



Netherlands Commission for
Environmental Assessment

Review of the Strategic Environmental Social Assessment (SESA) for the Lebanon National Integrated Solid Waste Management Strategy

LEBANON



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Advice by the NCEA

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| To | The Ministry of Environment (MoE) in Lebanon and Council for Development and Reconstruction |
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List of Abbreviations

CDR: Council for Development and Reconstruction

ESIA: Environmental and Social Impact Assessment

IFC PS: International Finance Corporation Performance Standards

ELARD: Earth Link and Advanced Resources Development S.A.L

LDK: LDK for Management Consulting

MARPOL: International Convention for the Prevention of Pollution from Ships

MoE: Ministry of Environment

NCEA: Netherlands Commission for Environmental Assessment

NISWMS: National Integrated Solid Waste Management Strategy

SEA: Strategic Environmental Assessment

SESA: Strategic Environmental and Social Assessment

UNDP: United Nations Development Programme

WB: World Bank

1. Introduction

1.1 Background to the advice

The waste management system in Lebanon has not been effective due to issues such as governance challenges and a lack of strategic planning. In 2015, this culminated in a severe nation-wide waste crisis, prompting the adoption of several laws and regulations and the launching of new initiatives. However, the Ministry of Environment (MoE), which is responsible for the waste sector, has yet to implement systematic and lasting solutions.

In November 2021, the MoE, in collaboration with the United Nations Development Programme (UNDP), developed the National Integrated Solid Waste Management Strategy (NISWMS or 'the strategy'). Based on Lebanese legislation¹ it was decided to conduct a Strategic Environmental and Social Assessment (SESA) to inform and update this strategy². Both the SESA and the strategy were prepared and finalised on 11 June 2024 by a consortium of the consultancy firms LDK³ and ELARD⁴ and were submitted to the MoE for approval.

In May 2024, the Netherlands Commission for Environmental Assessment (NCEA) received a request from the MoE to advise on the final SESA report. The NCEA's advice is meant to inform the MoE's internal committee, which will review the SESA and report its findings to the Minister (of Environment). With these inputs, the Minister will decide whether to approve the SESA report, or request further completion or amendments to the study.

1.2 The initiative and the SESA

The SESA is carried out for Lebanon's updated NISWMS which formulates these objectives:

Strategic Objective 1. Complete, upgrade and operate integrated solid waste management infrastructure

Sub-objective 1.1 Establish an effective waste collection and transportation system

Sub-objective 1.2 Establish reuse, recycling and material recovery facilities for separately collected waste

Sub-objective 1.3 Establish climate smart waste treatment and energy recovery facilities

Sub-objective 1.4 Establish climate smart final disposal facilities and close/rehabilitate open dumps

Strategic Objective 2. Enhance community and private sector stewardship towards a circular economy

Sub-objective 2.1 Engage community in waste reduction and sorting at source

Sub-objective 2.2 Integrate the informal sector in the integrated solid waste management system

Sub-objective 2.3 Promote private sector participation and investment in waste management

Sub-objective 2.4 Enhance public awareness and education

Strat. Objective 3. Enable an effective governance framework to implement the integrated solid waste management system

Sub-objective 3.1 Establish and operationalise the National Solid Waste Management Authority

Sub-objective 3.2 Establish and implement cost recovery system and extended producer responsibility

Sub-objective 3.3 Complete and enforce the Waste Management Legislative Framework

Sub-objective 3.4 Complete and implement the planning framework at the national and local level

Sub-objective 3.5 Establish and operationalise a waste (incl. hazardous) management information system

¹ Strategic Environmental Assessment Decree No. 8213/2012

² Both were commissioned by the Council of Development and Reconstruction (CDR) and the MoE with World Bank funding.

³ LDK for Management Consulting

⁴ Earth Link and Advanced Resources Development S.A.L.

In the SESA, the potential impacts of these strategic (sub)objectives are evaluated against several environmental, geographic and socio-economic parameters, and objectives linked to these parameters.

1.3 The NCEAs approach to the review

The NCEA assembled a working group of experts covering various fields of expertise⁵ to carry out an independent quality review. The primary focus of this review has been the Final SESA Report (dated 11 June 2024), but the working group also considered the 'Final National Integrated Solid Waste Management Strategy (dated 14 June 2024) and the 'Final National Integrated Solid Waste Management Master Plan' (dated 14 June 2024) as relevant background information. The review took place against national and international best practice frameworks for SEA including:

- [The SEA performance criteria](#) by the International Association for Impact Assessment (January 2002)
- The OECD DAC (2006) [Guidelines for Applying SEA](#)

The NCEA's independent reviews typically include a field visit to the country requesting the advice. However, due to safety concerns, the working group has not been able to conduct a site visit to Lebanon. The NCEA acknowledges that this absence of a site visit and interaction with key stakeholders have been a limiting factor for getting a more complete understanding of the situation on the ground and to consider the SESA within the local context. To address this limitation, the NCEA engaged two Lebanese experts with extensive knowledge of the local context and the topic under review.

2. Summary of findings

The NCEA starts with noting that it is commendable that this SESA was commissioned and carried out amidst the economic, political and security crises currently taking place in Lebanon. The NCEA acknowledges that these circumstances, along with the fact that SESA practice in Lebanon is not yet widespread, may have posed challenges to the team responsible for the study. Without disregarding these challenges, this advice mainly highlights the gaps comparing the study with international best practice. The NCEA hopes that its advice will inspire and guide this, but also future SESAs, as its practice evolves in Lebanon.

