6. The iterative three-dimensional demonstration, learning and communication approach embodied by EPACC
In both the planning and implementation of Ethiopia’s Programme of Adaptation to Climate Change, all levels of government administration, all types of civil society and religious organisation and communities across the country are invited to participate. Not only will this ensure an equitable and balanced response to climate change based on social justice, but will assist in generating appropriate knowledge, skills and actions, and thus the effectiveness of the programme.

The programme will be regularly monitored and reported on and verified. The monitoring programme will not only contribute to continual improvement and efficacy, but will generate learning from demonstration activities in sectors, regions and communities which will be communicated and scaled up to inform and benefit others.

An initial programme for the first three year phase of the EPACC (2011-14) has been budgeted at US $10 Million and will receive significant support from the Government of Japan through the United Nations Development Programme (U.S. Dollars 6.5 million) with a further US$ 2.6 million from the United Nations Development Programme. Negotiations are almost complete with the European Union to provide 8 million Euros for implementing EPACC. The World Bank and others are supporting this work through studies on the Economics of Adaptation to Climate Change in Ethiopia.
Climate Risks:
Vector borne and diarrhoeal disease identified as key risks

Challenges to dealing with these risks:
- low awareness and inadequate advocacy
- weak partnerships in relation to climate change
- quality and availability of information on vulnerable areas
- capacity and functional gaps in current systems e.g. responses to emergencies and extreme weather events
- weak surveillance systems
- limited capacity amongst health staff and lack of equipment

Objectives:
Adapt to the impacts of climate change by strengthening health systems to enable a response to climate related health risks
- Advocate for political attention to the issues
- Raise awareness of risks and coping mechanisms for behaviour change and social support
- Strengthen preparedness, early warning systems and response capability of local health services and the Public Health Emergency Management in the Ministry of Health
- Undertake a national assessment of vulnerability to climate related health risks

Programme summary:
- Nationwide implementation of health extension programme with an emphasis on preventative health care at the household level
- Deployment of 33 000 Health Care Workers to more than 15 000 kebeles
- Risk-based selection of Woredas based on prevalence and recurrence of vector borne and diarrhoeal disease
- Emphasize the needs of women, the marginalized, the disabled, elderly and children
- Link the handling of climate health risks to attainment of the MDGs and health equity

Activities planned:
a) plan action from National to kebele level
b) awareness raising campaign
c) advocacy workshop to put health at the centre of adaptation
d) Provide IEC / BCC tools
e) Develop HEW capacity and health service provision eg. for selective vector active UINS and diag-multi species RDT (equipment)
f) Indoor air pollution – actions to improve ventilation
g) Ambient air pollution
h) Sanitary landfill provision
i) Liquid waste management and proper drainage installation
j) Public Health Early warning systems
k) Interaction with other parties
l) Joint sectoral activities
m) Identification of most effective actions

Estimated costs / funds needed:
US$1.5 Million for initial 6 month phase
3. Towards a carbon neutral economy for Ethiopia

3.1 Why Ethiopia should plan for a low carbon future?

Notwithstanding the threats, climate change also represents a huge opportunity for Ethiopia. The opportunity lies in the broader global agenda on climate change. Poor countries like Ethiopia stand to gain from both adaptation and carbon finance. Carbon finance - payments for activities which reduce global carbon emissions such as planting new forests and foregoing dirty technologies – has the potential to be a major revenue source for Ethiopia. Although it is an early estimate and needs to be refined, assessed for feasibility and will require changes in the way carbon finance is delivered to realise, it has been calculated that **under a carbon neutral growth trajectory Ethiopia could offset in the region of 320 Million tonnes of carbon a year. Even with the low current carbon price of US$10-20 per tonne that could generate billions of dollars for the country.**

The opportunity is not just financial. Climate change offers a lens through which Ethiopia can revisit some of its most intractable problems. The challenge we face is to position Ethiopia at the forefront of the low carbon revolution promised by the climate agenda. Ethiopia has huge low carbon potential – it is rich in forests and has ample renewable resources (hydro, solar, wind and geothermal energy). To make the most of this potential, the country will need to (1) ensure that Ethiopia’s long-term planning is compatible with a low carbon future and (2) make Ethiopia as attractive as possible to carbon investors.

