Terminal Evaluation of the UN Environment-GEF Project "Delivering the Transition to Energy Efficient Lighting in Chile and GEF ID 5150" (2016-2019)

Evaluation Office of the United Nations Environment Progamme

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Delivering the Transition to Energy Efficient Lighting in Chile
GEF Project ID 5150
08/2020

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ABOUT THE EVALUATION[1]

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Brief Description: This report is a terminal evaluation of a UNEP-GEF project implemented between December 2015 and May 2019. The project aimed to promote the rapid uptake of high energy efficient lighting technologies (mainly light-emitting diodes or LEDs) in Chile through the transformation of the efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions.

Key words: Project Evaluation; Climate Change; TE; Terminal Evaluation; GEF; GEF Project;

[1] This data is used to aid the internet search of this report on the Evaluation Office of UNEP website

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List of acronyms and abbreviations

AChEE	Chilean Energy Efficiency Agency
ANESCO	Asociación Nacional de ESCOs Chile (ESCOs National Association)
AWP	Annual Work Plan
CC	Climate Change
CA	en.lighten Country Assessment
CCM	Climate Change Mitigation Results Framework (GEF)
CDM	Clean Development Mechanism
CHEM	Chemical Mitigation Results Framework (GEF)
CFL	Compact Fluorescent Lamp
CLA	Country Lighting Assessment
CRSO	Collection Recycling System Organization
EE	Energy Efficiency
ENIE	Estrategia Nacional de Iluminación Eficiente (National Efficient Lighting Strategy)
ESCO	Energy Service Company
ESL	Electron Stimulated Luminescence
FCH	Fundación Chile
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEFTF	Global Environment Facility Trust Fund
GELC	Global Efficient Lighting Centre
GW	Gigawatt
GWh	Gigawatt-hour
Hg	Mercury
hr	Hour
HID	High-Intensity Discharge lamp
HPS	High-Pressure Sodium lamp
INV	Investment
ktCO2	kiloton of carbon dioxide
kWh	kilowatt-hour
LA	Latin America
LCR	Latin America and Caribbean Region
LED	Light Emitting Diode
M&E	Monitoring and Evaluation
MEPS	Minimum Energy Performance Standards
MMA	Ministry of Environment Chile
MoE	Ministry of Energy Chile
MTS	UNEP Medium-Term Strategy
MVE	Monitoring, Verification and Enforcement
MW	Megawatt
NAMA	Nationally Appropriate Mitigation Action
NCRE	Non-Conventional Renewable Energy
NGO	Non-Governmental Organization
NLTC	National Lighting Test Center China
NPD	National Project Director
OFP	GEF Operational Focal Point

PCB	Poly Chlorinated Biphenyls
PIF	Project Identification Form
PM	Project Manager
PMC	Project Management Cost

PMU	Project Implementation Unit
PPEE	Programa País de Eficiencia Energética (Energy Efficiency National Program (2005 – 2010))
PPG	Project Preparation Grant
PSC	Project Steering Committee
PTR	Project Terminal Report
S&L	Standards and Labeling
SEC	Superintendencia de Electricidad y Combustibles Chile (Superintendency of Electricity and Fuels)
SERNAC	Servicio Nacional del Consumidor (Consumer National Agency)
STAP	Scientific and Technical Advisory Panel
tCO_2	ton of Carbon Dioxide (-equivalent)
TA	Technical Assistance
TJ	Terajoule
TL	Tubular Fluorescent Lamp
TWG	Technical Working Group
TWh	Terawatt-hour
UNDAF	United Nations Development Action Framework
UNDP	United Nations Development Programme
UNEA	First UN Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollar
yr	year

Table 1: Project Identification Table

Sub-programme:	Climate Change	**Expected Accomplishment(s):**	MTS 2010-2013: Para 35a[2] MTS 2014-2017: CC - EA 2[3]
UN Environment approval date:	30 October 2015	**Programme of Work Output(s):**	PoW Output 3[4]
GEF project ID:	5150	**Project type:**	Full-size project
GEF Operational Programme:	5	**Focal Area(s):**	Climate Change
GEF approval date:	8 July 2015	**GEF Strategic Priority:**	CCM-1:Technology Transfer Promote the demonstration, deployment, and transfer of innovative low-carbon technologies CCM-2: Energy Efficiency: Promote market transformation for energy efficiency in industry and the building sector CHEM-3: Pilot sound chemicals management and mercury reduction
Expected start date:	November 2015	**Actual start date:**	4 January 2016
Planned completion date:	November 2018	**Actual completion date:**	May 2019
Planned project budget at approval:	US$ 11,905,556	**Actual total expenditures reported as of 30 June 2019**	US$ 14,758,367
GEF grant allocation:	US$ 2,485,713	**GEF grant expenditures reported as of 30 June 2019:**	US$ 2,266,464
Project Preparation Grant - GEF financing:	US$ 22,830	**Project Preparation Grant - co-financing:**	US$ 0
Expected Full-Size Project co-financing:	US$ 9,419,843 (in-kind)	**Secured Project co-financing:**	US$ 15,364,119
First disbursement:	18 December 2015	**Date of financial closure:**	n/a
No. of revisions:	3	**Date of last revision**	31 December 2018
No. of Steering Committee meetings:	3	**National Steering Committee meetings:**	1st Steering Committee Meeting (SCM) at the Inception workshop: 23.03.2016 2nd SCM: 12.12.2016 3rd SCM: 8.6.2017 4th SCM: 28.11.2017 5th SCM: 9.8.2018 6th SCM: 5.12.2018
Mid-term Review/ Evaluation (planned date):	n/a	**Mid-term Review/ Evaluation (actual date):**	n/a
Terminal Evaluation (planned date):	October 2018	**Terminal Evaluation (actual date):**	October 2019
Coverage - Country(ies):	Chile	**Coverage - Region(s):**	Chile

[2] Expected Accomplishment in Para 35 (b) states that "countries make sound policy, technology and investment choices that lead to a reduction in GHG emissions and potential benefits, with a focus on clean and renewable energy sources, energy efficiency and energy conservation".
[3] Expected Accomplishment 2: "Energy efficiency is improved and the use of renewable energy is increased in partner countries to help reduce greenhouse gas emissions and other pollutants as part of their low emission development pathways".
[4] Output 3: "Tools and approaches designed and piloted in countries to develop mitigation plans, policies, measures, and low emission development strategies, and spur sector investment and innovation within and across selected sectors".

Dates of previous project phases:	"The Global Market Transformation for Energy Efficient Lighting project" ("en.lighten initiative")	**Status of future project phases:**	Fundación Chile, on behalf of the Government of Chile, is executing a similar GEF/UN Environment project who could be considered a continuation of this project regarding Energy Efficiency but it is focused on efficient residential refrigerators. The project "Leapfrogging Chilean's markets to more efficient refrigerator and freezers" (GEF ID 9496, GEF budget: USD 1,473,762) was launched in August 2018 (Agreement signed in May 2018).

Executive Summary

Project Background

The UNEP-GEF Project entitled "Delivering the transition to energy efficient lighting in Chile" (herein referred to as the "ChEEL", or "Project") is a carry-over of the "Global Market Transformation for Energy Efficient Lighting project" (referred to as "the en.lighten initiative"), a global umbrella initiative for all GEF efficient lighting projects designed to accelerate global market transformation to sustainable lighting technologies. ChEEL was designed utilizing the technical foundations built from the en.lighten initiative that had support mechanisms under "United for Efficiency" (U4E)[5]. With ChEEL being implemented by UNEP under its Economy Division, Energy & Climate Branch and executed by Fundación Chile in Santiago, Chilean regulators and regional bodies were to get exposure to global policies, strategies and actions to accelerate the phase-out of inefficient lighting appliances and equipment, and to receive assistance to apply an integrated policy approach to sustain a Chilean market transformation towards energy efficient lighting.

Key aspects of the baseline scenario during the commencement of ChEEL (as of late 2015) include:

- Increasing grid emission factors for the 2 main grid systems in Chile in the range of 0.432 MWh/tCO_{2e} and to 0.811 MWh/tCO_{2e}, respectively;
- Utility companies buying power from the wholesale market for sale to end-users;
- Growth of electricity consumption estimated at 7% annually, equating to the addition of over 8 GW of new electricity generation by 2020 to meet expected energy demands;
- The Government of Chile's 2012 National Energy Strategy (NES) and Energy Efficiency Action Plan 2012-2020 (PAEE 2020) were adopted to achieve a 12% decrease in the projected electricity demand for 2020, as a measure to mitigate Chile's import of fossil fuel for energy resources at escalating prices;
- A "Chilean Energy Efficiency Standards and Labeling Program" (Programa Nacional de Etiquetado de Eficiencia Energética en Chile or PNEEE) was already in place under the Energy Efficiency National Program (PPEE) and with the Fundación Chile. This included a regulatory framework for technical regulations and procedures for electrical products including certification systems and procedures for lighting devices and other electrical products, delegation of authority to the Superintendency for Electricity and Fuels (Superintendencia de Electricidad y Combustibles or SEC) to authorize and supervise the program, adoption of international energy efficiency test procedures as Chilean Standards (Normas Chilenas – NCh), and mandatory energy efficiency labelling implemented for all lighting devices and other common household electrical appliances;
- The Government of Chile (GoC) promoting the transition to efficient lighting as a pillar of its NES and PAEE 2020;
- the National Efficient Lighting Strategy (Estrategia Nacional de Iluminación Eficiente or ENIE) being in place with a Phase I focus (2013-15) on eliminating incandescent lamps, and a Phase 2 focus on accelerating LED use, using GEF resources from ChEEL;
- Ongoing education and communication programs and Chilean lighting market studies by various agencies including the Agency for Energy Efficiency (AChEE) under the Ministry of Energy and sales data provided by lamp suppliers, such as Philips and Osram.