In general terms, the study follows the necessary steps and contains the key elements of a SESA. The necessity of the strategy and the SESA are clearly established. The chapters follow a clear structure and present a wealth of information through a proper summary (both in Arabic and English), an extensive baseline, the legal and institutional framework, a compatibility analysis with other policies and plans and an overview of potential impacts and mitigation measures. The report also provides a broad framework for monitoring and capacity building. In addition, Annex 3 of the NISWMS outlines clearly formulated criteria for site exclusion and site selection for waste management infrastructure, incorporating environmental and social considerations. The NCEA assumes these criteria were formulated based on insights from the

⁵ Including on waste management, waste processing and recovery, social impacts, environment, water resources and coastal zone management.

SESA, even though the SESA does not refer to these criteria. Because these criteria will provide key guidance at the ESIA stage, several observations are included in this advice.

The SESA process and report also reveal shortcomings that limit its potential to improve decision making as well as guide in addressing significant issues related to the strategy. Below is a list of key findings and recommendations. These are elaborated in **Chapter 3** of this advice:

- **Methodology and reporting:** there is a need to improve the readability and clarity of the report and the assessment, especially of the impact assessment chapter.
- **Study scope:** is incomplete as several key topics, such as a mass-balance, coastal and marine areas and hazardous waste, are not adequately addressed.
- **Alternatives:** the comparison of alternatives is lacks detail and does therefore not provide sufficient justification for selecting the preferred alternative. More alternatives could have been considered such as the phased implementation of the strategy.
- **Impacts and risks:** the social impact assessment does not clearly identify which vulnerable groups may be affected by the strategy. Additionally, risks related to climate change, weak governance, public trust and security have not been effectively considered.
- **Stakeholder engagement:** the level of stakeholder engagement is not proportional to the scale and extent of the strategy. A stakeholder analysis and an explanation of challenges could have clarified these gaps and informed future engagement processes.
- **Guidance for future SESAs and ESIA:** a finding that cuts across earlier observations is that the report does not consolidate insights from this SESA into a clear summary that will inform and guide future SESAs and ESIA for waste management plans and investments.

In addition, several more detailed findings are shared in **Chapter 4** of this advice on:

- **Biodiversity:** there are gaps in biodiversity information such as on the effects of noise and odours on wildlife, habitat fragmentation and the monitoring of ecosystem health.
- **Water pollution:** in the current situation, the proposed discharge of leachate in waste water systems may lead to pollution.
- **Site exclusion criteria for waste management facilities:** it is not clear how the minimal distances to locations like water sources and protected areas were determined. Some distances may need to be revisited and probably revised.

Main recommendations

The NCEA recommends that, prior to approving the SESA, the MoE requests that these key findings and detailed findings be addressed in the current SESA. This may involve providing additional information on the identified topics, or that this SEA offers guidance to future SESAs and ESIA for incorporating and dealing with these topics.

The NCEA also recommends that, after approval of this SESA, a more detailed climate study and a study for dealing with hazardous waste is undertaken. This is because the SESA will, also after improvements suggested in this advice, not provide sufficient information to deal with these two topics.

3. Key findings

3.1 Reporting and methodology

Several chapters of the SESA provide extensive and valuable information, but these occasionally also cause the reader to lose track due to the level of details. Especially Chapter 6 and section 6.2.3 deserve specific attention, as these constitute an important part of the report:

- This section presents the assessment results in table format across various pages, making it difficult for readers to get a quick overview of the most significant issues.
- These tables contain a lot of redundant information. For example, for strategic objective 2.3, the same impacts are repeated across most environmental and social parameters. Similarly, strategic objective 3 and its sub-objectives are presented without links to most environmental and social parameters, but are still repeatedly presented. In addition, the tables include information on mitigation, that is repeated in the subsequent section 6.3.

Recommendations

Improve the readability of the SESA report:

- Reduce its volume by a) presenting a summary of key findings on the legal and institutional framework and b) limiting the baseline information provided to the parameters used in the assessment.
- Summarise the impacts in section 6.2.3 into a narrative that concentrates on key findings, by outlining the potential significant impacts and their causes per environmental and social parameter. The tables can then be moved to an annex.
- Remove repetitive information on mitigation in the tables of section 6.2.3.

In addition, the assessment approach and the reasoning behind the impact scores in Chapter 6 are not always easy to follow because:

- There is no explanation of how the environmental and social parameters and objectives were selected and formulated. There is also no clear description of the criteria and standards/benchmarks used to assess impacts, nor of the methodology followed to determine the corresponding scores⁶.
- The scores are based on a combined mix of positive and negative impacts, and impacts at different phases of the strategy's implementation. This does not allow to distinguish between the temporary impacts of construction and related mitigation, and the lasting (often more potent) effects of operating waste management infrastructure and related mitigation. It also leads to scores like 'uncertain correlation' which are difficult to interpret and at times even confusing⁷.

⁶ For example, one environmental objective is the '*reduction of soil pollution*'. The SESA concludes that strategic objective 1 scores with an 'uncertain correlation (+/-)' on this environmental objective. This score does not say anything about the predicted levels of soil pollution and how this relates to existing norms and standards. Similarly, one socio-economic objective is '*sustainable population growth*'. The SESA concludes that all strategic objectives score positive on this objective. It is not clear why this objective was selected and how 'sustainable population growth' is measured.

