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Low Emissions Development Program

MULTIPLE BENEFITS ASSESSMENT FRAMEWORK FOR LOW EMISSIONS DEVELOPMENT PROJECTS:

A How-to Guide

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WHY ARE MULTIPLE BENEFITS ASSESSMENTS USEFUL?

One of the challenges that policymakers face in promoting and justifying low emissions development (LED) or 'green economy' projects is effectively articulating and quantifying the positive socio-economic benefits that LED projects produce. To understand and quantify the benefits to the local community and environment arriving from LED projects, SA-LED developed a multiple benefits assessment methodology designed to measure benefits that resulted from LED interventions under SA-LED support.
Multiple benefits assessments have become increasingly important tools for the implementation of LED projects worldwide, especially in light of heightened awareness of accounting for economic, social, and environmental impacts in development. The information collected through these assessments can be used to align LED projects with national development goals, encourage investment in LED programs, and inspire further LED projects to effectively address mitigation and development mandates.

HOW SA-LED DEVELOPED AND APPLIED THE MULTIPLE BENEFITS ASSESSMENT TO LED PROJECTS

SA-LED's "multiple benefits assessment" framework is based on the Initiative for Climate Action Transparency (ICAT) tool, global sustainable development goals, and U.S. Environmental Protection Agency indicators for assessing multiple benefits. The ICAT provides policymakers globally with tools and support to measure and assess the impacts of their climate actions. It aims to help governments build capacity to measure the effects of their policies and report progress publicly to foster greater transparency, effectiveness, trust, and ambition in climate policies. Drawing from international best practices and contextualized to South Africa, SA-LED focused on the areas presented in Figure 1, below, as indicators of multiple benefits of LED.

Figure 1. Multiple Benefits

Social Impacts
- Employment for women and youth
- Training and empowerment of staff
- Livelihood enhancement
- Associated businesses and jobs

Environmental Aspects
- Water use
- Greenhouse gas and other emissions
- Waste management
- Land use change

Social Redress and Community Resilience
- Redressing past social and economic injustices
- Fit within the local municipal development plan

To further refine the methodology, SA-LED involved its partners and incorporated input from the Program's Advisory Committee. Specifically, SA-LED:

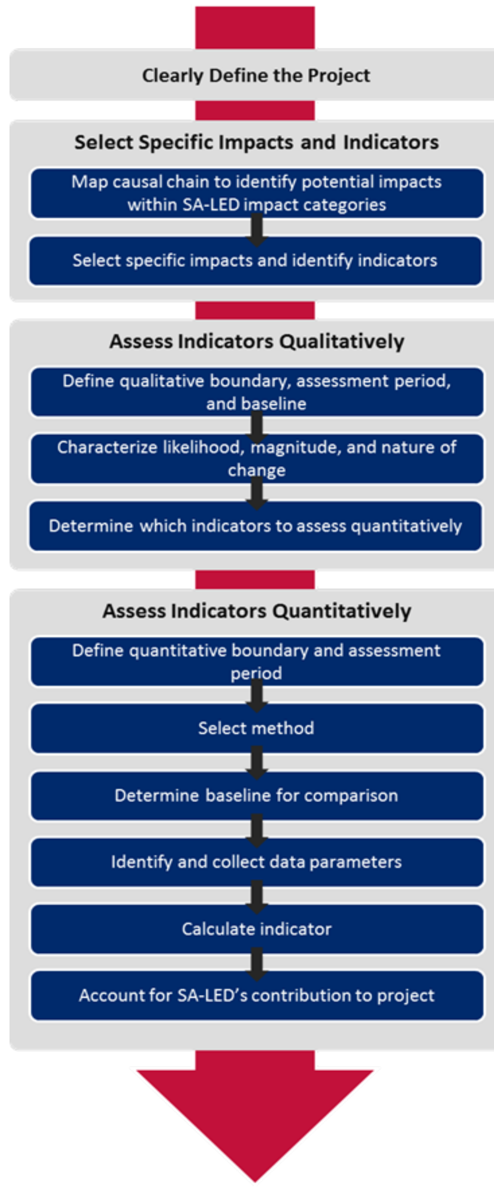
1. Determined the scope of assessment required to track development impacts related to greenhouse gas (GHG) mitigation interventions