The disadvantages of following a ‘traditional’ high carbon growth path and the advantages of taking a low-carbon ‘green growth’ path for Ethiopia have been summarized in Figure 8.

The case for developing a carbon neutral economy is a convincing one for Ethiopia. It has the natural resource assets which will help generate all the clean energy it needs and to decouple the economy from the wildly fluctuating prices and unsustainable nature of the oil based global economy. Global carbon finance will play an increasingly important role in the global economy and one that Ethiopia can benefit from. The co-benefits, for health, wellbeing, economic growth and natural resource conservation are significant; and Ethiopia is well positioned to become a regional and global leader in low carbon growth which will have legacy and commercial benefit long into the future.

3.2 Mitigation – what does it mean for Ethiopia

A carbon neutral economy is about taking opportunities to mitigate, or reduce greenhouse gas emissions. The objective is to reduce, offset or sequester (capture in plants and trees) the amount of greenhouse gases in the atmosphere in order to prevent future climate change. Those gases include carbon dioxide, methane, Nitrous oxides and CFCs. The main sources of greenhouse gases due to human activity are:

- burning of fossil fuels and deforestation leading to higher carbon dioxide concentrations. Land use change (mainly deforestation) account for up to one third of total anthropogenic CO₂ emissions.
- livestock enteric fermentation and manure management, paddy rice farming, land use and wetland changes, pipeline losses, and waste landfill emissions leading to higher methane atmospheric concentrations.
- use of chlorofluorocarbons (CFCs) in refrigeration systems, and use of CFCs and halons in fire suppression systems and manufacturing processes.
- agricultural activities, including the use of fertilizers, that lead to higher nitrous oxide (N$_2$O) concentrations.

Ethiopia’s historical contribution to green house gas emissions on a global scale has been negligible and the country will not be forced to prejudice future growth and wellbeing by restricting emissions of green house gases. However, as we have explored, Ethiopia stands to benefit from mitigation, offsetting or sequestering of green house gases.

### Figure 8. Why should Ethiopia follow a green growth path?

<table>
<thead>
<tr>
<th></th>
<th>Likely outcomes if Ethiopia follows a ‘traditional’ growth path:</th>
<th>Likely outcomes if Ethiopia follows a low-carbon, ‘green’ growth path:</th>
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</thead>
<tbody>
<tr>
<td><strong>Energy</strong></td>
<td>Dependence on fossil fuels</td>
<td>Sufficient renewable energy to support economic development</td>
</tr>
<tr>
<td></td>
<td>High emissions</td>
<td>Exporter of clean energy regionally</td>
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<td></td>
<td>Power shortages and restricted coverage</td>
<td>Expansion of rural energy coverage</td>
</tr>
<tr>
<td><strong>Agriculture</strong></td>
<td>Reduction in soil fertility</td>
<td>Long term land use and fertility maintained</td>
</tr>
<tr>
<td></td>
<td>Lower yields</td>
<td>Higher yields</td>
</tr>
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<td></td>
<td>Vulnerability to floods and droughts Food insecurity</td>
<td>Food security</td>
</tr>
<tr>
<td><strong>Forestry</strong></td>
<td>1.5 million hectares of forest and shrub cover at risk due to agricultural expansion and biomass energy needs</td>
<td>Zero deforestation and sustainable forest use</td>
</tr>
<tr>
<td></td>
<td>Health issues through smoke inhalation</td>
<td>Reforestation and afforestation as carbon sink</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Healthier sources of cooking and heating energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Watershed services maintained – fewer floods and droughts, erosion control</td>
</tr>
<tr>
<td><strong>Transport</strong></td>
<td>Congested cities</td>
<td>Increased availability of clean transport – rail, electrical vehicles, use of biofuels.</td>
</tr>
<tr>
<td></td>
<td>Dependence on expensive imported oil and gasoline</td>
<td>Reduced oil dependence</td>
</tr>
<tr>
<td></td>
<td>Polluting, aging, unsafe vehicle stock</td>
<td>Healthier, cheaper, safer transport</td>
</tr>
<tr>
<td><strong>Settlements</strong></td>
<td>Unplanned development</td>
<td>Coordinated and rational long term planning of settlements</td>
</tr>
<tr>
<td></td>
<td>Insanitary, unmanaged waste</td>
<td>Healthier towns and cities providing higher quality of life and wellbeing</td>
</tr>
<tr>
<td></td>
<td>Low quality of life and reduced wellbeing of population</td>
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<tr>
<td></td>
<td>Poor health</td>
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<tr>
<td><strong>Economy wide</strong></td>
<td>Dependent on commodities and international price fluctuations including oil price</td>
<td>Macroeconomic conditions bring job and wealth creation and reduce poverty</td>
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<tr>
<td></td>
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<td>Increased exports reduced imports</td>
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</table>
3.3 Nationally Appropriate Mitigation Actions