⁷ For example, Tables 6.2.3.1 and 6.2.3.2 suggest that building landfills and rehabilitating and closing dumpsites has a high probability of resulting in negative effects on soil and water quality. This conclusion seems to be mainly based on potential negative impacts. However, if the baseline is assumed to be the current situation of widespread open dumping and burning practices, the positive impact of the strategy on soil and water resources seems to have a higher probability and extent compared to the negative impacts of deficiencies in operating waste management infrastructure.

Recommendations

Improve the impact assessment methodology in the SESA:

- Elaborate on how the environmental and social objectives were selected and which criteria (qualitative and quantitative), benchmarks and standards were used.
- Clarify the approach adopted in scoring the environmental and social objectives.
- Present the impacts (in addition to the earlier recommendation to summarise this into a narrative) in such a way that one can clearly distinguish between: a) impacts during the construction and operational phases, b) the positive and negative impacts and their relative intensity and c) impact levels before and after mitigation.

3.2 Scope of the study

3.2.1 Mass balance

The SESA and the strategy provide detailed and quantified baseline data and predictions on the municipal solid waste to be generated in different regions. This information on the ‘input’ side is detailed and sufficient, with exception of the waste produced by blue economy activities as elaborated in section 3.2.2 of this advice. The SESA report (as well as the strategy) do not present the expected quantities of ‘output’ referring to recovered waste fractions that result from waste recycling and processing, including thermal treatment and quantities of waste going to landfill disposal. This is key information to: 1) consider in the assessment of impacts and risks, also for the alternatives and 2) inform the strategy on issues like resource allocation, policy and regulation development, monitoring and evaluation design, and economic considerations (e.g. opportunities for recycling and energy generation).

Recommendations

- Present in the SESA for each alternative a mass balance of solid waste streams which provides a quick overview of the expected waste generated (*inputs*), how much of this waste undergoes recycling/thermal treatment, the quantities of *outputs* from processing/recycling activities (recovered waste) and how much waste is eventually land-filled.
- Specify annually generated ‘output’ quantities of processed fractions (if possible their expected quality) and final destination for:
 - *Plastics, paper, cardboard and metals generated in recycling facilities*
 - *Refuse Derived Fuels (RDF) generated for thermal treatment facilities*
 - *Compost or residual products from fermentation*
- Consider the potential implications of the mass balance, including outputs and final destination of wastes in the assessment of the different alternatives. Where relevant, adapt the SESA and formulate additional recommendations.

3.2.2 Marine and coastal areas

The SESA includes baseline information on potential effects on marine areas. There are however consistent gaps in the way this topic is scoped and assessed:

- Marine areas are not explicitly included in the *study area and/or its area of influence*. Section 5.1 (physical environment) does not specify Lebanese territorial waters and its Exclusive Economic Zone.

- *Baseline information* on the marine environment lacks some information. Section 5.1.6 (p 86) only refers to salinity, seawater temperature and fish and section 5.2.2 (p 97) does not cover marine flora. Components of this ecosystem, such as the different habitat types and fauna groups which may be affected, have not been mentioned. There is also no clear reference to Lebanon's largest landfill located on the Mediterranean sea and its effects on water quality, marine habitats and biodiversity, and coastal communities.
- Information on *solid waste streams in marine areas* emerging from blue economy activities⁸, and from wastes transported by rivers into coastal waters and beyond, is not presented in section 5.4.1. The strategy does not include a specific objective to deal with waste from marine and coastal areas and it is not clarified whether these are considered to be part of municipal waste and under whose responsibility these wastes fall. It should be noted that solid waste collected through beach and marine cleaning campaigns, in river systems and other natural areas require specific treatment approaches which may differ from municipal solid waste. This is because they have been subject to weathering, degradation and contamination by organic matter, oil (spills) and other substances.
- Signed and/or ascended to *key conventions, protocols and standards* related to marine pollution are missing in section 2.1.3.
- There is no separate *environmental and climate parameter* for the marine environment (for example for marine water quality). As a result, impacts of the strategic objectives are assessed for freshwater resources and are mainly relevant for the terrestrial environment⁹. The impacts of waste generated by blue economy activities, but also by other pollution sources like leachate entering marine waters and open burning practices on the marine ecosystem, do not appear to be considered.
- No mitigation measures (section 6.3) are listed for the coastal and marine environment.

Recommendations

Take a more robust approach for including marine and coastal areas in the SESA by:

- Adding a map in section 5.1 specifying Lebanese jurisdictions on territorial waters and its Exclusive Economic Zones. Include these areas in the scope of the assessment.
- Adding baseline information on: water quality and current contamination levels of the mediterranean seawater along the shoreline, different habitats and marine biodiversity (including marine fauna and flora)¹⁰.
- Considering wastes in marine and coastal areas as a separate stream through a) specifying solid waste in these areas, b) adding a strategic objective to the SESA and the strategy for dealing with solid waste from marine and coastal areas and c) clarifying who is the official entity(ies) responsible for dealing with waste in marine and coastal areas.
- Making reference to the Integrated Coastal Zone Management Protocol for the Mediterranean, MARPOL¹¹ (in particular Annexes III and V) and other conventions and protocols related to marine pollution from wastes generated by blue economy activities.¹²
- Analysing and presenting the potential impacts from all waste streams (terrestrial and marine origins) on the marine environment and biodiversity.
- Including in the mitigation section recommendations for the marine environment.

⁸ Lebanon is a coastal country with many blue economy activities such as commercial shipping, cruise ships, port facilities etc. which generate solid waste including hazardous waste. In addition, waste is expected to be generated by gas and oil platforms.