2. Researched the international body of work completed related to multiple benefits of GHG mitigation interventions such as the Sustainable Development Goals
3. Selected applicable and relevant aspects that aligned with SA-LED's objectives
4. Contextualized the Framework and the qualitative and quantitative indicators for application in South Africa
5. Iteratively updated, and refined the Framework based on lessons learned from assessing specific LED projects

SA-LED's multiple benefits assessment is flexible because it can be applied to a variety of projects and it allows assessments to proceed within their context. As a result, emphasis can be placed on the impacts that are relevant for the local context or specific LED project. Additionally, if data is not available to allow for quantitative evaluation of indicators, a qualitative assessment can still be undertaken.

SA-LED applied the framework to assess the multiple benefits of ten LED projects that were supported by the Program. To provide context to conducting a multiple benefits assessment, examples from SA-LED's assessment of the Waste Characterization and Karoo Catch Fish Farm projects are integrated below.

Figure 2: SA-LED Multiple Benefits Assessment Framework



APPLYING SA-LED'S MULTIPLE BENEFITS ASSESSMENT FRAMEWORK

SA-LED's multiple benefits assessment framework involves four steps (see Figure 2) to assess the costs and benefits of pursuing a potential LED project.

STEP 1: DEFINE THE PROJECT SCOPE, AND BASELINE AND PROJECT SCENARIOS

To begin, first define the project to determine the scope of the multiple benefit assessment. The scope includes the **inputs**, **outputs**, and **processes** that will be assessed. Next, define the **baseline scenario** (i.e. existing conditions or business-as-usual) for comparison to the **project scenario** (i.e. proposed interventions, enhancements, changes, etc. to a facility, project, processes, etc.). Figures 2 and 3 below illustrate SA-LED's **baseline** and **project** scenarios for the Program's multiple benefits assessment of the Waste Characterization project that was aimed at diverting green waste from a landfill in the Garden Route District Municipality (previously known as the Eden District Municipality). The **baseline scenario** (landfill without composting) is defined as the Municipality's new regional landfill site if it did not have a composting facility. This scenario assumes that all organic waste goes to landfill, where it could produce GHG emissions from methane. The **project scenario** (enhanced local organic waste management scenario) is defined as the Municipality's new regional landfill facility with organic waste diverted from the landfill to a composting facility. This has the potential to reduce GHG emissions from methane, produce fertilizer, and create jobs (construction jobs to build the facility and jobs related to producing and distributing fertilizer).