To begin this work, in line with commitments within the Copenhagen Accord, the EPA, on behalf of the Federal Democratic Republic of Ethiopia submitted the country’s voluntary Nationally Appropriate Mitigation Actions to the Executive Secretary of the UNFCCC in January 2010. The NAMA contains aspirational targets for actions across the sectors to mitigate climate change which under commitments made within the Copenhagen Accord should be afforded financial and technological assistance from industrialized nations. A summary of the NAMA contents is provided in Figure 9, whilst full details are available in Annex 2.

3.4 Mitigation and Green Growth Programme

The EPA wants to help Ethiopia access significant funds from ‘Fast Start Finance’ starting in 2011 to enable the transfer of technology and capacity building required to fully achieve the targets articulated under EPACC and Ethiopia’s NAMA. Activities currently underway are:

1. Greenhouse gas inventories and emission projections
2. Emission reductions in tons of carbon dioxide equivalent relative to baseline
3. Information and analysis on mitigation action options and estimate of benefits
4. Estimate of costs and incremental costs
5. Indication of type and level of support required and description of actions for which support is sought.

The EPA is working with the Ministry of Finance, the Green Growth Institute and sectoral Ministries to complete this work which will enable the formalization and prioritization of proposals for funding and implementation.
Figure 9. A summary of projects and targets submitted in Ethiopia’s NAMA of 2010

1. Electricity Generation from Renewable Energy for the Grid System
   1.1. Hydro Power
      • 10 Hydro power generation facilities to be completed with 5632 MW electric power generation capacity by 2015
   1.2. HEP Projects under Study
      • HEP electric power generation studies to be completed with potential of 8915 MW capacity
   1.3. Wind Projects 762
      • 7 Wind Power Projects, with a total of 762 MW electric power generation capacity; to be completed by 2013
   1.4. Geothermal Projects
      • 6 Geothermal Projects with a total of 450 MW electric power generation capacity; to be completed in 2018

2. Bio-fuel Development for Road Transport and for household use
   • Produce ethanol
   • Produce biodiesel

   • Solar home systems
   • Small hydro electric power generation facilities
   • Wind pumps
   • Solar pumps
   • Institutional PVs
   • Solar lanterns
   • Solar water heaters
   • Solar cookers
   • Improved biomass household stoves
   • Biodiesel stoves
   • Household biogas
   • Institutional biogas plant

4. Transport: Railway Projects with Trains to Run with Electricity Generated from Renewable Energy
   • national routes
   • Addis Ababa Light Rail Transit project 300 km, to be completed in 2020

5. Forestry/forests
   • Enhanced district level reforestation actions for the increment of vegetation cover of degraded lands, lands affected by gullies and slopes including through the management of community areas closed off to grazing
   • Natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
   • Deciduous forest land sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
   • National parks sustainably managed to reduce GHG emissions from deforestation and forest degradation
   • Existing forests that are providing non-timber forest products maintained as buffer area for mitigating desertification
   • Forest in exhaustion or production forests established and sustainably managed for the purpose of sequestrating carbon
   • Wetlands wisely managed and sustainably used

6. Agriculture
   • Application of compost to agricultural land for increased carbon retention by the soil
   • Implementation of agroforestry practices for livelihood improvement and carbon sequestration
4. Steps required to build Ethiopia’s Carbon Neutral Climate Resilient Economy

To work efficiently towards a Carbon Neutral and Climate Resilient Economy we see that a 4 phase cycle of actions will be required across themes, sectors and regions. These 4 phases are illustrated in Figure 10.