⁹ This appears for example from section 6.2.3.2 which concludes that impacts on water resources are local (extent 2), while pollution in freshwater systems end up in marine waters and are transferred by currents which can affect other countries.

¹⁰ Where relevant, findings from the [Marine Litter Baseline in Lebanon 2021 \(worldbank.org\)](https://www.worldbank.org/) can be used here.

¹¹ The International Convention for the Prevention of Pollution from Ships to which Lebanon became signatory in 2008.

¹² See <https://www.imo.org/en/About/Conventions/Pages/ListOfConventions.aspx>

3.2.3 Hazardous waste

According to the SESA, a separate system for the management of hazardous waste is non-existent in Lebanon. It also states that hazardous waste is disposed of haphazardly without undergoing special treatment (section 5.4.1 p.121) which leads to hazardous industrial waste that is often mixed with the municipal solid waste stream and ending up in dumps or being burned (section 5.4.1 p.122). Therefore, the strategy rightly sets specific objectives for hazardous waste management¹³ and the SESA includes information on the volumes and the legal framework. Nevertheless, despite this information and the reference to potential impacts and risks, the SESA does not deal adequately with hazardous waste due to the following:

- Most hazardous waste infrastructure is proposed to be implemented at a much slower pace (50% implementation in 10 years and 100% implementation in 20 years) compared to municipal waste infrastructure. This means that during the transitional period, a significant proportion of hazardous waste will still end up in municipal waste streams without undergoing any treatment. The SESA does not highlight the specific impacts thereof on human health and on terrestrial, coastal and marine ecosystems. Similarly, no measures and guidance for avoiding and mitigating impacts are proposed.
- Hazardous waste infrastructure potentially poses different impacts and risks to humans and nature as compared to infrastructure for non-hazardous waste. Despite these differences, the SESA analyses the impacts of hazardous and non-hazardous waste jointly in one assessment. Similarly, no specific measures and monitoring indicators are proposed for hazardous waste, for example for (but not limited to) its safe transport. It is also not clear whether the site exclusion and site selection criteria presented in the strategy (Annex 3) are suitable for selecting sites for hazardous waste facilities, or whether these can only be used for selecting sites for non-hazardous waste facilities?

Recommendations

Give better consideration to hazardous waste in the SESA through:

- A separate analysis on the impacts and risks on humans, terrestrial, coastal and marine ecosystems that emerge from:
 - hazardous waste that will be mixed with municipal solid waste.
 - hazardous waste infrastructure (such as separate collection, transport, storage and other interventions).
- Formulating measures (for example for risks in hazardous waste transportation) and monitoring indicators.

The NCEA also notes that improvements to the current SESA may not be sufficient to adequately address issues around hazardous waste. Given the importance of this topic, it is highly recommended that the MoE and its development partners consider formulating a separate plan for hazardous waste with an own SESA in order to:

1. Obtain an overview of the sources, quantities and types of hazardous wastes.
2. Learn which sources pose the highest impacts and risks and at which hotspots.
3. Formulate site exclusion and selection criteria for hazardous waste infrastructure.
4. Determine impact/risk avoidance and mitigation measures, including for contingencies and emergencies.
5. Clarify roles, responsibilities and coordination mechanisms to deal with impacts/risks.

¹³ Strategic sub-objective 1.1.3 is to design and to implement a hazardous waste collection system. Sub-objective 1.2.4 is to design construct, upgrade, operate and manage hazardous wastes recovery facilities. Sub-objective 1.4.4 is to design construct upgrade, operate and manage hazardous wastes disposal sites. Finally, sub-objective 1.4.5. is to close and rehabilitate areas contaminated with hazardous wastes and existing historical hazardous wastes disposal sites.

3.3 Alternatives

The SESA considers several alternatives¹⁴ as required by Lebanese regulations. The NCEA supports proposing alternatives with varying levels of land uptake and energy recovery from waste processing, as these may result in more or less social and environmental impacts. Chapter 4 first presents the five alternatives in the Table 4-1 (p 69). These alternatives are then scored through a multi-criteria analysis¹⁵ and presented in Table 4-2 (p 71). Based on this analysis, Alternative 3 (the NISWMS) is chosen as the preferred option. The evaluation of the alternatives presented, however, does not provide sufficient justification for selecting Alternative 3 for reasons explained below.

The first reason is that the multi-criteria analysis on the alternatives is inadequate:

- The description of the alternatives is not sufficiently detailed. It is therefore not clear how the alternatives differ in terms of their mass-balance (see this advice section 3.2.1), (additional) land requirements and the means and extent of energy recovery.
- On page 70, only three scores on sustainability criteria are explained¹⁶ while Table 4-2 uses scores varying between -5 to +5. The quantitative scores on how each alternative performs on the sustainability criteria are presented in an overview, but almost no explanation is given on the rationale underlying these scores. For example, why do Alternatives 3 to 5 score differently on waterborne and airborne diseases?
- The scores to all sustainability criteria are added up to one total score per alternative, suggesting that all criteria have the same 'weight'. The explanation or justification for this weighting is not given.