[5] https://united4efficiency.org/countries/chile/

For ChEEL to achieve this accelerated market transformation in Chile towards LEDs, a number of barriers to more widespread energy efficient lighting in Chile were identified in 2015 including:

- a general lack of technical knowledge on cost, benefits and environmental aspects of lighting products;
- testing labs and certification bodies not investing in the testing of lamps and lighting devices due to the perceived small market with lamp suppliers faced with insufficient testing capacity when needed;
- the absence of regulations regarding sustainable management of lamp residues, in particular mercury recovery and an extended responsibility to lighting manufacturers;
- no systems in place for collecting lamp waste and processing it in large volumes for recycling and mercury recovery;
- residential consumers not fully aware of the benefits of LEDs over its lifetime and shying away from LEDs due to their high initial price;
- lack of consumer confidence in LEDs due to a lack of market surveillance to ensure LEDs for sale are in compliance with regulatory standards; and
- lack of consumer knowledge on how to read and interpret the information provided on energy labels, especially when introduced for new technologies (such as LEDs), notwithstanding similar past campaigns. This applies to LED lifetime benefits and characteristics (versus incandescent lamps and CFLs).

Purpose of Terminal Evaluation

This Terminal Evaluation was undertaken to assess the performance of ChEEL towards its intended **objective** of "promoting the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions". The purposes of this Terminal Evaluation were to provide evidence of ChEEL results to meet accountability requirements, and to promote operational improvement, learning and knowledge sharing through results and lessons learned from UN Environment, Fundación Chile (FCH) and other executing partners.

Key issues for this Terminal Evaluation (Para 10) includes:

- The degree of success of ChEEL interventions to overcome identified barriers, gaps and challenges to the transformation of the lighting market in Chile while it promotes the rapid uptake of high-energy efficient lighting technologies;
- The extent of factors as identified by this evaluation as the key assumptions to achieve the desired impact (and address the challenges in efficiency-energy lighting market transformation) and their sustainability during the post-project period;
- The existing opportunities that have already been set in motion to stimulate replication or a catalytic effect of positive outcomes and best practice experiences within the country and/or region; and
- Identification of any unintended results from ChEEL implementation, and if so, characterizing how this would affect the intended impact.

Responses to these key issues were influenced by a number of Project specific factors (Para 11):

- The receptiveness of key Chilean Government ministries to ChEEL project outputs, and their responses to utilizing these outputs towards an energy efficient lighting market;
- The effectiveness of institutional and management arrangements of ChEEL and the capacity of the execution agency, Fundación Chile, to effectively coordinate with the Ministry of Energy and other relevant ministries to advance key Project outputs;

- ChEEL support to effectively raise awareness and achieve the consensus of policymakers, consumers and the private sector to increase the market share of energy efficient lighting through LEDs and lighting controls;
- The effectiveness of building local capacities to undertake Monitoring, Verification and Enforcement (MVE) activities that have accelerated the adoption of EE lighting systems, maximized energy savings and GHG emission reductions, and are in compliance with the Extended Producer Responsibility (EPR) Law.

To gauge the soundness of logic in the ChEEL design, this Terminal Evaluation undertook a **Theory of Change** (ToC) approach to identify the Project's intended impacts that would be achieved through outcome-impact pathways (Para 7). These pathways were evaluated against the Project Results Framework (PRF) as a means of assessing the likelihood of achieving intended impacts. A review of the ChEEL PRF was also conducted to evaluate the clarity of the indicators to be monitored to achieve an intended outcome and impact, and to suggest clarifications, simplifications and edits of the original indicators towards SMART indicators and targets.

Evaluation Findings

Overall, the performance of the ChEEL Project is rated as satisfactory. This can be attributed to ChEEL being effective in its efforts to promote the rapid uptake of high energy efficient LEDs through strengthening of the regulatory environment, demonstrating LED use in public buildings and residences, and augmenting local capacities for monitoring, verification and enforcement (MVE). This has resulted in ChEEL meeting and exceeding its objective-level lifetime direct GHG emissions reduction target (of 22,275 tCO_{2e}) and lifetime direct energy saved target (49 GWh or 176,400,000 MJ) by a factor of more than 5 (Para 55).

Underpinning the drivenness of the GoC were its efforts to implement their aforementioned National Efficient Lighting Strategy or ENIE with LEDs. Through the utilization of ChEEL resources, an integrated policy approach was implemented to:

- develop MEPS and labelling systems for energy efficient LEDs and lighting systems. ChEEL resources were used to expose local stakeholders to the best international practices for developing minimum energy performance standards (MEPS) for lighting devices and unified labels that would increase the availability of high-quality energy efficient lighting devices in Chilean market. With the assistance of the professional network of the UNEP en.lighten team, the Ministry of Energy has been able to accelerate its development of a lighting MEPS and a unified labelling system into a National Energy Efficiency Law to be implemented in mid-2020 (Para 71);
- MVE systems to ensure maximized compliance to MEPS for LEDs that would be managed by several trained personnel within the SEC who would ensure minimal presence of "free-rider" lighting devices on the Chilean market. The MVE system would also be backed by CESMEC, Chile's primary certified testing lab for lighting devices that is able to efficiently and accurately determine compliance of lighting devices on the Chilean market for safety and MEPS (Para 71);
- formulating support mechanisms and policies to avail and promote the demand for highly energy efficient lighting devices in the Chilean market. The promotional successes of ChEEL can be highlighted by the "Cambia el Foco" campaign throughout the duration of ChEEL that was initially held in public schools but later supported by municipalities, retailers, the electric utility (ENEL), lighting suppliers, the Chilean press and social media. This only served to increase demand and sales of LEDs that reduced LED prices to an extent where they were the same prices as CFLs by EOP, eventually convincing consumers that LEDs represented the best value for serving lighting needs. In addition, there was broad cooperation amongst these stakeholders on market surveillance activities to ensure the prevention of non-compliant lighting devices into the Chilean market (Para 68); and
- set up frameworks for enacting an Extended Producer Responsibility Law, obligating producers and suppliers of waste electronic goods to dispose inefficient waste lamps in an environmentally sound manner. This resulted in an agreement with a consortium of 16 companies to form and finance a "Collection Recycling System Organization" or CRSO to begin operations in 2021 on a pilot basis

(Para 72). While ChEEL was able to enable the GoC to enact a national EPR Law, it did not have the requisite time to fully achieve the intended outcome for enacting and enforcing and EPR Law. Considering the time to prepare such legislation (that would time to collect baseline information on current practices in managing e-waste in Chile), the 3-year period of ChEEL to enable the GoC to enact as well as enforce the EPR Law appears overly ambitious.

Lastly, ChEEL has created significant interest in the sale of LEDs through retail outlets and ENEL, based on market information from the Ministry of Energy stating the market share of LEDs in Chile has grown from 2% in 2016 to 40% in 2019 (and exceeding ChEEL's EOP target of 17% market share). This can be attributed to the dramatic increase in availability of quality LEDs in Chile facilitated by the project's awareness raising campaigns and effective information dissemination programmes, and the government's driven-ness ensure the necessary legislation is promulgated with energy efficiency labelling and MEPS for lighting devices in place.

While ChEEL has focused mainly on the residential sector and vulnerable groups for efficient lighting, the Ministry of Energy is positioned well to promote efficient lighting to the commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. Moreover, a number of ChEEL actions can be and are being replicated for rapid uptake of efficient lighting and other highly energy efficient electronic devices in Chile such as refrigerators (using the 4 demo program models mentioned in Para 68 and management arrangements on another UNEP-GEF project in Chile as mentioned in Para 102, 6th bullet). The Government of Chile has institutions and agencies to manage such processes but will likely require periodic inputs of international expertise to ensure compliance to best international practices.

Recommendations and Lessons Learned

The following recommendations are being made to the Government of Chile that are intended to achieve full market transformation of the Chilean energy efficient lighting market:

- Continual training is required to sustain the capacities of market surveillance personnel to identify a broad range of qualities of LEDs and other electronic devices such as service life and product materials (Recommendation #1). This is important to sustain confidence of Chile's consumers on the quality of energy efficient equipment that falls under its Energy Efficiency Strategy;
- There needs to be sustained resources available for dedicated training of electricians for the installation of lighting systems as well as for updating of best practices (Recommendation #2);
- Future EE lighting initiatives should focus on EE lighting for commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. Lessons from deployment models for the residential sector under ChEEL can be considered for these sectors wherever appropriate with time required to develop approaches. This may include a business-to-business transaction for changing of lighting systems that could would minimize the down-time of a commercial or industrial entity (Recommendation #3);
- The Ministry of Environment should seek a linkage for the provision of international best practices for managing other WEEE waste streams, similar to the ChEEL approach to building local capacity for CRSOs for inefficient waste lamps (Recommendation #4).