Figure 10. The four phase action cycle towards CNCRE

I. Assessment
   A. Assignment of responsibility
   B. Dialogue and deliberation
   C. Scoping, research and analysis
   D. Review of enabling environment
   E. Piloting and demonstration

II. Planning
   F. Strategic planning
   G. Operational planning
   H. Mainstreaming
   I. Costing

Towards a Carbon Neutral and Climate Resilient Economy

III. Implementation
   J. Financing
   K. Guidance and communications
   L. Capacity Building and training
   M. Activities and action

IV. Review
   N. Monitoring & Evaluation
   O. Verification
   P. Reporting
   Q. Responding
In order to map, track and coordinate these activity phases the EPA has prepared the thematic-action matrix attached as Annex 3. We will use and share this as a working document to ensure targeted and coherent action on the issue of climate change from all stakeholders.

To assist us in this task we would ask all existing and planned initiatives to work with us to identify the areas which their work and collaborative action will target and deliver on, how it fits and complements ongoing activities and contributes to the wider objective of CNCRE.
Annex 1. Components of EPA-CC and designated responsibilities

1. The components of EPACC are expected to be further enriched in detail as discussions continue from the federal level down all administrative levels to the local community level in the sample weredas and back up to the Environmental Protection Authority at the federal level.

2. To improve the predictability of climate change in Ethiopia, a country-wide and 3 sub-country level climate change models will be developed by the National Meteorological Agency and the Environmental Protection Authority.

3. Human diseases, e.g. malaria, bilharziasis, human trypanosomiasis, water-borne parasitic and bacterial diseases, trachoma, and, with the disruption of agriculture, also malnutrition will increase. Though the agents to counter these diseases will be all levels of administration down to the homestead, the federal agency for leading the required adaptation will be the Ministry of Health.

4. Animal diseases, both of domestic and wild, will increase, e.g. animal, trypanosomiasis, rabies, anthrax, liver fluke and possibly other new diseases may emerge. Though the agents to adapt to these increases are all the administrative levels from the homestead up to the federal level, the highest level responsible agency is the Ministry of Agriculture and Rural Development and, in protected areas, the Ministry of Culture and Tourism.

5. Crop and wild plant diseases and pests, e.g. locusts, Wollo cricket, army worm, Quelea infestation, stem borer, rusts, smuts will increase. Though from the homestead up all levels of administration will need to stand together for adapting to these diseases and pests, the federal level agency that can spearhead the process is the Ministry of Agriculture and Rural Development.

6. With increasing extreme weather events, the already frightening rate of land degradation will increase. Means of effectively countering this process have already been pioneered by some local communities that participatorily developed their action plans, formulated their by-laws and elected their leaders to implement the by-laws. Their experience has been upscaled to the wereda level especially in many parts of Northern Ethiopia. The main activities include area closure to stop free range animal grazing, physical and biological structures for reversing gullying, and cutting and carrying feed for domestic animals. This increases the availability of animal waste and trampled biomass remaining from animal feeding. The making and use of compost for raising farmland productivity raises agricultural production. Freed from grazing, the vegetation cover recovers in a matter of 2-3 growing seasons. Soil erosion virtually stops. The hydrological cycle is reinforced and both microclimate and the availability of ground water markedly improved with springs becoming stronger and stream flow both decreasing in the heavy rains and increasing in the dry season. The main agents of this recovery have been the local communities supported by some NGOs, particularly the Institute for sustainable Developments, and the respective local governments. At the federal level, this process has been spearheaded by the Environmental Protection Authority.