The second reason is that a detailed assessment and comparison of the alternatives has not been undertaken, which is not in line with common good practice. Already at the multi-criteria analysis stage, Alternatives 4 and 5 are dismissed¹⁷ and a detailed assessment is only undertaken for Alternative 3 (the NISWMS). As a result, the report does not provide insight into how the alternatives perform on social and environmental factors and goal achievement. For example, in relation to Alternative 5 it could be noted that when collecting and separating waste, there will always be a fraction of low calory flammable waste. Dumping this into sanitary landfills has disadvantages versus incineration, such as methane emissions. Also, there are waste incineration facilities in the world and the region that meet high standards of environmental protection¹⁸. Providing a fuller picture of such advantages and disadvantages of the alternatives would have allowed for a more balanced decision making.

¹⁴ Alternatives 1 and 2 relate to a 'do nothing' scenario and the 'current situation'. Alternative 3 is the National Integrated Waste Management Strategy (NISWMS) and includes energy recovery from waste. Alternatives 4 and 5 present different options for treating fractions arising from mechanical biological waste treatment. Alternative 5 includes incineration.

¹⁵ With an indicator for including soil, air and water quality, geographical constraints, human health, biodiversity, CAPEX, OPEX, social acceptance and governance criteria.

¹⁶ Being -5 (very negative compared to current situation), 0 (not affected) and 5 (very positive compared to current situation)

¹⁷ Alternative 4 is dismissed because of its land requirements. Alternative 5 because it is seen as not viable in the current conditions of public dept, public opposition and mistrust, weak governance and high investment and operation costs.

¹⁸ For example, in [Istanbul \(Turkey\)](#) a waste incineration plant has been in operation for several years which was partly built because space was lacking for a sanitary landfill around the city. Also new waste incinerators have been built in amongst others in [Mesaieed \(Qatar\)](#) and in [Sharjah \(United Arab Emirates\)](#).

Recommendations

Complement in the SESA the information on the alternatives:

- Describe in more detail what the Alternatives 1 to 5 entail and quantify their differences in mass-balance and recycling rates, land uptake and energy recovery.
- Complete the explanation of the sustainability criteria (p 70) and justify the weighting factor applied for the criteria in Table 4-2.
- Explain the rationale for the scores on the alternatives in the multi-criteria analysis. Consider carrying out a sensitivity analysis with different weighting factors per criteria to gain insight in how the perceived weighting affects the overall scores of the alternatives.
- Present a detailed environmental and social assessment of all alternatives.

The SESA is based on the assumption that the NISWMS is implemented within a 10 to 20 year timeframe. In the light of current financial, governance and security challenges in Lebanon, the successful implementation of the strategy during this period may prove to be ambitious. Therefore, comparing alternatives for different phasing of implementing the strategy would inform decision makers and investors on which components of the planned infrastructure/interventions should be prioritised and at which locations. In addition, such comparison would also give insight into interventions that lead to environmental and social 'quick wins'.

Recommendations

Consider including in the SESA the comparison of alternatives for the phased implementation of the strategy. This would inform decision makers and investors on priorities and potential 'quick wins'. In case this is not feasible for the current SESA, the NCEA recommends that the MoE ensures their inclusion in future SESAs and ESIAs for local plans and investments (see also section 3.6 of this advice). Examples of alternatives for phased implementation are:

- Priority construction of new landfills to enable the closure of major dumpsites with the highest negative environmental and social impacts.
- Priority implementation of mechanical and biological treatment to reduce the quantity of untreated waste going to landfills with limited capacity.
- Prioritising incineration at specific locations or waste sources (e.g. large remote industries) where public opposition is minimal, to reduce the quantity of landfilled waste.

3.4 Impacts and risks

3.4.1 Social impact assessment

The SESA formulates six socio-economic and health objectives¹⁹ and describes the possible effects of the strategy on these objectives²⁰. Although this information is relevant and useful, the methodological approach adopted does not constitute a social impact analysis that is in line with international standards (such as the World Bank and IFC Performance Standards²¹).

¹⁹ Including: sustainable population growth, improve conditions for accessing public services, improve access to work/Education/shopping services/leisure, stimulate productive activities and expansion of economic activity, improving quality of life, reduce gas pollutants and noise emissions which negatively impact human health.

²⁰ The SESA concludes that the strategy has a positive effect on socio-economic and health objectives (Tables 6-3 and 6-4). Several negative effects are identified, like the temporary disruption of communities during construction and noise and unpleasant odours during operations (section 6.2.3.8 p 151) for which appropriate measures are proposed.

²¹ International Finance Corporation Performance Standards

Such analysis would help to identify vulnerable and social groups that may be negatively affected, and to formulate suitable measures. Some examples are below.

Refugee camps: Lebanon hosts a large population of refugees²² which puts substantial pressure on Lebanese public services. The SESA makes reference to the vulnerable situation of refugees²³ and the rising tensions between Lebanese host communities and Syrian refugees (section 5.3.9, p 114). Aside from some baseline information, no further details are included on how waste is currently dealt with in areas heavily populated by refugees. In addition, the potential impacts on refugee camps and their host communities are not analysed to ascertain whether specific mitigation measures need to be considered in these areas.

Labour conditions: implementation of the NISWMS will probably require a substantial workforce, for whom adequate working conditions need to be put into place. The SESA makes reference to national and international laws and regulations on labour and occupational health and safety, and proposes that these are followed. However, the report does not offer any insight into the current working conditions in the sector or what changes are needed, nor does it include the improvement of these working conditions as a socio-economic objective. Additionally, there is no indication of the estimated quantities and qualifications of the required workforce and the potential health and safety risks they may be exposed to.

