Sector prioritization

Sector Prioritization

3.1 An overview of sectors, and projected climate change and the GHG emission status and trends

Lebanon's Second National Communication to the UNFCCC (SNC) has served as the baseline for the selection of the priority mitigation and adaptation sectors. The report, which was submitted in February 2011 to the UNFCCC secretariat, presents the country's GHG inventory for the year 2000 with a trend analysis for the period 1994-2004 as well as sectoral mitigation measures to reduce national emissions. The report also presents the climate risks to Lebanon, based on modeled climatic projections and identifies the most vulnerable sectors and proposes adaptation measures. The preparation of the SNC was based on a participatory approach where relevant stakeholders were involved in data collection and validation of methodology, baseline and emission scenarios as well as proposed measures and action plans.

3.1.1 Mitigation sectors

In the year 2000, Lebanon's total GHG emissions recorded 18,507Gg (18.5 Million tonnes (Mt)) of CO_2 equivalent (CO_2eq), the energy sector being the main source of emissions, accounting for 74.86% of the total national emission (53.45% from energy production and 21.41% from transport). Industrial processes and waste sector accounted for 9.62% and 9.40% respectively while emissions from agriculture and land use change and forestry constituted 5.76%, and 0.36% of total CO_2 eq. respectively.

Lebanon's GHG emissions have increased by 27.6% since 1994, when total emissions were approximated to 15,901 tCO_2 eq. This represents an average annual growth rate of 2.77%. As can be seen in Table 2, the fastest rate of growth occurred in the waste sector followed by the energy and industrial sector. A significant decrease in emissions was noted in the Land Use and Forestry sector in addition to a slight decrease in the agriculture sector.

In general, the trend of increase in total GHG emissions closely follows the trend of emissions from the energy sector, which constituted 49 to 58% of total emissions during this period (Fig. 1). This significant growth in emissions reflects the growing demand for electricity, due in part to the changing socio-economic conditions and to the expansion of the national grid. In fact, the sharp increase noticed between the 1994 and 2000 emissions is due to the increase in gas/diesel oil consumption (Fig. 2) that accompanied the installation and operation of the 4 diesel power plants during this period.

Table 2 - Trend of emissions (in Gg CO_2 eq.) during the period 1994-2004

	Total GHG emissions	Energy	Transport	Industry	Agriculture	Land Use Forestry	Waste
1994	15,901	7,743	3,991	1,924	1,130	210	902
2000	18,507	9,892	3,963	1,781	1,066	67	1,739
2004	20,299	10,979	3,976	2,178	925	12	2,227
% change 1994-2004	27.66%	41.79%	-0.39%	13.19%	-18.12%	- 94.42%	146.99%
Average % change/year	2.77%	4.18%	-0.04%	1.32%	-1.81%	-9.44%	14.70%

Source: (MoE/UNDP/GEF, 2011)