Continued involvement of UNEP is recommended by approaching the GoC through:

- the Ministry of Energy to identify technical assistance needs to bring best practices to implement the National Energy Strategy; and
- the Ministry of Environment to identify its desired approaches for environmentally sound management of a wider range of waste streams of WEEE and technical assistance needs (Recommendation #5).

Key lessons learned (see Para 114 for more details) include:

- To provide the highest likelihood of a successful project, the management arrangements for a project need to include an execution entity that can be viewed as an honest broker and can foster a collaborative and transparent working relationship amongst partners that maximizes their participation and influence to achieve the project objective (Lesson #1);
- Preparing precise and specific ToRs for consultant inputs is necessary and time consuming to provide effective and efficient consulting inputs for a project (Lesson #2);
- Project teams tasked with developing and delivering draft national legislation should be more efficient if the team consisted of national and international consultants with national consultant’s prime responsibility being to provide a local context to the work and the international consultant complementing the local context into the work (Lesson #3);
- It is important that a MEPS proposal is developed before any energy labelling proposal for electronic appliances (Lesson #4);
- Successful market transformation activities need to involve public and private sector support to lower the barrier to the high cost of a new electrical appliance (Lesson #5);
- Maximizing the leverage of a demonstration can be achieved through careful and thoughtful designs that place the demonstration in strategic locations to maximize exposure of the technology being demonstrated (Lesson #6);
- The duration of a project needs to carefully consider the time required to achieve all the intended direct outcomes. For example, the outcome of enacting and enforcing a national Law appears too ambitious for a 3-year project implementation period (Lesson #7).

1 Introduction

1. The UNEP-GEF Project entitled "Delivering the transition to energy efficient lighting in Chile" (herein referred to as the "ChEEL", or "Project") was implemented by UN Environment under its Economy Division, Energy & Climate Branch, and executed by Fundación Chile in Santiago, Chile. The ChEEL Project was supported by a GEF grant of US$2,485,713 and commenced operations in January 2016 with an intended completion date of 31 December 2018. This was designed as a 36-month project but was extended another 5 months to 31 May 2019.

2. This GEF project Terminal Evaluation was conducted 5 months after the date of operational completion. The aim of this Evaluation is to assess the overall ChEEL Project as described in the June 2015 Project Document for "**Delivering the Transition to Energy Efficient Lighting in Chile"**. The Evaluation consists of an evaluation of GEF Project support:

- for technical assistance and institutional support for strengthening of local capacities to monitor, verify and enforce the standards to facilitate the transition to an efficient lighting market;
- to enable the Government of Chile's to enact and enforce a national policy that extends responsibilities of sound environmental management to lighting producers;
- to facilitate consumers, decision makers in government and the private sector to reach consensus on the increased use of solid-state lighting and lighting controls in domestic, commercial/industrial and outdoor lighting applications; and
- to increase the awareness of consumers and decision makers of the economic benefits of advanced lighting systems through demonstration programmes.

3. The Terminal Evaluation for the ChEEL Project was conducted by Mr. Roland Wong serving as the independent evaluation consultant.

1.1 Evaluation objectives

4. In line with the UN Environment Evaluation Policy[6], this Terminal Evaluation was undertaken at completion of the ChEEL Project to assess its performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the activities of the Project including sustainability. This Terminal Evaluation serves two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote operational improvement, learning and knowledge sharing through results and lessons learned from UN Environment, Fundación Chile (FCH) and other executing partners. Therefore, the Evaluation is intended to identify lessons of operational relevance for future project formulation and implementation.

1.2 Evaluation approach and methodology

5. This Evaluation was conducted using a participatory approach where key stakeholders were kept informed and consulted throughout the process. To deliver evidence-based qualitative and quantitative information, the collection of data and information was sourced from available key project documentation, desk studies, literature reviews, meetings with individuals and focus groups, surveys and direct observations. Documentation was provided by Project personnel in Paris and Santiago. The evaluation methodology consisted of:

- A review of Project documents;
- Re-examination of the Project Results Framework (PRF) against which Project performance is

[6] http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationPolicy/tabid/3050/language/en-US/Default.aspx

evaluated, followed by the re-construction of a Theory of Change;

- Skype briefings with personnel at the offices of UN Environment Global Environment Facility (GEF), Climate Change Mitigation Unit in Paris, France, and with Fundación Chile prior to mission travel to Santiago to meet with ChEEL stakeholders;
- Mission travel to Chile for meetings with the Project Management Unit (PMU) at the FCH Office and Santiago-based stakeholders;
- De-briefing with FCH in Santiago on mission findings;
- Follow-up phone conversations, emails and reporting writing from home base; and
- A period of additional gathering of information, validation of findings and editing of the draft report to reflect factual accuracy of the findings.

6. Steps were undertaken to enhance stakeholder engagement and the quality of consultation: i) interviewees were informed about the Evaluation's aims and informed of the expectations of the evaluation; ii) open-ended questions were used to promote balanced reflection, generate new insights, and yield higher quality information (as opposed to yes/no questions or an 'audit' approach); and iii) interviewees were assured of the anonymity and confidentiality of their input whenever deemed appropriate.

7. This Terminal Evaluation employs a **Theory of Change** (ToC) approach that was conducted to identify the Project's intended impacts through an analysis of the Project's outcomes-impact pathways. These pathways were evaluated against the Project Results Framework (PRF) as a means of assessing the likelihood of impact. The review of the ChEEL PRF included an evaluation on the clarity of the indicators to be monitored to achieve an intended outcome and impact. This review has resulted in the identification of a need for clarifications, simplifications and edits of the original indicators towards SMART indicators and targets. This is further discussed in Section 2.8.

8. The primary limitation to this Evaluation includes the limited time period to interview a critical mass of key stakeholders who could provide information on the effectiveness of technical assistance being provided by ChEEL as listed in Para 2. The time limitations were exacerbated by the commencement of unexpected civil unrest in Santiago on the first day of the Terminal Evaluation mission on 18 October 2019, severely limiting the mobility of the Evaluator to meet a number of key ChEEL stakeholders throughout the metropolitan area of Santiago. Moreover, the meetings with some of the key stakeholders were shortened due to security concerns in Central Santiago. The impact on the Evaluation was the difficulty in triangulating the evaluation findings with other stakeholders, though the performance of the Project made this a minor issue. In addition, the meetings with FCH were much more extensive than planned, making up for the lost opportunities for meeting a wider range of ChEEL stakeholders to the extent that sufficient information was gathered to more confidently assess the likelihood of impact of the legislation, policies and demonstrations setup by ChEEL, primarily in Santiago.

1.3 Main evaluation criteria and questions

9. The evaluation assesses the project performance against 9 criteria: (1) strategic relevance; (2) quality of project design; (3) nature of external context; (4) effectiveness, which comprises assessments of the achievement of outputs, achievement of outcomes and likelihood of impact; (5) financial management; (6) efficiency; (7) monitoring and reporting; (8) sustainability; and (9) factors affecting project performance. The Evaluation follows the guidance provided by the Evaluation Office of UN Environment in 2017 with evaluation criteria being adapted as required.

10. The assessment of Project performance was based on key strategic issues identified within the evaluation framework[7] including:

[7] These questions were in line with the strategic questions provided in the evaluation ToR and were revised/ specified to better serve the purpose of the evaluation

- The degree of success of ChEEL interventions to overcome identified barriers, gaps and challenges to the transformation of the lighting market in Chile while it promotes the rapid uptake of high-energy efficient lighting technologies;
- The extent of factors as identified by this evaluation as the key assumptions to achieve the desired impact (and address the challenges in efficiency-energy lighting market transformation) and their sustainability during the post-project period. This may include sustained consumer perceptions of the cost-benefits of LEDs or the continuance of certification bodies to provide services to manufacturers and retailers on the quality of LEDs entering the Chilean market;
- The existing opportunities that have already been set in motion to stimulate replication or a catalytic effect of positive outcomes and best practice experiences within the country and/or region;
- Identification of any unintended results deriving from ChEEL implementation, and if so, characterizing how this would affect the intended impact.

11. Responses to these key issues were influenced by the following Project specific factors:

- The receptiveness of key Chilean Government ministries to ChEEL project outputs, and their responses to utilizing these outputs towards an energy efficient lighting market;
- The effectiveness of institutional and management arrangements of ChEEL and the capacity of the execution agency, FCH, to effectively coordinate with the Ministry of Energy and other relevant ministries to advance key Project outputs;
- The support of the Project to effectively raise awareness and achieve the consensus of policymakers, consumers and the private sector to increase the market share of energy efficient lighting through LEDs and lighting controls;
- The effectiveness of building local capacities to undertake Monitoring, Verification and Enforcement (MVE) activities that have accelerated the adoption of EE lighting systems, maximized energy savings and GHG emission reductions, and are in compliance with the Extended Producer Responsibility (EPR) Law.

2 Project Background

2.1 Context

12. According to the Project Document, the Government of Chile requested the UNEP en.lighten team (currently part of the United for Efficiency-U4E team, within the Energy and Climate Branch) to provide technical support in delivering certain activities[8]. Based on this request, a budget and workplan for this GEF grant were split. Fundación Chile managed and executed US$ 1,868,365 and the remaining US$ 617,348 managed and executed by the UNEP en.lighten team to provide the requested targeted technical support.