7. Biodiversity loss will accelerate. The very process of countering land degradation greatly decreases the rate of biodiversity loss. However, there will be need for a
conscious creation of biodiversity movement corridors, especially up towards higher terrain, in areas where most of the land is under cultivation. The Ministry of Agriculture and Rural Development, especially through its Institute of Biodiversity Conservation, should be the federal level institution that will be responsible for creating these corridors.

8. Urban centres seem set to continue growing irrespective of climate change. This means that increasing amounts of biomass will move into them to create urban solid and liquid waste. If taken back to the countryside, e.g. as compost, the removal of this waste will not only help urban areas to be clean, but more importantly, it will take the soil nutrients and humus back to where they came from and help maintain ecosystem stability and agricultural productivity. Though it is expected that the private sector will be the main agent of this process, the Environmental Protection Authority backed by the Ministry of Works and Urban Development together with the Ministry of Agriculture and Rural Development will be the main federal level agent for the process.

9. Factors besides those that are related to soil fertility that decrease agricultural productivity will increase, e.g. hitherto suited crop varieties becoming no longer optimally productive. The agricultural research system in the Ministry of Agriculture and Rural Development, i.e. the Ethiopian Institute of Agricultural Research, as well as those in the universities in the country, will be the main institutions to solve these problems.

10. Water availability for both humans and animals will increasingly fluctuate. Solving this problem will require the diversion of streams, the digging of wells and water harvesting. The water supply of urban areas will have to become more dependable. Spaced out watering points, say along grids that are approximately 5 kilometers apart, will have to be developed to supply the rural areas. At the federal level, the focal institution for these activities will be the Ministry of Water Resources.

11. The increasing frequency and severity of droughts will make attempts at cloud seeding to induce rain helpful. This will have to be tried even if the experience so far in other countries is not very encouraging. The feasibility of cloud seeding will be studied during the first 3-year phase of the Programme of Adaptation to Climate Change. The National Meteorological Agency in the Ministry of Water Resources will be the federal level agency for this exercise.

12. The growing extremes in the weather will challenge all physical structures built by humans. The federal level responsibility of putting in place construction systems that ensure that physical structures remain strong enough to withstand the expected buffeting will be that of the Ministry of Works and Urban Development, Ministry of Water Resources and Ministry of Transport and Communication in their respective sector.

13. It is necessary to store food and feed in good years for use in bad years. This will be done by farmers and pastoralists all the way from the federal down to the village local community levels under the federal level leadership of the Ministry of Agriculture and Rural Development.

14. Transportation networks for reaching disaster affected areas both to take supplies to them and to remove victims from them need to have been in place. The first 3-year phase is expected to be one of identifying the needed additions to the existing network. This will be led at the federal level by the Ministry of Transport and Communications.
15. Since disasters will increase owing to climate change, it makes sense to develop a disaster insurance system. The system can be operated by the private sector. However, it must be developed at the federal level through the leadership of the Ministry of Labour and Social Affairs.

16. The local communities in each kebele (the lowest administrative unit) must be organized to deal with disasters. This should be initiated by each wereda (district) administration. At the federal level, the Ministry of Agriculture and Rural Development will be the lead agency for follow-up to ensure that the sample weredas do this.

17. Disasters that emanate from climate change can be reduced through the appropriate choice of settlement areas and through appropriate homestead construction. Each wereda (district) administration should ensure that this is done within its territory. At the federal level, the Environmental Protection Authority will initiate the process and monitor its implementation.

18. It helps mitigate the damage from climate change if kerosene, firewood and dried dung are no longer used for fuel. This can be achieved through the use of renewable energy. Each wereda (district) administration should take the necessary steps towards this end. It should mobilize the kebeles (lowest administrative unit) under it to follow the implementation at each homestead. At the federal level, the Ministry of Mines and Energy and the Ministry of Agriculture and Rural Development will jointly be responsible for making this possible.

19. So as to minimize climate change, it is essential to make transportation and other economic and service sectors use engines that run on renewable energy. The federal level instigators of this process will be the Ministry of Transport and Communications and the Ministry of Mines and Energy acting jointly.