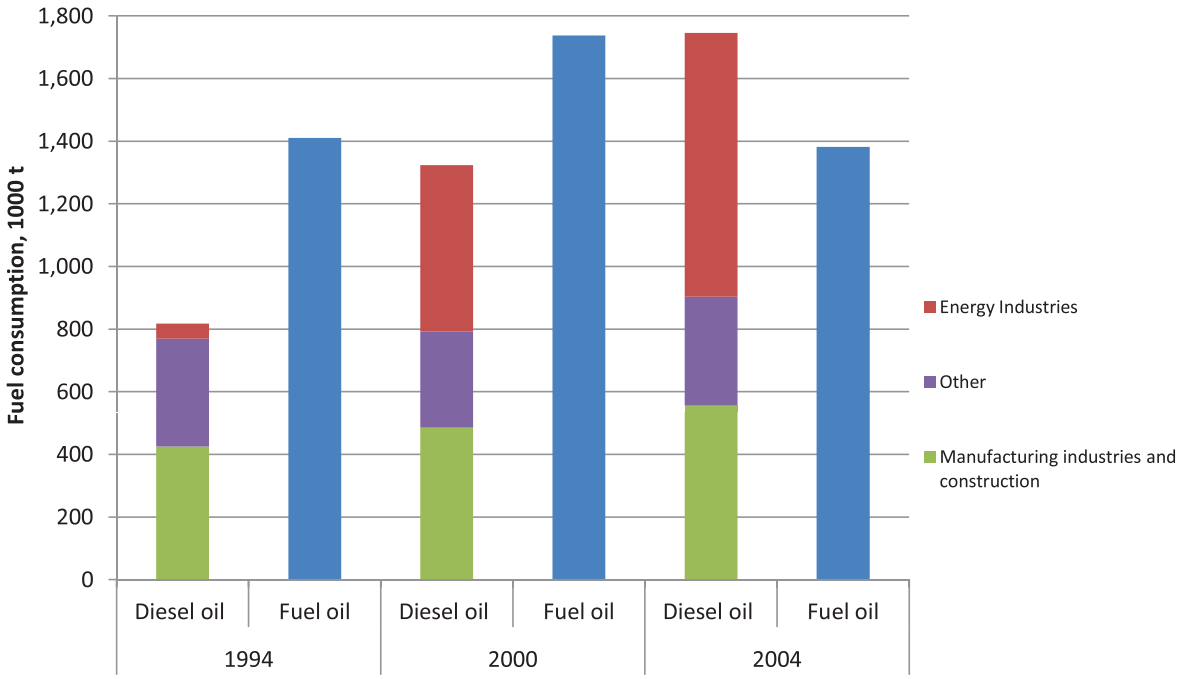

Fig. 1- Trend in emissions

Source: (MoE/UNDP/GEF, 2011)