13. The ChEEL Project is a carry-over of the "Global Market Transformation for Energy Efficient Lighting project" (referred to as "the en.lighten initiative"), a global project designed to accelerate global market transformation to sustainable lighting technologies. ChEEL has been designed on the momentum built by the technical support from the en.lighten initiative that also serves as a global umbrella initiative for all GEF efficient lighting projects. With the en.lighten initiative falling under the support mechanisms of "United for Efficiency" (U4E)[9], Chilean regulators and regional bodies were to get exposure to global policies, strategies and actions to phase-out inefficient appliances, equipment and lighting. This included an emphasis on an integrated policy approach to support a sustained transition by the Chilean market without continued external support or resources. The objectives of the 2013-2017 phase of en.lighten were the sale of Class A lamps (on an energy efficiency scale from A to G), application of MEPS for tubular, circular and compact fluorescent lamps (CFLs), and raised awareness of advanced lighting technology (improved halogen and LED). The ChEEL design (implemented from January 2016 to May 2019) focused on the accelerated adoption of updated LED lighting technology, and the setting of more stringent MEPS for Chile to adopt higher standards of EE lighting.

14. A number of barriers to more widespread energy efficient lighting in Chile was identified including:

- a general lack of technical knowledge on cost, benefits and environmental aspects of lighting products;
- testing labs and certification bodies not investing in the testing of lamps and lighting devices due to the perceived small market, while lamp suppliers are faced with insufficient testing capacity when needed;
- no control or regulations exist regarding sustainable management of lamp residues, in particular mercury recovery coupled with no regulations regarding extended responsibility of manufacturers;
- no collection system in place and no companies that would be able to process large volume of lamp waste for recycling and mercury recovery;
- residential consumers are not fully aware of the benefits of LEDs over its lifetime and shy away due to the high initial price of LEDs vs CFLs vs incandescent lamps and perceived different lamp characteristics (such as start-up time, color, temperature);
- a lack of market surveillance specifically for LEDs to ensure compliance with regulatory standards and boost consumer confidence in LEDs and

[8] Activities as mentioned in page 50 of the CEO Endorsement Document request technical support from the UNEP en.lighten team on the assessment of the status of the existing national testing capacities, and proposal for strengthening labs and testing capacities; assessment of the status of the existing lighting safety and efficiency tests in the national labs, and proposal for improvement; design of an operational framework and strategy for collection, recycling and disposal of used lamps; development of labels and/or MEPS for LED lamps; and training related to different elements of the three components of the project.

[9] https://united4efficiency.org/countries/chile/

- lack of consumer knowledge on how to read and interpret the information provided on the energy label, especially when introduced for new technologies (such as LED), notwithstanding similar past campaigns. This applies to LED lifetime benefits and characteristics (versus incandescent lamps and CFLs).

The level of mitigation of these barriers was assessed during the Evaluation.

Baseline Scenario of ChEEL

15. The baseline for the ChEEL Project as of late 2015 can be characterized as follows:

- Increasing grid emission factors for the 2 main grid systems in Chile that includes the Central Interconnected System and the Great North Interconnected System increasing to 0.432 MWh/tCO_{2e} and to 0.811 MWh/tCO_{2e}, respectively;
- Utility companies buy power from the wholesale market and supply it to electricity customers;
- Growth of electricity consumption estimated at 7% annually, equating to the addition of over 8 GW of new electricity generation by 2020 to meet expected energy demands;
- With Chile predominantly being an importer of fossil fuel for energy resources (recently importing fossil fuels at high prices resulting in higher electricity prices), the Government of Chile (GoC) focused on reducing energy demand by 12% in 2020 and increasing renewable energy to 10% by 2020 in its 2012 National Energy Strategy (NES);
- Plans for reducing energy demand were defined in the Energy Efficiency Action Plan 2012-2020 (PAEE 2020), developed by the division of Energy Efficiency at the Ministry of Energy to achieve the aforementioned goal of a 12% decrease in the projected electricity demand for 2020, decreasing Chile's expected energy demand by 1,122 MW. Actions in the PAEE 2020 were to be undertaken by both public and private sectors;
- In 2005, the Chilean Energy Efficiency Standards and Labeling Program (Programa Nacional de Etiquetado de Eficiencia Energética en Chile or PNEEE) was created as a strategic activity under the framework of the Energy Efficiency National Program (PPEE) and with the Fundación Chile. Outputs from PNEEE included:
    - a regulatory framework outlining requirements for development, adoption and application of technical regulations and procedures for electrical products, certification systems and procedures for electrical products, and delegating the authority of the Superintendency for Electricity and Fuels (Superintendencia de Electricidad y Combustibles or SEC) to authorize and supervise the certification and inspection bodies, test laboratories and certification procedures;
    - adoption of international energy efficiency test procedures as Chilean Standards (Normas Chilenas – NCh) for a range of appliances and equipment;
    - mandatory energy efficiency labelling implemented for all lighting devices and other common household electrical appliances;
- The GoC promoting the transition to efficient lighting as a pillar of its NES and PAEE 2020. This actually commenced in 2007 with the Ministry of Energy spearheading campaigns disseminating information on the proper use of energy highlighting the use of energy efficiency labels facilitating the choice of efficient lighting devices. With technical and policy support from the en.lighten initiative during 2012-13, the GoC (under the Ministry of Energy with technical support from Fundación Chile) developed and adopted in 2013 the National Efficient Lighting Strategy (Estrategia Nacional de Iluminación Eficiente or ENIE);

- Ongoing education and communication programs by ChileCompra, SERNAC and the Agency for Energy Efficiency (AChEE) under the Ministry of Energy, with support from international organizations;
- Completion of a number of Chilean lighting market studies including the Ministry of Energy (Estudio de Usos Finales y Curva de Oferta de Conservación de la Energía en el Sector Residencial de Chile based on a nation-wide residential survey in 2010), and UNEP en.lighten project (Evaluación Nacional de Iluminación, Country Lighting Assessment, based on sales data provided by lamp suppliers, such as Philips and Osram in 2010);
- ENIE being in place with the objectives of contributing towards the PAEE 2020 goal of reducing energy demand by 12% in 2020, reducing GHG emissions by 20% in 2020, and controlling the level and limiting the release of mercury in lighting products into the environment;
- The ENIE focus between 2013 and 2015 was for eliminating the incandescent lamps. A Phase 2 ENIE sought to accelerate the use of LEDs, using GEF resources from ChEEL. This was approved in 2015 as the Ministry of Energy's Hogar Eficiente program where the communication campaign of this program promoted LED technology (instead of CFL technology) as a means of meeting the PAEE targets for reducing energy demand.

2.2 Project Objectives and Components

2.2.1 Objectives

16. To accelerate the adoption of high energy-efficient lighting products in the Chilean market as a means of rapidly reducing Chile's energy consumption and related GHG emissions, the ChEEL Project was designed with the **objective** of "promoting the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions". To achieve this objective, ChEEL sought to:

- support technical assistance and institutional capacity building to strengthen local capacities to monitor, verify and enforce the standards that will facilitate the transition to an efficient lighting market;
- enable the Government of Chile to enact and enforce a national policy that extends responsibilities of sound environmental management to lighting producers and suppliers;
- facilitate consumers, decision makers in government and the private sector to reach consensus on the increased use of solid-state lighting and lighting controls in the domestic, commercial/industrial and outdoor lighting applications; and
- increase the awareness of consumers and decision makers of the economic benefits of advanced lighting systems through demonstration programmes.

2.2.2 Components

17. The ChEEL Project consisted of 3 components:

- Component 1: Strengthening monitoring, verification and enforcement (MVE) capacities to ensure an effective transition to efficient lighting markets: This component consisted of technical assistance to relevant government authorities and customs personnel to build their capacities to monitor, verify and enforce efficient lighting standards. This would have included assistance to government personnel to set the standards based on best international practices, increasing the knowledge of a wide spectra of government personnel on these new standards and regulations, and national testing laboratories to provide them the capacity to verify compliance these new standards;

- Component 2: Ensuring an environmentally sound management and sustainable transition to efficient lighting: This component was designed to enable the Government of Chile to enact and enforce a national policy that influences user behaviour towards energy efficient lighting combined with extended responsibilities to lighting manufacturers for the proper disposal and recycling of old and inefficient lamps. The technical assistance provided under this component included the development of the national framework and strategy for lighting suppliers and producers to comply with environmentally sound management of lighting products, training for governmental authorities, retailers and collection services on compliance with this national framework, development of a business model for a Collection Recycling System Organization (CRSO) for old and inefficient lamps to be disposed, and the provision of awareness raising and communication campaigns that promote collection and recycling of old and inefficient lamps;
- Component 3: Lighting innovation: accelerating the use of solid state lighting (including light emitting diodes (LEDs) and controls): This component was designed to support domestic, commercial, industrial and outdoor lighting applications that would bring more confidence to consumers and decision makers as well as private sectors to increase the market share of solid state lighting and lighting controls in the Chilean lighting market. Technical assistance provided included improvements to the ENIE Strategy with more stringent MEPS for lighting devices, and the set up an organization of a market surveillance team to ensure high quality compliant lighting devices on the Chilean lighting market.

2.3 Target Areas/Groups

18. The stakeholders of the ChEEL Project are key players essential to the transformation of the lighting market in Chile. More broadly, stakeholders of ChEEL are a broad coalition of public institutions, accreditation agencies, NGOs and private sector entities who supply and sell lighting devices. Some of the more important stakeholders listed in the Project Document are listed in the following paragraphs.