20. In the pressure for acting towards adaptation to climate change, gender equity and child welfare could receive reducing attention. This must be prevented. The focal federal level institution to ensure that the necessary attention is internalized into all activities is the Ministry of Women’s Affairs.

21. The same pressure could also further weaken the already weak attention given by Ethiopia to the physically handicapped. Care must be taken that this weakening does not happen. At the federal level, the institution for ensuring that care for the physically handicapped continues to grow is the Ministry of Labour and Social Affairs.

22. Climate change is expected to increase the number of environmental refugees, especially from the countries just south of the Sahara Desert and thus north of Ethiopia. Ethiopia must be ready to care for them. It is appropriate that, at the federal level, the Refugees and Returnees Administration leads in this essential activity.

23. Identifying the risks posed by climate change and mapping the areas likely to suffer when these risks materialize is a prerequisite for countering them effectively. At the federal level, this is the responsibility of the Environmental Protection Authority.

24. To minimize disasters through appropriate action, an information network should be developed and its accessibility made easy and user friendly. The focal agency to do this at the federal level is the Environmental Protection Authority.

25. An early warning system must be created and strengthened to react to disasters soon enough to save life and property. This activity will be undertaken at the
federal level jointly by the Environmental Protection Authority and the National Meteorological Agency of the Ministry of Water Resources.

26. Awareness on climate change must be mainstreamed into development and service activities so as to develop the requisite institutional capacity at all administrative levels. To achieve this, the Ministry of Capacity Development will take the federal level steps necessary to make the responsible development and service institutions as well as educational and research institutions take the necessary action.

27. The educational curricula at all levels should integrate adaptation to climate change. At the federal level, this process will be led by the Ministry of Education.

28. Research and development (R&D) for an effective programme of adaptation to climate change must be enhanced in all sectors and not only in agriculture. The federal institution to bring this about is the Ministry of Science and Technology.

29. Monitoring and evaluation of the process of implementation of the Programme of Adaptation to Climate Change will be carried out by the Environmental Protection Authority every three months. This will involve both the evaluation of written quarterly reports and field visits to where the activities of the Implementation of the Programme of Adaptation are taking place.
Annex 2.

Nationally Appropriate Mitigation Actions of Developing Country Parties

Non-Annex I Actions Federal Democratic Republic of Ethiopia

1. Electricity Generation from Renewable Energy for the Grid System
   1.1. Hydro Power
      1.1.1. Beles Project, with 460 MW electric power generation capacity; to be completed in 2010
      1.1.2. Gibe III Project, with 1870 MW electric power generation capacity; to be completed in 2013
      1.1.3. Fan Project, with 100 MW electric power generation capacity; to be completed in 2013
      1.1.4. Halele Werabesa Project, with 422 MW electric power generation capacity; to be completed in 2015
      1.1.5. Chemoga-Yeda Project, with 278 MW electric power generation capacity; to be completed in 2015
      1.1.6. Gibe IV Project, with 1472 MW electric power generation capacity; to be completed in 2015
      1.1.7. Genale III Project, with 258 MW electric power generation capacity; to be completed before 2014
      1.1.8. Genale IV Project, with 256 MW electric power generation capacity; to be completed before 2015
      1.1.9. Geba I and II projects, with 366 MW electric power generation capacity; to be completed in 2015
      1.1.10. Gojeb Project, with 150 MW electric power generation capacity; to be completed in 2015

   1.2. Hydro Power Projects under Study
      1.2.1. Tekeze Project, with 450 MW electric power generation capacity; the study to be completed in 2012
      1.2.2. Beko Abo Project, with 1600 MW electric power generation capacity; the study to be completed in 2010
      1.2.3. Boarder Project, with 1200 MW electric power generation capacity; the study to be completed in 2012
      1.2.4. Mendeya Project, with 2000 MW electric power generation capacity; the study to be completed before 2012
      1.2.5. Gibe V Project, with 600 MW electric power generation capacity; the study to be completed in 2012
      1.2.6. Wabi Shebele Project, with 460 MW electric power generation capacity; the study to be completed in 2012
      1.2.7. Birbir Project, with 467 MW electric power generation capacity; the study to be completed in 2012
      1.2.8. Lower Dedessa Project, with 613 MW electric power generation capacity; the study to be completed in 2012
      1.2.9. Dabus Project, with 425 MW electric power generation capacity; the study to be completed in 2012
      1.2.10. Tams Project, with 1000 MW electric power generation capacity; the study to be completed in 2010
      1.2.11. Genale Dawa V Project, with 100 MW electric power generation capacity; the study to be completed in 2012