Poverty levels: one objective of the strategy is to establish a cost recovery system. Currently, several initiatives and studies are being undertaken on this topic²⁴. In the stakeholder comments, reference is made to a study on cost recovery which estimates the costs for rural areas at 2–8 dollars and for urban areas at 3–12 dollars per household per month. The SESA also highlights the increasing poverty levels which have deepened by the current economic crisis²⁵. No consideration is given on how a cost recovery system may affect the poorest segments in society.

Land acquisition: land availability and requirements played an important role in the alternative comparison and selection (see p 75). Land availability is stated to be problematic and related concerns have also been raised during stakeholder consultations. At the same time, section 6.2.3.6 suggests that no negative impacts on land use and material assets are expected. This conclusion is not substantiated as no information is given on land requirements and the necessity of land acquisition for implementing the strategy.

Recommendations

Add to the SESA a section which identifies in broad terms the social groups that will be potentially adversely affected by the strategy. Pay specific attention to:

- Potential impacts on refugee camps or communities that host large numbers of refugees.
- Labour requirements, current working conditions and future occupational health and safety risks. Consider adding a socio-economic objective for improved labour conditions in the sector to the strategy and include monitoring indicators.
- Effects of a cost-recovery system on the poorest segments in society.
- (Additional) land that may be required. Either justify why no impacts are expected, or explain what land issues may arise and which groups may be potentially affected.

²² Section 5.3.2.5 p108 refers to 1,5 million Syrians who resettled in Lebanon of which 805.326 are registered as of 2023.

²³ See statements 'with the restricted legislation that does not stipulate any civil rights for refugees within the Lebanese territories, these people have become vulnerable with limited access to services and the job market' and that 'over half (58%) of Syrian refugee households were living in overcrowded shelters with conditions below humanitarian standards'.

²⁴ This is especially reflected throughout the stakeholder comments and answers presented.

²⁵ At page 113, the portion of Lebanese households living in poverty is estimated at 75%.

Include in the mitigation section recommendations on how future SESAs and ESIA's (see also section 3.6 of this advice) should deal with social impacts including:

- Additional analyses and studies that need to be conducted to assess, avoid and mitigate social impacts and vulnerabilities.
- How affected stakeholders should be engaged in future impact assessments.

3.4.2 Climate change

Table 5-2 (p 94) lists several impacts expected in Lebanon as a result of climate change²⁶. In the subsequent chapters of the report, the potential implications of climate change on waste management infrastructure are not specified. There are many examples of such implications. One example is the reduction in dilution capacity of water resources and increased contamination levels (caused by waste dumping) as a result of reduced rainfall and aquifer recharge. Another example is the increased fire risk on landfills or dumpsites caused by higher temperatures. Also higher levels of coastal and seawater pollution could occur because of the increased recurrence and intensity of storms and flooding events (not considered in Table 5-2), especially because major landfills are located on the coast and seafilled in marine waters. The SESA does rightly recommend that (section 6.3.4 p 156), in future planning, each strategic objective incorporates measures to address vulnerability to climate change. It does not, however, offer guidance for doing this (e.g. what studies and mitigation are appropriate at the national/regional level and what should be considered at the investment/ESIA level?).

Recommendations

The importance of undertaking a detailed climate study before the implementation of the strategy should not be underestimated. However, undertaking a detailed study as part of this SESA may not be feasible and realistic. With this in mind the NCEA recommends that:

First, the current SESA only provides the following information:

- a broad overview of the potential risks and implications of climate change on waste infrastructure and management.
- a broad outline for a detailed study to assess climate related risks, with an eye on regional differences (urban versus rural areas and coastal/marine versus inland areas).
- guidance for considering climate change in future SESAs and ESIA's (see section 3.6 of this advice).

Second, that the MoE commissions a new and more detailed climate study before the strategy is implemented. Based on this climate study, the proposed site exclusion and site selection criteria (Annex 3 of the strategy) can be revisited and adapted where necessary.

3.4.3 Governance, social and security risks

The SESA and the strategy mention several profound challenges in the waste management system in Lebanon. These challenges either imply a high degree of uncertainty for the

²⁶ This table refers among other things to more frequent droughts, a reduction in river flows and a rise in sea level as a result of climate change.

successful implementation of the strategy, or pose environmental and social risks. The SESA does not analyse or give suggestions for dealing with these uncertainties and risks.

- **Governance risks:** the SESA refers to the weak governance and indicates that in case there are no enhancements, the waste management system will not improve. At the same time, the SESA assumes effective performance of the governance framework²⁷ without analysing the reasons behind poor waste governance in the past, or pinpointing the governance risks and ways to manage these in the future.
- **Social risks:** throughout the stakeholder comments, the lack of trust among citizens in the government, and the failure of previous waste management initiatives are explicitly flagged. There is no clear pathway for how this issue will be addressed²⁸.
- **Security risks:** a waste facility in any given country is subject to risks like fire, explosion and can be a target for terrorism, sabotage and nowadays cyberattacks. Especially when hazardous waste is illegally dumped, or hazardous waste facilities are targeted, the consequences for both human and nature can be severe. These potential risks have not been touched upon in the SESA.

Recommendations

For the current SESA, the NCEA suggests that a section is added to the report which:

- 1) lists the gaps in knowledge, additional studies and plans that still need to be formulated for dealing with governance, social and security risks (see section 3.6 of this advice);
- 2) makes notion of the need to develop emergency and contingency plans to deal with incidents or events related to for instance climate change, fire outbreaks, hazardous wastes or acts of war (see also section 3.6 of this advice).