19. Personnel from **public sector** institutions:

- Chilean Agency for Energy Efficiency (Agencia Chilena de Eficiencia Energética, AChEE) was set up, hereby transforming the energy efficiency program PPEE into a separate non-profit agency. Its mission is to "promote, strengthen and consolidate the efficient use of energy, through partnerships with relevant actors at the national and international level, and implementing public-private initiatives in different sectors of energy consumption, contributing to the competitive and sustainable development of the country". The Board of Directors of AChEE is chaired by a representative of the Ministry of Energy, and includes representatives of the Ministry of Finance, industrial associations and universities;
- Superintendency for Electricity and Fuels (Superintendencia de Electricidad y Combustibles, SEC) has been a decentralized state entity since 2010 related to the Ministry of Energy. SEC's primary function is to "control, inspect and supervise the observance of legal and regulatory stipulations, and technical standards regarding the generation, production, storage, transport and distribution of liquid fuels, gas and electricity" (Article 2 of Law No 18.410). With respect to standards and labelling, SEC is in charge of developing technical regulations (Form 2005), in particular in the area of product testing and certification of safety and efficiency. In its role as control and inspection entity, SEC is in charge of verifying compliance of certified and labelled products with the respective specifications and regulations. SEC also authorizes and controls the certification bodies which participate in the program. They have access to the Custom's database to crosscheck compliance but do not undertake retailer checks;
- Instituto Nacional de Normalización (INN) is Chile's National Standardization Institute, responsible for the development and publication of all Official Chilean Standards. INN is a member of the international standardization body, ISO, and develops and issues Official Chilean Standards (NCh) through their Standards Division that includes energy efficiency test procedures, and adoption of

international reference standards. INN's Certification Division acts as an accreditation body for certification bodies and test laboratories; and

- The Ministry of Environment, through its Circular Economy Office, responsible for reducing the environmental impact related to waste generation and promoting a Circular Economy which proposes a change in the linear systems of production, businesses and consumption, incorporating the eco-design, the reuse, recycling and valorization. This Office implements EPR Law 20.920 and fosters an environment of innovation within a regulatory framework and other tools towards achieving a circular economy. The Ministry was created in 2010, replacing the National Commission for Environment. The National Climate Change Action Plan (Plan de Acción Nacional de Cambio Climático 2008-2012; PANCC) described the national climate change strategy, amongst other responsibilities such as environmental and waste management regulations (inclusive of reduction of waste, recycling, re-use, treatment and final disposal of residues in an environmentally sound manner). A proposed Law of Extended Producer Responsibility was drafted by this Ministry for promulgation by National Congress on 2015. The Ministry of Environment is also responsible for national implementation of the Minamata Convention Agreement in Chile with dedicated full-time staff.

20. Personnel from **private sector entities**: This would include:

- Dartel[10], the largest distributor of electrical equipment in Chile and ENEL[11] each launched their own e-commerce site where they have LED lamps for sale for the Cambia el Foco campaign (see Figure 1 and Para 68 for details);
- Philips, one of the largest suppliers of lighting devices to Chile and globally, who provided co-finance and technical assistance to the design of the ChEEL Project;
- COPEC, who managed Philips' national campaign through Cambia el Foco at the end of May 2018.

21. **Project beneficiaries** including Liceo Pablo Neruda in Arica, Luis Calvo Mackena Hospital, Museum of Memory and Human Rights, the City of Santiago, City of Cerro Navia, the Cristo Vive Foundation, the Intendance Metropolitan region building, and the Cousiño Palace where 906 lamps saved 85 MWh and avoided 34 ton of CO_2 annually.

[10] https://www.dartel.cl/index.php/iluminacion/ampolletas-y-fluorescentes/ampolletas-led.html

[11] https://www.tiendaenel.cl/57-iluminacion-led

Figure 1: Cambia el Foco outreach

2.4 Milestones in Project Design and Implementation

22. Table 2 presents the milestones and key dates in the ChEEL Project design and implementation.

Table 2: Milestones and key dates in ChEEL Project design and implementation

Milestones	Applicable dates
Preparation grant approved	7 March 2013
Concept approved (under GEF-5)	1 April 2013
Approval of Project by GEF	8 July 2015
Actual commencement date	4 January 2016
Inception workshop	22 March 2016
Law of Extended Producer Responsibility promulgated.	April 2016
FCH attendance at the Professional LED Symposium (Austria) and the CE 100 Event (Brazil)	September 2016
Ambilamp training for Ministry of Energy, Ministry of Environment, FCH and selected recycling companies on lighting waste management in Spain (under Component 2)	20-25 November 2016
Seminar in Santiago (for important Government stakeholders and the public) on main lighting technology trends from international perspective	16 December 2016
Ministry of Energy announcement that their programmes to deliver energy efficient light bulbs would be LEDs	January 2017
Online lighting market study was conducted with 13 LED models tested in CESMEC laboratory.	March 2017
Training session on certification systems in Chile for lighting manufacturers and a enforcement mechanisms based on market surveillance (based on the experience in Mexico and Report on MVE scheme.	April 2017
Workshop on amended Law 18.410 and regulations for lighting manufacturers and certification bodies	19 July 2017
New SEC team dedicated to online market surveillance	January 2017

Milestones	Applicable dates
Visit to MABE/CANAME to Mexico to transfer their experience on market surveillance platform model	August 2017
Recycling of fluorescent lamps and CFLs implemented on a Component 3 activity in Santiago and Cerro Navia by ECOSER (mainly safe mercury extraction and disposal).	July 2017-June 2018
Training at the Global Efficient Lighting Centre GELC (China) on certification processes, standards and norms for LED lighting and testing protocols with laboratory practices.	January 2018
Creation of a lighting commission leading by CORNELEC with the participation of the main lighting brands in Chile and a self-declaration platform to facilitate market monitoring	August 2017
COPEC and Philips' national campaign with Cambia el Foco	May 2018
International expert the national consultant developing study to implement the Extended Producer Responsibility (EPR) law for electrical and electronic equipment.	June 2018
Completion of study to develop background economic analysis of the collection of electrical and electronic devices named in Law 20.920	May 2019
4 Lighting replacement projects and 2 mass deliveries of light bulbs to the community with energy efficiency training have taken place	June 2018
Halt to distribution of more light bulbs under in government program due to the change in the Government of Chile	November 2018
MEPS proposal for EE Labeling and quality specifications and LED lamps and other efficient technologies posted for public consultation[12]	17 October 2019
Terminal date of ChEEL Project	31 May 2019

2.5 Implementation Arrangements and Project Partners

23. The ChEEL Project implementation arrangements consisted of:

- a Project Steering Committee (PSC) that was to guide and provide oversight to technical progress and performance of the Project, and facilitate and optimize contributions from various partner organizations by coordination of all activities and inputs;
- a Project Management Unit (PMU) comprised of personnel from Fundación Chile who was to serve as the Executing Agency. The PMU was to consist of a Project Manager (PM) partially supported with GEF funds and partially by Executing Agency co-financing, Technical Advisors (partly funded by GEF) were to provide advice and guidance on selected project topics, and support staff. The PM was also to be responsible for the day-to-day project operations, financial accounts, periodic reporting to UNEP and the PSC and for allocation of the GEF grant according to the quarterly and annual work plans and budgets in coordination with UNEP and Ministry of Energy, and serve as secretary of the PSC;
- short-term consultants to assist with specific technical areas within each of the 3 ChEEL project components;
- a Technical Working Group (TWG) is formed consisting of the government entities participating in PSC, power distribution utilities, ESCOs Association, private sector (lamp representatives, importers/distributors and retailers) as well as consumer organizations, universities/institutes and NGOs to interact with stakeholders at the institutional level.

These arrangements are illustrated on Figure 2.

24. The United Nations Environment Programme (UNEP) serves as the GEF Implementing Agency for ChEEL, responsible for the supervision of project execution to ensure consistency with GEF and UNEP policies and procedures and overall project reporting. UNEP was also to formally participate in steering