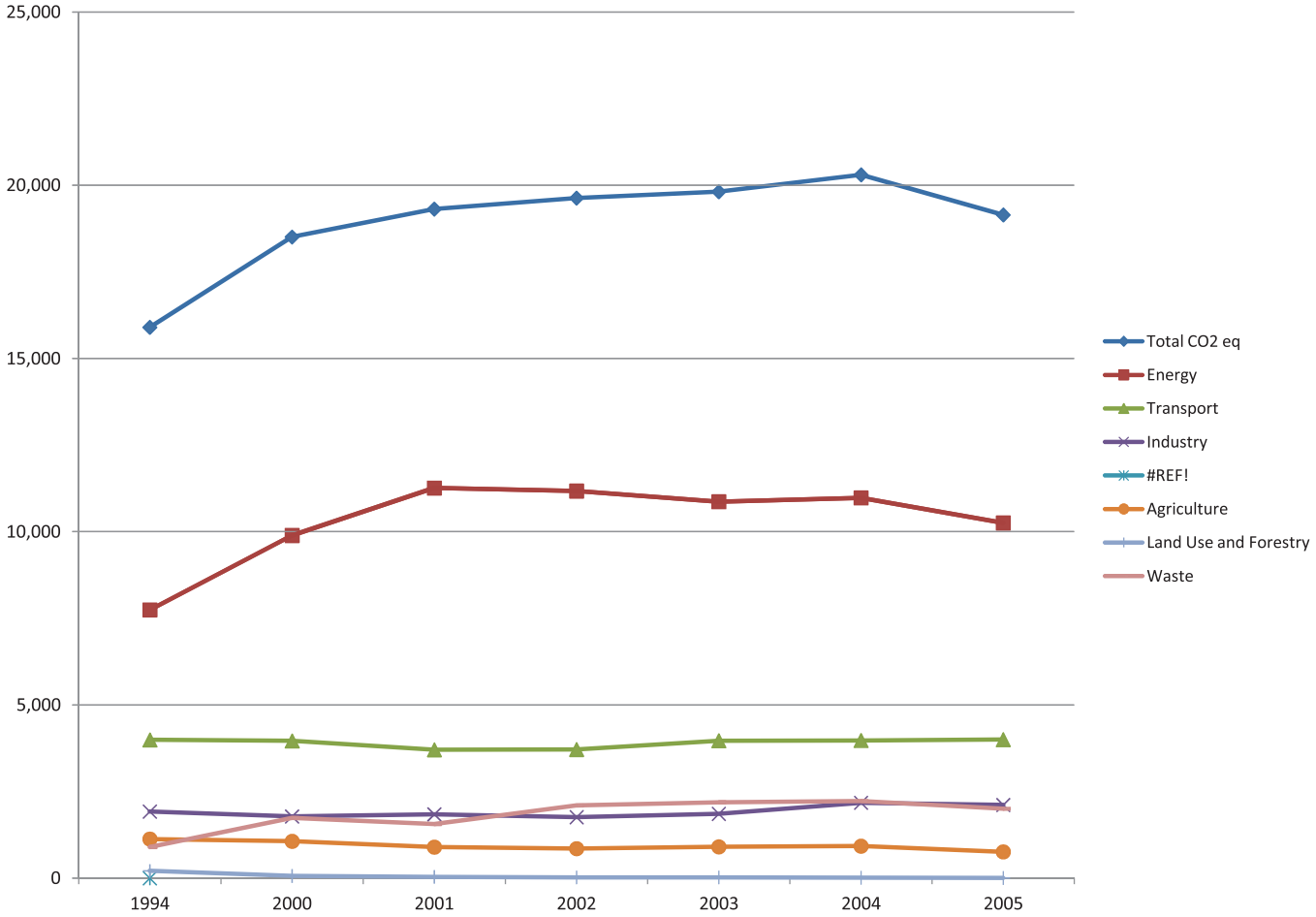

Fig. 2 - Consumption of fuel and diesel oil in the power sector

Source: (MoE/UNDP/GEF, 2011)

As for the transport sector, GHG emissions have conserved a steady state throughout the 1994-2004 period. Despite a vehicle fleet increase during this period, the increased efficiency in fuel consumption of new cars, the ban to import cars older than 8 years that was introduced in Lebanon and the inspection system that was established in Lebanon in 2001 contributed to the stabilization of the emission trend from the transport sector.

Emissions from the industrial sector increased during this period by around 13.19%., and namely due to the increase in cement and lime production while emissions from the waste sector increased by 147% from the 1994 values. With an increase in population, in waste generation and in percent of waste deposited in landfills, methane emissions from solid waste disposal on land have increased by 135% despite the flaring that was introduced in 2000 with the establishment of the Naameh landfill.

As for agriculture and land use change and forestry, emissions decreased by 18% and 94.44% respectively, mainly due to a decrease in the population of livestock and decrease in forest fires from 1994 to 2004.

3.1.2 Adaptation sectors

Analysis of historical climatic records of Lebanon from the early 20th century with future emissions trajectories indicates that the expected warming in Lebanon has no precedent. Annual average temperatures are projected to increase by 1 to 2°C above the current levels by the year 2040, and 3 to 5°C by 2090. In addition, rainfall is projected to decrease by 10-20% by 2040, and by 25-45% by the year 2090, compared to the present. This combination of significantly less wet and substantially warmer conditions will result in an extended hot and dry climate. Temperature and precipitation extremes will also intensify with additional 50 “hot summer days” and 34 “tropical nights” by the end of the century, causing the seasonal prolongation and geographical expansion of drought periods (MoE/UNDP/GEF, 2011).

Such changes in climate are expected to have diverse implications on Lebanon’s environment, economy, and social structure. The fragile biodiversity, ecosystems, and natural habitats will be threatened by increased forest fires, pest outbreaks and sea level rise. The findings from the vulnerability assessment do not single out one specific vulnerable sector, but identifies the agriculture, forestry, water resources, human health, coastal zone, and tourism sectors as most vulnerable with distinctive social, economical and environmental implications.

Lebanese agriculture may experience a decrease in productivity for most of the crops and fruit trees especially for wheat, tomatoes, cherries, apples, olive and grapes, despite some transient benefits from the expansion of the coastal plantations such as banana and tomatoes. Furthermore, changes in precipitation and, subsequently water management are particularly critical factors affecting the future productivity of the Lebanon’s agriculture. The declines in precipitation will also exacerbate existing challenges to water availability and quality for agriculture as well as for commercial and residential uses. Climate change will induce a reduction of 40% to 70% of the snow cover of Lebanon with an increase of 2°C to 4°C respectively, a shift of elevation of snow from 1500 m to 1900 m and a decrease in snow residence time from 110 days to 45 days. This will have adverse impacts on rivers and groundwater recharge, and will affect water availability during the summer season and in drought periods.

Coastal zones may be affected by increases of sea level rise and sea level temperature, which will have an impact on sand beaches and coastal natural reserves. This may also lead to seawater intrusion into aquifers and cause coastal flooding and inundation during storms.

As for forests, they will be adversely affected by climate change, especially that forest stands suffer from fragmentation, pest outbreaks, forest fires and unsuitable practices that already challenge their capacity to survive and develop.