Figure 2: Baseline Scenario – Landfill Without Composting

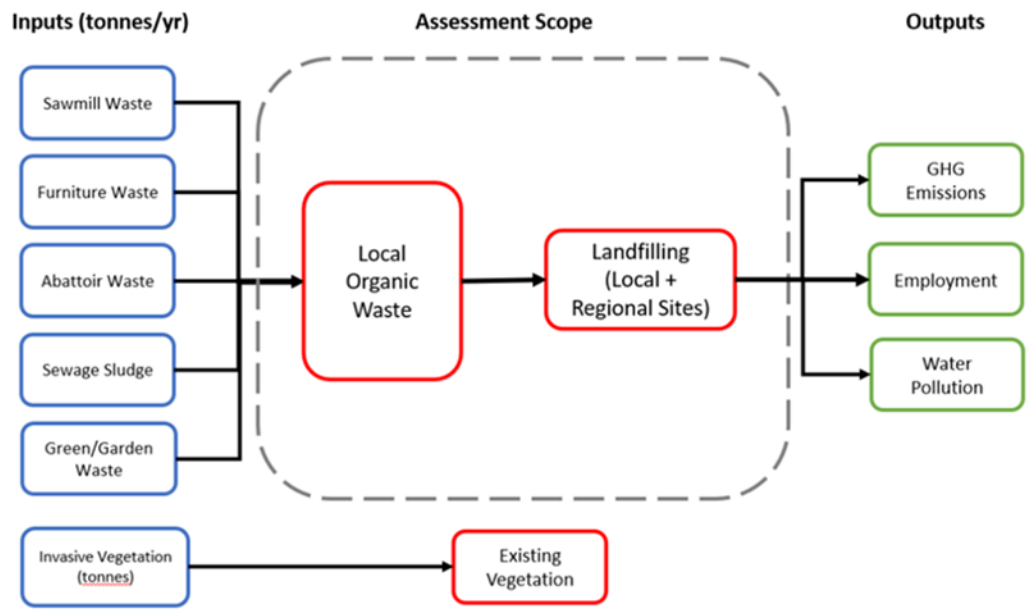
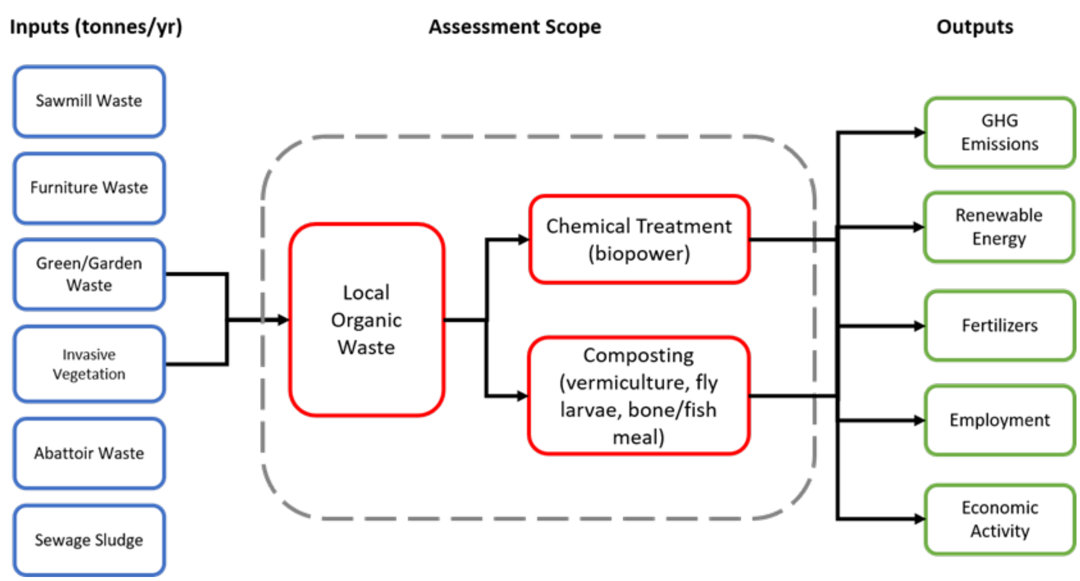


Figure 3: Project Scenario – Enhanced Local Organic Waste Management Scenario



STEP 2: SELECT SPECIFIC IMPACTS AND INDICATORS

SA-LED identified five key impact categories for inclusion in the multiple benefits assessments:

1. **Gender**: tracking gender impacts make it possible to determine the LED project's impact on opportunities for women and their participation in decision-making. ICAT suggests indicators including average income of women, gender wage gap, proportion of women in the labor force, and proportion of women in senior management positions to assess the impact of the project.
2. **Youth**: similar to gender, tracking impacts by age make it possible to determine the LED project's impact on opportunities for youth employment and their participation in decision-making. While ICAT provides limited guidance on youth impacts, gender impacts can be tailored to impacts on youth.
3. **Jobs**: job impacts from LED projects include direct (on-site), indirect (supply chain), and induced impacts. Methods for estimating these impacts range from rule-of-thumb jobs multipliers and screening models, to more sophisticated approaches such as input-output, econometric, computable general equilibrium models, and hybrid models.
4. **Energy Efficiency and GHG Mitigation**: LED projects can improve the energy efficiency of an activity or generate clean energy for consumption, both of which result in the mitigating GHGs from fossil fuel consumption.
5. **Other Environmental Impacts**: LED projects can help mitigate soil and water degradation and pollution.