The NCEA recommends that the MoE encourages future SESA's for waste management plans and ESIA's for specific investments to take a broader approach by analysing governance, social and security risks, and by proposing pathways to manage and deal with these risks.

These topics can be analysed by using insights from existing studies and experiences, but it may also require additional data collection and consultations with key stakeholders.

3.5 Stakeholder engagement

The SESA includes sections and appendices that describe the stakeholder engagement process. In fact, the study has an explicit aim to *'involve stakeholders and provide them with an opportunity to influence decisions'*. In line with this, both the scoping report and two months later the draft SESA were presented and discussed in a virtual meeting and four workshops in four governorates. The notes of these workshops are presented in an annex with a clear overview of stakeholder comments and suggestions.

Although acknowledging these efforts, the NCEA considers that the level of stakeholder engagement is not proportionate to the scale, importance and implications of the proposed strategy. The NCEA observes the following:

²⁷ Strategic objective 3 and its subobjectives refer to the establishment of a National Solid Waste Management Authority, completion and enforcement of a legislative framework and establishing a cost-recovery system.

²⁸ An analysis of the practices and attitudes among groups of waste producers towards waste management, recycling and cost recovery will help in formulating differentiated approaches (e.g. for urban and rural areas and for different types of communities).

- Chapter 8 does not explain the approach adopted for stakeholder engagement. It is for example not clear whether a stakeholder analysis was done and how this guided the approach to the consultations. The challenges that may have been faced are not explained²⁹ which could have clarified the limitations in stakeholder engagement and helped formulating communications and logistic recommendations for the future.
- The engagement process includes only a small number of stakeholders and the attendance list in Annex 1 is difficult to read. It is therefore not entirely clear whether all key stakeholders were consulted. The effective engagement of key authorities with a role in waste management will be a crucial factor for successful implementation of the strategy and environmental and social safeguards. For example the Ministry of Industry (for waste from manufacturing processes), the Ministry of Public Health (for medical and hazardous waste), Ministry of Agriculture (for agricultural waste), Ministry of Public Works and transportation (for waste management infrastructure), the Ministry of Interior and Municipalities (waste management at municipal level), the Ministry of Education and Higher Education (for educational campaigns and initiatives) and Ministry of Water and Energy (for integrating waste management with energy production).
- Most comments and suggestions made during the consultations relate to the waste management strategy and plan. It appears that these consultations did not specifically focus on collecting inputs on social and environmental impacts and risks and on suggestions for their mitigation. From the comments, it appears that only the summaries (of the SESA, strategy and implementation plan) were shared. The NCEA notes that full reports should have been shared and sufficient time allocated, to enable stakeholders to review, form opinions and formulate concerns. The reply by the consultants on the comments are presented in the Annex, but the SESA does not indicate how stakeholder comments and suggestions contributed to the SESA's scope and final report.

Recommendations

For the current SESA the NCEA recommends the following:

- Explain in Chapter 8 the approach and considerations that guided the stakeholder engagement. Also explain the challenges that may have limited the engagement process.
- Explain in Chapter 8 how the stakeholder comments were considered in the scope and final report. Add to the Annex a typed anonymised list of attendees of the consultation meetings, along with the stakeholder they represent.
- Formulate suggestions for future SESAs and ESIs for stakeholder engagement. Both in terms of who should be engaged (key authorities, affected groups, informal sector) and for overcoming possible challenges (see section 3.6 of this advice).

Considering the trust that needs to be built between citizens and the government, the NCEA recommends that the MoE encourages future SESA processes to be used as catalyst to start building such trust. This will require a robust approach, including a stakeholder analysis and a detailed plan to engage them in the assessment and implementation of environmental and social mitigation plans, as well as the sharing of full information.

²⁹ Which may relate to limited access to people and areas under the current security conditions, lack of interest under prevailing economic crisis etc.

3.6 Guidance for future SESAs and ESIAs

In general terms, the SESAs level of detail corresponds with the high abstraction level of the strategy. Not all issues can or need to be studied in larger extent at this level. Nevertheless, it would be helpful if this SESA provides the framework and guidance to upcoming SESAs and ESIAs in the waste management sector. The report does include some useful elements that can be considered in future assessment, these are however scattered and not complete. The SESA does for example not include the site exclusion and site selection criteria, which can be used in future ESIAs.

Recommendations

Consolidate the insights from this SESA, complemented by the points and recommendations elsewhere in this advice, into a section which outlines:

- Limitations to this SESA, an overview of existing studies and gaps in knowledge, additional studies required.
- The scope of future SESAs for sub-sector or decentral waste management plans.
- The mandatory and suggested components for the scope of future ESIAs. Also include the site exclusion and selection criteria of the strategy in the SESA.
- Recommendations for stakeholder engagement and plans.

4. Detailed findings

4.1 Biodiversity

The SESA pays consistent attention to biodiversity. Still, the NCEA observes some gaps:

- The effects of **noise and odours on wildlife** are not referred to consistently. It is unclear whether the objectives for noise and odours (EO3) also take into account permissible limits related to biodiversity. In cases where solid waste management infrastructure is located near protected areas, such limits need to be established and promulgated by legislation. The guidance and measures section does not include recommendations to avoid or mitigate effects, or formulate indicators to monitor the effect of noise and odours on wildlife.
- There is no clear consideration of **habitat fragmentation** and the impacts thereof on biodiversity (section 6.2.3.5 p 145), nor in the monitoring indicators (Table 6-5 page 159).
- The guidance and measures section (6.3.5 p156) lacks a recommendation on the **continuous monitoring of ecosystem health** (marine, freshwater and terrestrial).