Finally, the effects of climate change on public health include the outbreak of infectious diseases from changing temperatures, increased morbidity and mortality from heat and other extreme weather events, malnutrition from droughts and floods and other water-borne, rodent-borne diseases and vector-borne diseases.

3.2 Process and criteria of prioritization

An inception and sector prioritization workshop was held to introduce the project in its global and national context and to clarify the role of the stakeholders in the process. The process of the TNA project was presented in terms of objectives, planned activities, number of expected national workshops, and overall project expectations.

The workshop also served as a sector prioritization session where all relevant sectors in mitigation and adaptation were presented, described in terms of emissions and vulnerability and analyzed for the selection of the priority sectors.

Mitigation prioritization was based mainly on the findings of the national GHG inventories that indicate that energy, both in terms of power production and transport, is the sector that contributes the most to GHG emissions. The selection criteria were:

- GHG reduction potential
- Availability of technologies
- Potential in attracting investment
- Potential of market penetration
- Cost of mitigation

The discussion lead to an unanimous agreement that the energy and transport sectors are indeed considered as priority development sectors in the country, as it is reflected in every ministerial declaration and in all development plans. The consensus resulting from the workshop was to focus on soft and hard technologies related to power production from public utilities and private generators as well as the transport management in terms of mass public transport and individual commutation.

As for adaptation prioritization, a Multi-Criteria Analysis (MCA) exercise was conducted using a scoring of 0 to 5, with 0 being “not important” and 5 being “extremely important” to rank the 6 most vulnerable sectors (agriculture, forestry, water, public health, coastal zone and, tourism) according to the following selection criteria:

- Vulnerability to climate change
- Adaptive capacity
- National priority based on development plans
- Socio-economic importance
- Extent to which change can be inflicted
- Technological availability
- Cost of adaptation

The exercise revealed a general consensus on the assessment of the water and agriculture sectors (average score of 32 for water and 27 for agriculture) followed by coastal zones (average score 20) and the public health sector (average score 19) (see Table 3).

Table 3 - Ranking of adaptation technologies through MCA

	Score	Agriculture	Forestry	Water	Public health	Coastal zones	Tourism
Vulnerability to climate change	1: low 5: high	4	3.7	4.5	2.5	4	2
Adaptive capacity	1: high 5: low	3.7	2.5	4.2	2.4	3.5	1.5
National priority	1: low 5: high	3.8	2.7	5	1.8	2.3	1.5
Socio-economic importance	1: low 5: high	4	2.4	4	4.5	3.7	3.8
Extent to which change can be inflicted	1: low 5: high	3.5	1.9	4.5	1	1.5	2.3
Technological availability	1: low 5: high	4.1	2.5	4.7	3.6	1.8	2
Cost of adaptation	1: high 5: low	3.8	2.3	5	3	3.5	1.8
TOTAL	26.9	18	31.9	18.8	20.3	14.9	
RANK	2	5	1	4	3	6	

3.3 Mitigation and adaptation prioritized sectors

3.3.1 Mitigation sectors

According to the sector prioritization exercise, and confirmed by the latest national GHG inventory results, the TNA project will assess the specific technology needs of the power and the transport sectors.

Although the government has been significantly active in initiating and implementing activities related to the power sector through relevant ministries, national and international organizations, the private sector and other partners, it was decided through the sector prioritization workshop to concentrate the work on power production from the supply side and not to tackle the demand side. Indeed, Demand Side Management is a topic that is intensively being dealt with in Lebanon and that the TNA project would not be much of an added value to it.

Contrarily to the power sector, the transport sector is unfortunately under-assessed at the national level, being confounded in political conflicts and being tore apart by overlapping of responsibilities between ministries and public agencies. The sector is characterized by a major lack of data, rare sound research and an uncooperative first circle of stakeholders. However, since it negatively impacts a large proportion of the population on the social and economical level, transport has raised to become one of the priority areas in the country's race to development needing urgent interventions.

3.3.2 Adaptation sectors

Based on the results of the vulnerability assessment published in the Second National Communication, and according to the prioritization exercise undertaken by stakeholders, the TNA project will assess the agriculture and water sectors in term of technologies identification and preparation of action plans.

Although these sectors have already been tackled numerous times as priority development areas, the TNA Project offers an opportunity to complement government efforts in these sectors and to propose specific targeted solutions to increase their resilience to the adverse impacts of climate change