Each impact category covers a wide range of impacts that can be measured using different indicators. To focus on the impacts that are most relevant and significantly affected, identify and select specific impacts in each impact category and identify appropriate indicators to measure each specific impact.

2.1. MAP THE CAUSAL CHAIN TO IDENTIFY POTENTIAL IMPACTS WITHIN THE KEY IMPACT CATEGORIES

Causal chain diagrams show how different processes within the project scope lead to the development of different outputs, and thus, how changing the processes can change the outcome of the outputs. Using **baseline** and **project scenarios** developed in Step 1, develop causal chain diagrams that link specific processes to other processes and outputs. Next, compare the project scenario causal chain diagram to the business-as-usual scenario. Figures 4 and 5 demonstrate the business-as-usual causal chain diagram for SA-LED's assessment of the Water Characterization project, and how the process within the project scope (blue boxes) lead to the outputs (green boxes).

Figure 4: Waste Characterization Business-as-Usual Causal Chain

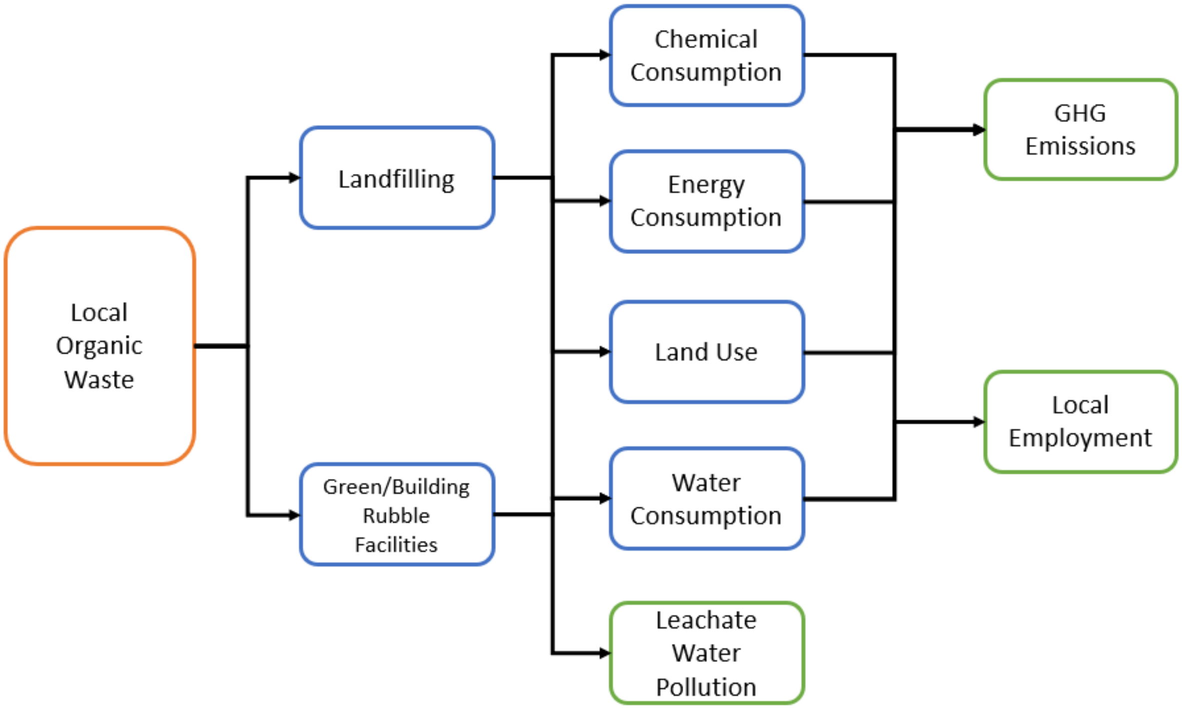