Recommendations

Add to the SESA mitigation measures and monitoring indicators on the following:

- Necessity to establish permissible limits for noise and odours for protected areas.
- Potential impacts from noise, odours and habitat fragmentation on biodiversity.
- Continuous monitoring of ecosystem health near all waste management infrastructure.

4.2 Water pollution

The SESA (Table 2–6 p60) proposes that the leachate produced in solid waste treatment facilities is either treated on site or is discharged into the municipal wastewater system. The SESA also acknowledges that municipal wastewater systems are not adequately functioning in Lebanon. Adopting the proposed recommendation may thus result in pollution of the water bodies where the wastewater is discharged. Therefore, this proposed recommendation for leachate treatment needs to be refined.

Recommendations

- Suggest that leachate treatment is to be properly implemented on site of a waste treatment facility, unless a wastewater treatment plant is available with the capacity to deal with leachate.
- Regardless the location of treatment, leachate should always reach national or international standards before being disposed into a water body.

4.3 Site exclusion criteria

The site exclusion criteria present a clear framework that will guide future investments and ESIA's. The NCEA has the following comments, which are based on existing guidelines on solid waste management and landfills³⁰:

- It is not made explicitly clear, how the proposed distances are determined for the site exclusion.
- **Environmental Criteria 3:** the term 'coastline' is generally used to describe approximate boundaries at relatively large spatial scales. Using the term 'shoreline', as determined by Lebanese legislation would be more appropriate, which generally describes the precise location of the boundary between land and water. A distance of 1 km instead of 500m from the shoreline would be more appropriate.
- **Environmental Criteria 6:** it is unclear why the minimal distance to water supply is proposed at 200m as this distance could be too close to ensure their protection. In the case of rivers, lakes, streams and other water sources a minimum of 500m from the edge of the water body seems more appropriate.
- **Environmental Criteria 7:** proposes that waste management facilities are located 'outside' protected areas and areas of increased ecological significance. It should be explicitly stated that the buffer zones of these areas also fall under legal protection. It should also be taken into consideration that facilities located adjacent to buffer zones may have an adverse effect on areas under protection. In addition, the numbers on the protected areas and areas of increased ecological significance mentioned are outdated.
- **Environmental Criteria 8:** proposes to locate waste facilities 'outside' forest areas. When located adjacent to forest areas, facilities may have adverse effects on these forests.

Recommendations

As suggested before, include the site exclusion and selection criteria in the SESA. In addition, consider the following on to the site exclusion criteria:

³⁰ U.S Environmental Protection Agency (EPA) Landfills and Solid Waste Disposal Guidelines (EPA 40 CFR Part 258), World Health Organisation (WHO) Solid Waste Management in Coastal Areas and the European Union (EU) Landfill Directive 1999/31/EC (revised by the Directive (EU) 2018/850 of 30 May 2018).

- Explain how the distances were determined.
- EC3: change the term 'coastline' into 'shoreline' and set the distance to at least 1 km.
- EC6: set the distance from a water supply zone at least at 500m
- EC7: change the criteria 'outside' into a distance of at least 500m from the buffer zone and 1km from the core zone of protected areas and areas of ecological significance. Consult the MoE to update the numbers on protected areas or preferably; remove these numbers from the comments as they are constantly subject to change.
- EC8: change the criteria 'outside' forests into a distance of at least 500m.

4.4 Other details

Below is a list of observations which are detailed but which could be relevant. The NCEA recommends that these issues are considered and addressed:

- In the legislative framework, no reference is made to Decree No 2366 of 2009 defining the Comprehensive Plan for Lebanese Territory Arrangement. This Decree will be relevant for site selection of the waste infrastructure.
- Waste generated from acts of war (which usually include hazardous and other type of material like asbestos) and natural hazards are not given attention.
- The SESA refers to studies and intentions to integrate the informal sector into the strategy. They are also considered as an actor for capacity building. Currently, very little information is given on the extent of the informal sector, number of people involved and what conditions need to be put in place to allow for their integration. This information needs to be generated and considered in future plans and investments.
- It is noted that both the SESA and the strategy lack clarity on the types of waste streams that are included in the presented waste generation figures. Although most figures refer to 'household wastes' or 'municipal solid wastes', the presented volumes also seem to include other waste streams like construction and demolition and non-hazardous industrial waste. This lack of clarity is partly caused by the different terms used, but also because different waste streams are mixed during collection and/or treatment and disposal, which may complicate obtaining reliable data on waste streams. It is therefore recommended that the SESA specifies the uncertainties in the presented waste generation figures, so that these can be taken into account when planning for treatment capacities.
- The monitoring indicator for the soil (Table 6-5 p 159) suggests to monitor soil quality (Ph, chemical indicators). This only covers one environmental objective for soil (p 31, EO1B reducing soil pollution). There is no monitoring indicator for the second objective (EO1A) which is to preserve the quantity and quality of soils.
- Section 6.4.3 (p 159) lacks an indicator, to monitor the environmental objective (EO4C) 'Energy and fuel savings to increase RES exploitation'.
- Table 7.1 (p 164) suggests that capacity building activities are undertaken for MoE staff for implementing the strategy. Also other ministries will play (to different degrees) a role in the successful implementation of the strategy. For example the Ministries of Industry, Agriculture, Public Health, Transport and Public Works and Education. Building capacity in these ministries should also be considered, according to their mandates, roles and needs.