   1.3. Wind Projects
      1.3.1. Ashengoda Wind Power Project, with 120 MW electric power generation capacity; to be completed in 2012
      1.3.2. Adama Wind Power Project, with 51 MW electric power generation capacity; to be completed in 2011
      1.3.3. Adama II Wind Power Project, with 51 MW electric power generation capacity; to be completed in 2013
      1.3.4. Assela Wind Power Project, with 100 MW electric power generation capacity; to be
completed in 2013
1.3.5. Ayisha Wind Power Project, with 300 MW electric power generation capacity; to be completed in 2012.
1.3.6. Debre Birhan Wind Power Project, with 100 MW electric power generation capacity; to be completed in 2013
1.3.7. Messobo Wind Power Project, with 42 MW electric power generation capacity; to be completed in 2012

1.4. Geothermal Projects
1.4.1. Aluto Langano Geothermal Project, with 75 MW electric power generation capacity; to be completed in 2012
1.4.2. Tendaho Geothermal Project, with 100 MW electric power generation capacity; to be completed in 2018
1.4.3. Corbeti Geothermal Project, with 75 MW electric power generation capacity; to be completed in 2018
1.4.4. Abaya Geothermal Project, with 100 MW electric power generation capacity; to be completed in 2018
1.4.5. Tulu Moye Geothermal Project, with 40 MW electric power generation capacity; to be completed in 2018
1.4.6. Dofan Project, with 60 MW electric power generation capacity; to be completed in 2018

2. Bio-fuel Development for Road Transport and for household use
2.1. Project to produce 63.36 million litters of ethanol starting from 2010 up to 2015
2.2. Project to produce 621.6 million litters of biodiesel starting from 2010 up to 2015

3.1. Project to install 150000 solar home systems starting from 2010 up to 2015
3.2. Project to construct 65000 small hydro electric power generation facilities starting from 2010 up to 2015
3.3. Project to install 300 wind pumps starting from 2010 up to 2015
3.4. Project to install 300 solar pumps starting from 2010 up to 2015
3.5. Project to install 3000 institutional PVs starting from 2010 up to 2015
3.6. Project to install 3 million solar lanterns starting from 2010 up to 2015
3.7. Project to install 3500 solar water heaters starting from 2010 up to 2015
3.8. Project to distribute 10000 solar cookers starting from 2010 up to 2015
3.9. Project to distribute 9000000 improved biomass household stoves starting from 2010 up to 2015
3.10. Project to distribute 10000 biodiesel stoves starting from 2010 up to 2015
3.11. Project to install 25000 household biogas digesters starting from 2010 up to 2015
3.12. Project to install 1000 institutional biogas plant starting from 2010 up to 2015