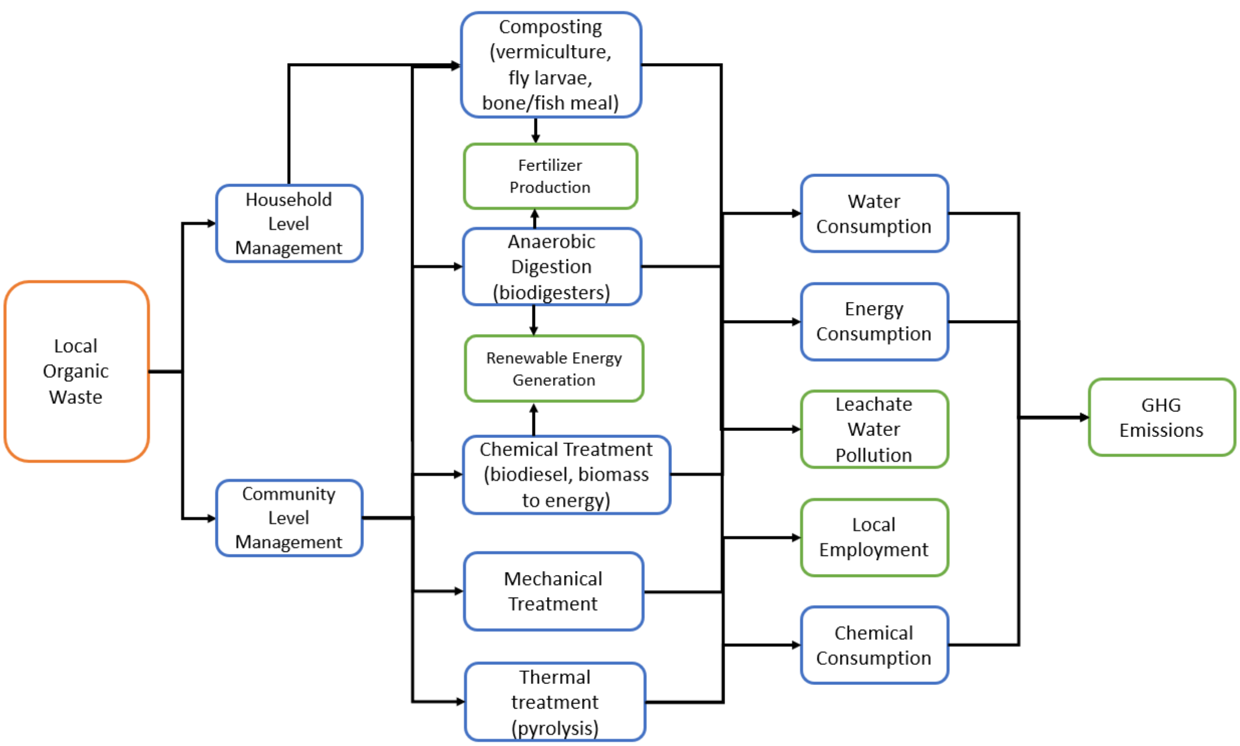


Figure 5: Waste Characterization Enhanced Local Organic Waste Management Scenario



2.2 SELECT SPECIFIC IMPACTS AND IDENTIFY THE INDICATORS

Next, use the causal chains to identify the impacts that fit into the key impact categories (gender, youth, jobs, energy efficiency and GHG mitigation, and other environmental impacts). **Error! Reference source not found.** below lists examples of these key impact categories and the associated impacts and indicators.

Table 1. Examples of indicators and parameters formed from impact categories

Impact Categories	Specific Impacts	Indicators	Parameters
Youth Gender ***Jobs***	Increase in direct jobs Increase in indirect jobs ***Increased skills/training***	Trainings held People trained ***Person-hours of training***	List of events Length of event Number of attendees

From the five key impact categories, select the impacts to assess and develop them into indicators. ICAT also provides detailed definitions of indicators in its "Targets & Indicators" section. The full list of indicators, as well as South Africa-specific indicators, can be found on the ICAT website.