[12] https://members.wto.org/crnattachments/2019/TBT/CHL/19_5705_00_s.pdf

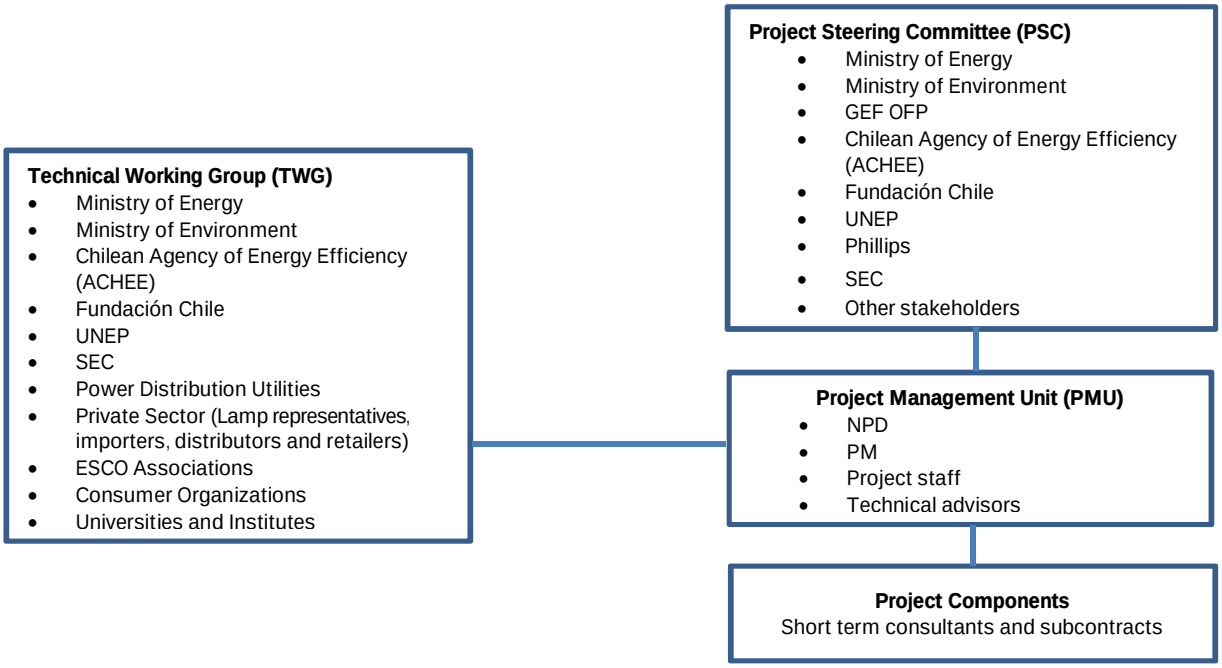
committee meetings and terminal evaluations, clearance of half yearly and annual reports, technical review of project outputs, and additional technical assistance for the execution of the project as may be requested. The Ministry of Energy designated Fundación Chile[13] as the executing body, and to be accountable to the Government and UNEP/GEF for ensuring:

- proper achievement of the objectives of the Project;
- monitoring and evaluation of the project outputs and outcomes;
- more efficient use of allocated international and national resources due to its autonomous status and ability to more quickly execute service and procurement contracts outside the public sector;
- project has the required administrative support through FCH's own protocols, accountability and audits;
- timely availability of financing to support project implementation;
- proper coordination among all project stakeholders, in particular inter-ministerial dialogue; and
- timely submission of all project reports, including work plans and financial reports.

25. Key partners of the ChEEL Project include:

- Ministry of Energy charged with oversight of energy efficiency in Chile, namely the Efficient Lighting Strategy (ENIE). In their role of policy formulation and oversight of enforcement mechanisms, this Ministry spearheaded campaigns to disseminate information on the proper use of energy while also providing consumer advice on choosing efficient light bulbs;

Figure 2: ChEEL Implementation Arrangements



[13] Fundación Chile is a non-profit organization with more than eight years supporting the public and private initiatives on energy efficiency (with the public and BHP on the Board of Directors) with a mandate to improve Chile through innovations and new ideas.

- The Superintendency for Electricity and Fuels (SEC), a decentralized state entity related to the Ministry of Energy, and responsible for the country's generation of electricity, and developing technical regulations under a standards and labelling regime, in particular with product testing and certification of safety and efficiency;
- Ministry of Environment through its Circular Economy Office, and responsible for proposing policies and formulating plans, programs and action plans in the area of waste management that under this project would include responsible disposal of inefficient light bulbs in an environmentally sound manner under a proposed "Law of Extended Producer Responsibility".

2.6 Project Financing

26. Total ChEEL Project cost in the 2015 Project Document was US$11,905,556. This cost has been broken down into the GEF grant of US$2.486 million and co-financing of US$9.42 million as detailed in Table 3.

2.7 Changes in design during implementation

27. Due to the strength of the ChEEL Project design, there were few changes in the ChEEL design during implementation. This was partially due to the Project being associated and benefitting from the expertise available from the UN Environment Global en.lighten project. Only a few changes in the ChEEL design were made during implementation including:

Table 3: Project budget summary

Particulars	Amount (USD)
Ministry of Energy	5,600,000
Ministry of Environment	50,000
Fundación Chile	369,843
UN Environment	100,000
Osram	1,500,000
Philips Lighting	1,500,000
National Lighting Test Center, China (NLTC)	300,000
Total Co-financing of the ChEEL Project	**9,419,843**
GEF grant to UN Environment	2,485,713
Total Cost of ChEEL Project	**11,905,556**

- Technology change from CFLs to LEDs due to changes in the conditions of the lighting market when LEDs became the preferred technology. This was a change initiated by the GoC due to the GoC agenda to reach their 12% targets of the PAEE, under AChEE that was recently renamed as the Sustainability Energy Agency;
- Dropping of Activity A.7 (under old Output 1.1.4 – MVE Actions) "Development of a lighting NAMA or other climate financial tools". Despite the terms of reference for a NAMA consultant being posted in August 2016, there were no applications from relevant experts. Moreover, many of the Project's stakeholders were of the opinion that the most appropriate means of sustaining market transformation to efficient lighting was improve support to pilot projects under Component 3 instead of a NAMA;
- Adding an activity to collect data for the general assessment of social and economic impact for the Ministry of Environment (under Output 2.1.1 - National framework and strategy developed for environmentally sound management of lighting products). This new activity approved by the PSC in June 2017 was to allow the Ministry of Environment to conduct the social and economic impact

assessment of a proposed EPR Law for electronic and electrical devices and thus accelerate the operationalization of the EPR Law;

- Activity b.4 "Local counterpart for the design of an implementation plan for the CRSO and local public or private initial investors identification" was removed to amplify the scope and the impact of the CRSO proposal through a participative process led by U4E international expert in REP Law implementation for Electrical and Electronic Equipment.

2.8 Reconstructed Theory of Change of the Project

28. A Theory of Change (TOC) for a project essentially describes the roadmap of developmental pathways driven by regulatory or market drivers in combination with project activities to reach intended project outcomes as well as long-term outcomes to reflect the sustainability of the project activities. No TOC was prepared for the ChEEL Project Document. However, ChEEL did have a Project Results Framework (PRF) that is assessed in Paras 52-53 that indicates the need for a link between the current indicators and targets and the delivery of intended outputs of the project.

29. Table 4 presents the Programmed Activities and corresponding planned Outputs, as indicated in the project document. Table 5 provides adjustments of the ChEEL PRF's original language of "outcomes and indicators" and the addition of outputs into a ChEEL TOC that are linked to the actual targets and indicators on the original ChEEL PRF. Table 6 provides another check of the Project's outcomes, outputs and indicators from the PRF to ensure they have corresponding outcomes and outputs in the TOC. The ChEEL TOC derives its structure from the Terminal Evaluation of a related UN Environment Project "Establishing the Foundations of a Partnership to Accelerate the Global Market Transformation for Efficient Appliances and Equipment" (GEF ID 5831).

30. Through corrective actions taken in Tables 5 and 6 to reword indicators and match them with outputs, a TOC diagram for the ChEEL Project was developed as illustrated on Figure 1. The logic of the TOC diagram flows in a horizontal direction (from the baseline on the left to the long term impact on the right) flowing from project activities (green boxes) to outputs (yellow boxes) to intended outcomes (brown boxes) to long term impacts (blue boxes) of global GHG emission reductions from the reduced electricity consumption. In between, there is the ChEEL intermediate state that leads to the intended long-term impacts of the ChEEL Project.

31. The intended direct outcomes of ChEEL from the PRF for this evaluation and TOC formulation are as follows:

- Outcome 1.1: Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened;
- Outcome 2.1: Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behaviour;
- Outcome 3.1: Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/ industrial and outdoor lighting applications;
- Outcome 3.2: Consumers and decision makers are aware of the economic benefits of advanced lighting systems through demonstration programmes.

The wording of these outcomes is clear with outputs (as re-worded in Table 6) to be delivered as a means to achieve to outcomes.

32. The TOC clarifies these development pathways from the baseline, where there are drivers behind the intended Project activities to deliver outputs that would include government commitments to mandatory labelling for all lighting devices. The TOC in Figure 3 has been reconstructed to:

- reflect the baseline conditions of the ChEEL Project;
- harmonize the language of the TOC, ChEEL’s PRF (mainly its indicators) and the outputs mentioned in the ChEEL Project Document (from pgs 23-28). There are simplifications suggested in Table 6 to more clearly state intended outputs from the Project, and linking SMART indicators to outputs and the TOC for project monitoring;
- reflect the relationship of these outputs with direct outcomes that is driven by efficient lighting with mandatory labelling as a pillar in the NES strategy;
- clarify end-of-project (EOP) or direct outcomes of the ChEEL Project that would lead to a spiked increase in the sales of advanced energy efficient lighting devices and LEDs which is the intermediate state of “a rapid uptake of efficient lighting” or LEDs, the preferred technology for ChEEL. The rapid uptake of efficient lighting would be driven, most importantly, by the Government in its promotion of efficient lighting as a part of its National Energy Strategy of 2012, and a decrease in the global prices of LEDs.