4. Transport: Railway Projects with Trains to Run with Electricity Generated from Renewable Energy
4.1. Route 1 (Addis Ababa-Modjo-Awash); 656 km, to be completed in 2015
4.2. Route 2 (Modjo-Shashemene-Awassa–Konso–Woyito–including Konso–Moyale); 903 km, date of completion to be determined
4.3. Route 3 (Addis Ababa–Ejaji–Jimma–Guraferda-Dima-Directed to Boma); 637 km, date of completion to be determined
4.4. Route 4 (Ejaji–Nekemt–Asossa–Kurmuk); 460 km, date of completion to be determined
4.5. Route 5 (Awash–Kombolcha–Mekele–Shire); 730 km, date of completion to be determined
4.6. Route 6 (Finoteselam–Bahirdar–Wereta–Weldia–Mile–Djibouti); 740 km, date of completion to be determined
4.7. Route 7 (Wereta–Azezo–Metema); 248 km, date of completion to be determined
4.8. Route 8 (Adama-Indeto–Gasera); 215 km, date of completion to be determined
4.9. Route 9; Addis Ababa Light Rail Transit project; 300 km; to be completed in 2020
5. Forestry/forests
5.1. enhanced district level reforestation actions for the increment of vegetation cover of 214440 square kilometres of degraded lands, lands affected by gullies and slopes including through the management of community areas closed off to grazing
5.2. 28736.70 square kilometres of natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
5.3. 4390.96 square kilometres of deciduous forest land sustainably managed in order to reduce GHG emissions from deforestation and forest degradation
5.4. 60360 square kilometres of national parks sustainably managed to reduce GHG emissions from deforestation and forest degradation
5.5. 198175 square kilometres of existing forests that are providing non-timber forest products maintained as buffer area for mitigating desertification
5.6. 52695 square kilometers of forest in exhaustion or production forests established and sustainably managed for the purpose of sequestrating carbon
5.7. 51496 square kilometres of wetlands wisely managed and sustainably used

6. Agriculture
6.1. application of compost on 80000 square kilometers of agricultural land of rural local communities for increased carbon retention by the soil
6.2. implementation of agroforestry practices and systems on 261840 square kilometers of agricultural land for livelihood improvement and carbon sequestration

7. Waste management
7.1. Repi-Addis Abeba project to reduce the generation of methane from 14.56 million cubic meters of deposited urban waste
7.2. Addis Abeba project to reduce the generation of methane from 1 million cubic meters of urban waste with a growth rate 2.3%/year
7.3. Mekele project to reduce the generation of methane from 19345 tonnes of urban waste with a growth rate 6.1 % /year
7.4. Adama project to reduce the generation of methane from 27010 tonnes of urban waste with a growth rate of 4.2%/year
7.5. Bahir Dar project to reduce the generation of methane from 10220 tonnes of urban waste with a growth rate of 4.8%/year
7.6. Diredawa project to reduce the generation of methane from 255 tonnes of urban waste with a growth rate of 2.7% / year
7.7. Hawasa project to reduce the generation of methane from 5840 tonnes of urban waste with a growth rate of 6.4%/year
7.8. Harari waste to energy project to reduce the generation of methane from 99.4 tonnes urban waste which is estimated to grow 2%/year
7.9. Kaliti waste treatment facility to reduce the generation of methane from 27.4 million cubic meters of liquid waste with a growth rate 2.1%/year
Annex 3. Thematic-Activity Matrix for coherent action towards CNCRE
<table>
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<tr>
<th>Phase</th>
<th>I. Assessment</th>
<th>II. Planning</th>
<th>III. Implementation</th>
<th>IV. Review</th>
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<tr>
<td>Activity areas</td>
<td>A. Assignment of responsibility</td>
<td>B. Dialogue &amp; deliberation</td>
<td>C. Scoping, research &amp; analysis</td>
<td>D. Enabling environment review</td>
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<td>E. Piloting &amp; demonstration</td>
<td>F. Strategic and operational planning</td>
<td>G. Mainstreaming</td>
<td>H. Costing</td>
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<td>I. Financing</td>
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<td>J. Guidance &amp; Communications</td>
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<td>L. Actions and activity</td>
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<td>M. Monitoring and evaluation</td>
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<td>O. Reporting and response</td>
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<tr>
<td>1. Agriculture</td>
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<td>1a. Agricultural Development</td>
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<td>1b DRM and FS</td>
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<td>1c Natural Resources</td>
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<td>2. Water</td>
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<td>2b Watersheds</td>
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<td>1. Health</td>
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<td>2. Education</td>
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<td>3. Trade and industry</td>
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<td>4. Energy and mines</td>
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<td>5. Settlements</td>
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<td>6. Labour, social affairs and gender</td>
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<td>7. Finance and economy</td>
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<td>12. Science and technology</td>
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Geographical

Regional - Transbounda
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<td>Cross cutting</td>
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<td>Leadership and domestic coordination</td>
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<td>Mainstreaming</td>
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<td>Technology transfer, research and advice</td>
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