STEP 3: ASSESS THE INDICATORS QUALITATIVELY

3.1 DEFINE QUALITATIVE BOUNDARY, ASSESSMENT PERIOD, AND BASELINE

Elements that constitute an LED project will differ between project partner, location, and context. The qualitative boundary frames the project, most often beyond the technical intervention. It is essential to make a clear statement on which measurables (qualitatively and quantitively) are included within the boundary and why, and why others are excluded. At this stage of the assessment, ensure assumptions and measurables are clearly motivated and defined.

Next, apply the project scenario from Step 1 and causal diagrams from Step 2 into the selected indicators. Assess each indicator for annual impacts and benefits. The items in this step are defined as:

- **Qualitative boundary**: temporal, spatial, and/or process boundaries used to define the indicator.
- **Assessment period**: the time period for assessment (e.g., annual or monthly).
- **Baseline**: the scenario with which to compare to the project scenario.

3.2 CHARACTERIZE LIKELIHOOD, MAGNITUDE, AND NATURE OF CHANGE

For each indicator, characterize the likelihood, magnitude, and direction of change or impact qualitatively or quantitatively through methods such as research, interviews, and expert judgment. An indicator is deemed "significant" based on its likelihood and magnitude.

Table 2 shows the six conditions (shaded orange) that would result in a "significant" rating for an indicator.

Table 2. Significance Matrix (highlighted boxes correspond to significant impacts)

		Magnitude		
		Major	**Moderate**	**Minor**
Likelihood	**Very likely**	High	High	Medium
	Likely	High	Medium	Low
	Possible	High	Medium	Low
	Unlikely	High	Medium	Low
	Very unlikely	Medium	Low	Low

3.3 DETERMINE WHICH INDICATORS TO ASSESS QUANTITATIVELY

Depending on the amount of available data for a specific indicator per sector, as well as the significance of the indicator for development impact, you may decide which indicators to assess quantitatively. A job created in the formal solar PV sector is not the same as a job created in the agricultural sector. The projects resulting in the specific outcomes may itself be a learning curve and needs to be described qualitatively. The not-measurable-but-meaningful impacts of projects are thus included in a narrative, qualitative manner. Quantitative indicators may be the most significant indicators, or those for which baseline and project scenario data are available, yet the qualitative indicators often tell the development impact story.

STEP 4: ASSESS THE INDICATORS QUANTITATIVELY

Using the same scoping parameters (i.e., project components, boundary, and assessment period), assess the remaining indicators quantitatively as follows:

4.1 SELECT METHOD

The ICAT guidance provides two options for assessing indicators quantitatively. The difference lies in the availability and certainty of a correct baseline from which to measure indicators. In some cases, the project has clear beginnings, baseline data, people, energy-use statistics, etc., from which change can then be projected and measured. In the deemed estimates method, a clear baseline information and data may not be available, and change will have to measured differently.

- **Scenario method**: Separately define, estimate, and compare a baseline scenario with a policy scenario for the same group or region
- **Deemed estimates method**: Directly estimate the change resulting from a policy or action without separately defining and estimating baseline and policy scenarios

4.2 DETERMINE BASELINE FOR COMPARISON

A quantitative assessment of the baseline should be conducted for comparison between the project and baseline scenarios. For each indicator, determine its energy-related, environmental, and/or social impacts before implementing the project scenario.

4.3 IDENTIFY AND COLLECT DATA PARAMETERS

Use existing **data sources** and tools for the assessment, like reports and GHG accounting tools. Consider conducting interviews with experts and local stakeholders, which can be a valuable method for closing data gaps and better characterizing impacts and benefits.

4.4 CALCULATE INDICATORS

Similar to quantitatively determining the baseline scenario, calculate the project scenario of each indicator. Measure each indicator by subtracting the baseline from the project result (e.g., GHG emissions produced before and after project implementation) to determine the overall change on that indicator due to project intervention. For example, SA-LED produced the summary in Table 3 of quantitative impacts for the Karoo Fish Farm.