Table 4: Summary of ChEEL programmed activities and expected outputs by component

Project component	Programmed Activities	Expected Outputs
Component 1: Strengthening Monitoring, Verification and Enforcement (MVE) capacities to ensure an effective transition to efficient lighting markets	a.0. Regular management of legal and administrative process of EE labelling and MEPS a.1. Participation on International specialized technical meetings, Lighting Fairs and/or visit to lighting test labs	1.1.1 Defined and implemented legal and administrative processes to improve compliance with national standards
	a.2. Training by experts on international technology trends and specific technical aspects like: lifetime, luminous flux, beam opening angle, colour temperature and rate of colour reproduction to SEC professionals and others	1.1.2 Technical support to government authorities and customs administrations
	a.3. International expert diagnosis of testing labs in LA and Chile: business models, technical people, equipment and facilities and define/cost estimate of improvements alternatives at international, Latin American and national levels a.4. Improve/develop lighting safety and efficiency test protocols as required a.5.Learning by doing training to Labs technicians	1.1.3 Strengthening of national laboratories to verify compliance with standards
	a.6. Checking and verifying the original baseline data and progress monitoring the transition to efficient lighting. a.7 Development of a lighting NAMA or other climate financial tools	1.1.4 Monitoring, Reporting and Verification actions to assess progress in the transition to efficient lighting
Component 2: Ensuring an environmentally sound management for lighting products	b.1. Design of an operational framework and strategy to establish a collection scheme, recycling facilities and/or sound disposal systems, as appropriate, to ensure the sustainable end of life treatment of spent lamps	2.1.1 National framework and strategy developed for environmentally sound management of lighting products
	b.2. Training on environmentally sound management of lighting residues	2.1.2 Training provided to governmental authorities, retailers and collection services
	b.3. Developing of a business base for CRSO through a participative process and according to international conventions b.4. Local counterpart for the design of an implementation plan for the CRSO and local public or private initial investors identification (this was removed as per Para 27)	2.1.3. Development of CRSO business model for spent lamps, including international coordination for the environmentally sound export/import of lamp waste (CRSO ready to be operational)
	b.5. Design and application of collection and recycling campaign	2.1.4 Awareness raising and communication campaigns to promote collection and recycling of spent lamps
Component 3: Lighting innovation – accelerating the use of solid-state lighting (including light emitting diodes (LEDs) and controls	c.1.Develop training courses on advanced technologies and systems, including LEDs and controls, to public and private sectors	3.1.1. Enhance National Efficient Lighting Strategy with more stringent MEPS, taking into account advanced lighting technologies and systems.
	c.2. Develop EE Labelling and quality specifications and/or MEPS for LED lamps and other efficient technologies as required. c.3. ENIE - GEF coordination for accelerating the use of LEDs c.4. Design and application of communication campaigns	3.1.2 Supporting policies developed (to increase user acceptance and demand for high efficiency products and systems).

Project component	Programmed Activities	Expected Outputs
	c.5. Study that proposes a unified energy label for all types of lighting technologies.	
	c.6. MVE of LEDs technologies in the market	3.1.3. MVE scheme produced (to ensure high quality products that will deliver the expected energy and GHG emission benefits).
	c.7. Design, bidding and evaluation of a demonstration program	3.2.1 Design and evaluation of a demonstration programme implemented (for locally-appropriate LEDs and lighting controls among country selected stakeholder groups (i.e. low-income residents)).
	c.8. Procure and install CFLs (from cash co-financing source from Ministry of Energy) c.9. Procure and install LEDs and control systems	3.2.2 Energy efficient lamps procured and installed

Table 5: Proposed Changes in ChEEL Project Logical Framework (PLF) Language

Original PLF language for Outcomes and Indicators	Corrective Action	Reconstructed TOC targets, outputs and outcomes
Project Objective: Promote the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions	Objective clear.	No changes proposed
Indicator A) Number of lamps entered in the market, IL, Hal, CFL, LED, others	2027 targets are not measurable considering ChEEL is only 36 months in duration.	2017, Sold lamps 85.7 million; technology rates[14] IL/Hal/CFL/LED/others - 0%/10%/70%/6%/14%
Indicator B) Energy savings and corresponding emission reductions		Direct 2015-2017: 49 GWh; 23 $ktCO_{2e}$, Direct post project: 33,671 GWh; 15,568 $ktCO_{2e}$
Outcome 1.1: Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened	Outcome intended is clear.	Outcome 1.1: Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened
Indicator 1.a: Law 18.410[15] and regulations are amended	This needs to be re-worded as a target or output and should be tied to Output 1.1.1: Defined and implemented legal and administrative processes to improve compliance with national standards	Output 1.1: Amended Law 18.410 and regulations to improve compliance with national standards
Indicator 1.b: Decrease in the % of non-compliance according to the law (or number of fines)		
Indicator 2: % of requests to testing lamps that are met on time as defined by contract	This indicator should be tied to Output 1.1.2: Technical support to government authorities and customs administrations	Output 1.2: Government lamp testing program that provides timely contractual services for testing lamps coming into the Chilean lighting market.
Indicator 3: Rating of the certified labs according to the interlaboratorial assessment increased by at least 1 level.	This can be tied to Output 1.1.3: Strengthening of national laboratories to verify compliance with standards. This output, however, should be reworded as provided in the next column.	Output 1.3: Strengthened certified laboratories that have increased their certification by at least one level
Missing indicator for Output 1.1.4.	Output 1.1.4 does not have any corresponding indicators or targets in the original PRF	Output 1.4: MRV actions that assess progress of a transition to efficient lighting that may be included under a lighting NAMA.
Outcome 2.1: Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behavior	Outcome is clear.	No changes proposed.

[14] The STAP/GEF model used to create the BAU and the project scenarios for the market transition is based on standards and labels regulations adopted by the government which are planned to be enforced by 2020. Therefore, the model shows the same technology rates for the GEF scenario than for the BAU in 2017 (IL/Hal/CFL/LED/others - 0%/14%/70%/2%/15%). However, the project aims to boost the LED market share during the project period through communication campaigns and demonstration programmes, therefore the target for LED share in 2017 is at least 4% even if this is not shown in the STAP/GEF model.

[15] As stated in Section A.5.2, the Law 18.410, revised in 16.05.2012, defines the products that may not be marketed in the country without the respective Certificates of Approval and defines the methods of enforcement

Original PLF language for Outcomes and Indicators	Corrective Action	Reconstructed TOC targets, outputs and outcomes
Indicator 4: Law of Extended Producer Responsibility developed and endorsed (Ley Marco para la Gestión de Residuos y responsabilidad Extendida del productor[16])	This indicator can be tied to Output 2.1.1: National framework and strategy developed for environmentally sound management of lighting products	Output 2.1: A developed and endorsed Law of Extended Producer Responsibility.
Missing indicator for Output 2.1.2.	Output 2.1.2 on "Training provided to governmental authorities, retailers and collection services" does not have any corresponding indicators in the original PRF	Output 2.2: Training programs for governmental authorities, retailers and collection services on environmentally sound management of lighting residues.
Indicator 5: A CRSO Business Model developed, endorsed and available to be shared with potential investors in the sector?)	This indicator can be tied to Output 2.1.3: Development of CRSO business model for spent lamps, including international coordination for the environmentally sound export/import of lamp waste (CRSO ready to be operational)	Output 2.3: A developed and endorsed international CRSO business model that is disseminated to potential investors in the sector.
Indicator 6: Increase of the % of population aware of the importance to dispose correctly their spent lamps (disaggregated by men/women) (proxy indicator)?)	This indicator can be tied to Output 2.1.4: Awareness raising and communication campaigns to promote collection and recycling of spent lamps.	Output 2.4: Awareness raising and communication campaigns to promote collection and recycling of spent lamps.
Outcome 3.1: Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/industrial and outdoor lighting applications	Outcome is clear.	No changes proposed.
Indicator 7: Multi-stakeholder working group and a work plan stablished to build consensus on the increased use of solid-state lighting and controls.	This indicator can be tied to Output 3.1.2: Supporting policies developed (to increase user acceptance and demand for high efficiency products and systems).	Output 3.1: Developed supporting policies to increase user acceptance and demand for higher efficiency lighting products and systems.
Indicator 8: Standardized and comprehensive labels and/or MEPS for LED technologies are developed and adopted by the government (Output 3.1.1?)	This indicator can be tied to Output 3.1.1: Enhance National Efficient Lighting Strategy with more stringent MEPS, taking into account advanced lighting technologies and systems.	Output 3.2: Standardized and comprehensive labels and/or MEPS for LED technologies are developed and adopted by the government.
Missing indicator for Output 3.1.3.	Reword "Output 3.1.3: MVE scheme produced (to ensure high quality products that will deliver the expected energy and GHG emission benefits)" into an output	Output 3.3: Operational MVE scheme to ensure high quality lighting products on the market that meet MEPS for LED technologies.
Indicator 9: Increase of the % of population aware of the benefits of LED technology (disaggregated by men/women) (proxy indicator)	This indicator is not tied in with any output under Outcome 3.1. As such, an output is required for this indicator for the TOC. The PRF only indicates that the "means of verification" for this indicator could be from "reports on campaign impacts (including assessment before the campaign", and not necessarily a national survey.	Output 3.4: Compilation of information that indicates an increase in the population aware of the benefits of LED technology, and disaggregated by gender.
Outcome 3.2: Consumers and decision makers are aware of the economic benefits of advanced lighting systems through demonstration programmes	Outcome is clear.	No changes proposed.