LESSON LEARNED

Data collection proved to be one of the key challenges and lessons learned by SA-LED in conducting multiple benefits assessments. An effective assessment requires the collection of information on both the sector in which the project falls, as well as project-specific information. Every project will have its own unique data collection challenges and opportunities. The type of information sources that proved useful to SA-LED included:

- Interviews using standardized questionnaire with projects owners
- Site visits
- Project documents supplied by project owners or managers
- Web-based information on the sector
- Proxy data for innovative technologies and sectors
- Globally accepted figures for GHG

Table 3. Summary of Impacts for the Karoo Fish Farm Project

Indicator	Change
Total annual GHG emissions	-8,600 tons CO2e/year
Number of employees under 35 years	89 youth employees
Number of women employees	76 women employees
Total number of employees	105 jobs
Number of Karoo Catch employees trained and Level 1 qualified at NQF	11 trained and Level 1 NQF-qualified employees
Quantity of water discharged while cleaning the filters	4,500 m^3/month
Total renewable solar electricity generated	72,359 kWh/year
Number of people fed by Karoo Catch production	65,000 people/year
Amount of reused solid waste	30 tons/month
Amount of locally produced nutritious fish protein	720 tons/year

CONCLUSION

Upon completing the assessment, the entire assessment or portions (such as the summary of impacts) can be used to support municipal or LED project decision making, encourage investment in or budget allocation for LED projects, and aid in the expansion of existing LED projects. Moreover, as demonstrated by SA-LED's comparative analysis of six LED projects the Program supported (see Table 4 below), conducting a variety of assessments and comparing them can allow decision makers to choose from a menu of LED projects that fit their specific needs.

Table 4: SA-LED's Comparative Analysis Across Multiple Benefits Assessments of Six LED Projects

Indicator Categories	Karoo Catch	Biogas at Schools	Municipal Solar PV	Angora Goat Farming	Garden Waste Compost	Abattoir Waste use for black fly feeding
Jobs	114 new jobs. 11 new staff trained.	1 Job per school. 13 production Jobs.	16 New jobs. 7 new jobs for youth.	Not Applicable	124 permanent new jobs.	2 permanent new operation and maintenance jobs. 53 new single-year construction jobs.
Energy Consumption and GHG Emissions	97% reduction in GHG emissions.	170 tons of CO_2e avoided per year. 100000 kWh biogas energy produced.	1,800 tons of CO_2e avoided per year. 1,770 MWh of electricity generated annually.	24% reduction in GHG emissions per ton of mohair produced.	11,500 tons of CO_2e avoided per year.	5,700 tons of CO_2e avoided per year. 1,800 MWh of electricity generated annually.
Other Environmental Impacts	4,500m3 increase in water use per month. Smaller land and water use per kilogram of protein production.	6 Tones in organic waste reused per year. Improved soil quality.	Not Applicable	18% increase in water used per month.	Avoided water use and leachate pollution from replacing chemical fertilizers with digestate.	290 tonnes of digestate fertilizer per year. Avoided water use and leachate pollution by replacing chemical fertilizers.
Social Impacts	76 new jobs for women. 89 new jobs for youth.	Reduction in human health risks.	Not Applicable	Not Applicable	Reduction in human health risks from safe disposal.	Reduction in human health risks from safe disposal.

Indicator Categories	Karoo Catch	Biogas at Schools	Municipal Solar PV	Angora Goat Farming	Garden Waste Compost	Abattoir Waste use for black fly feeding
Cost Savings	Not Applicable	R11000 per year per school.	R725000 average annual saving for the municipality.	9% increase in electricity bill per month.	Sale of R37 per ton of waste into the market.	R313,000 average annual cost savings.
Solid Waste Impacts	Less abattoir waste per kilogram of protein produced.	6 Tons of organic waste per year avoided.			Additional 10 years in landfill lifespan. 32,000 tons of abattoir waste diverted annually.	Additional 3 years in landfill lifespan. 9,700 tons of abattoir waste. diverted annually.

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