[16] http://www.camara.cl/pley/pley_detalle.aspx?prmID=9501

Original PLF language for Outcomes and Indicators	Corrective Action	Reconstructed TOC targets, outputs and outcomes
Most of the objective level indicators are tied in with Output 3.2.1.	Output 3.2.1: Design and evaluation of a demonstration programme implemented (for locally-appropriate LEDs and lighting controls among country selected stakeholder groups (i.e. low-income residents)).	Output 3.5: Evaluation of a locally implemented LED and lighting controls demonstration program that was designed for selected stakeholder groups (i.e. low-income residents).
Indicator 10: Market share of LEDs from total lamps increase	This indicator can be tied to Output 3.2.2: Energy efficient lamps procured and installed.	Output 3.6: Demonstration program with procured and installed LED and lighting controls

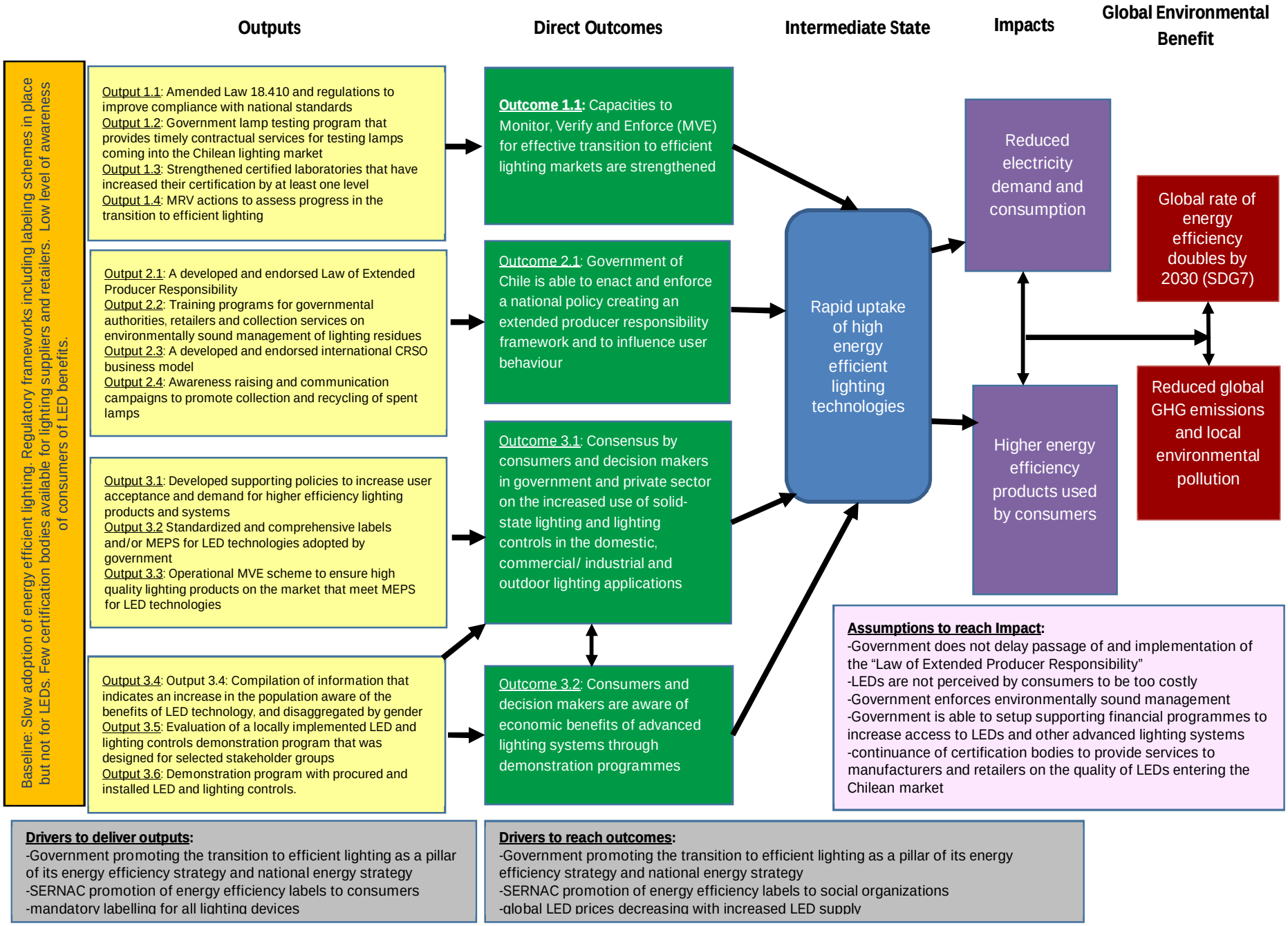
Table 6: Comparison between Results Levels in the Original Project Document vs Reconstructed TOC

Project Document/Logical Framework	Reconstructed TOC
	Global Environmental Benefit: Global rate of energy efficiency doubles by 2030 (SDG7) Reduced global GHG emissions and local environmental pollution
	Impacts: Reduced electricity demand and consumption Higher energy efficiency products used by consumers
Project Objective: Promote the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions	**Intermediate State:** Rapid uptake of high energy efficient lighting technologies
Outcome 1.1: Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened	**Outcome 1.1:** Country capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened
Outcome 2.1: Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behaviour	**Outcome 2.1:** Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behaviour
Outcome 3.1: Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/industrial and outdoor lighting applications	**Outcome 3.1**: Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/ industrial and outdoor lighting applications
Outcome 3.2: Consumers and decision makers are aware of the economic benefits of advanced lighting systems through demonstration programmes	**Outcome 3.2:** Consumers and decision makers are aware of economic benefits of advanced lighting systems through demonstration programmes
Outputs/Indicators	**Outputs**
Output 1.1.1: Defined and implemented legal and administrative processes to improve compliance with national standards Indicator 1.a: Law 18.410 and regulations are amended Indicator 1.b: Decrease in the % of non-compliance according to the law (or number of fines)	Output 1.1: Amended Law 18.410 and regulations to improve compliance with national standards[17].
Output 1.1.2: Technical support to government authorities and customs administrations Indicator 2: % of requests to testing lamps that are met on time as defined by contract	Output 1.2: Government lamp testing program that provides timely contractual services for testing lamps coming into the Chilean lighting market.
Output 1.1.3: Strengthening of national laboratories to verify compliance with standards. Indicator 3: Rating of the certified labs according to the inter-laboratorial assessment increased by at least 1 level.	Output 1.3: Strengthened certified laboratories have increased their certification by at least one level
1.1.4 Monitoring, Reporting and Verification actions to assess progress in the transition to efficient lighting	Output 1.4: MRV actions that assess progress of a transition to efficient lighting.
2.1.1 National framework and strategy developed for environmentally sound management of lighting products Indicator 4: Law of Extended Producer Responsibility developed and endorsed (Ley Marco para la Gestión de Residuos y responsabilidad Extendida del productor)	Output 2.1: A developed and endorsed Law of Extended Producer Responsibility.

[17] Decrease in non-compliance is also covered under Global Environmental Benefits but should still remain an indicator for monitoring.

Project Document/Logical Framework	Reconstructed TOC
2.1.2 Training provided to governmental authorities, retailers and collection services	Output 2.2: Established training programs for governmental authorities, retailers and collection services on environmentally sound management of lighting residues.
2.1.3. Development of CRSO business model for spent lamps, including international coordination for the environmentally sound export/import of lamp waste (CRSO ready to be operational) Indicator 5: A CRSO Business Model developed, endorsed and available to be shared with potential investors in the sector?)	Output 2.3: A developed and endorsed that is disseminated to potential investors in the sector.
2.1.4 Awareness raising and communication campaigns to promote collection and recycling of spent lamps Indicator 6: Increase of the % of population aware of the importance to dispose correctly their spent lamps (disaggregated by men/women) (proxy indicator)?)	Output 2.4: Awareness raising and communication campaigns to promote collection and recycling of spent lamps.
3.1.2 Supporting policies developed (to increase user acceptance and demand for high efficiency products and systems). Indicator 7: Multi-stakeholder working group and a work plan stablished to build consensus on the increased use of solid-state lighting and controls. Indicator 8: Standardized and comprehensive labels and/or MEPS for LED technologies are developed and adopted by the government	Output 3.1: Developed supporting policies to increase user acceptance and demand for higher efficiency lighting products and systems.
3.1.1. Enhance National Efficient Lighting Strategy with more stringent MEPS, taking into account advanced lighting technologies and systems.	Output 3.2: Standardized and comprehensive labels and/or MEPS for LED technologies adopted by the government.
3.1.3. MVE scheme produced (to ensure high quality products that will deliver the expected energy and GHG emission benefits).	Output 3.3: Operational MVE scheme to ensure high quality lighting products on the market that meet MEPS for LED technologies.
Indicator 9: Increase of the % of population aware of the benefits of LED technology (disaggregated by men/women) (proxy indicator)	Output 3.4: Compilation of information that indicates an increase in the population aware of the benefits of LED technology, and disaggregated by gender.
3.2.1 Design and evaluation of a demonstration programme implemented (for locally-appropriate LEDs and lighting controls among country selected stakeholder groups (i.e. low-income residents)).	Output 3.5: Evaluation of a locally implemented LED and lighting controls demonstration program that was designed for selected stakeholder groups (i.e. low-income residents).
Output 3.2.2: Energy efficient lamps procured and installed. Indicator 10: Market share of LEDs from total lamps increase	Output 3.6: Demonstration program with procured and installed LED and lighting controls.

Figure 3: Re-Constructed Theory of Change Diagram for ChEEL Project



2.8.1 Causal pathways from Outputs to Direct Outcomes

33. With regards to the TOC causal pathways from the newly passed outputs to the direct outcomes:

- the continued driven-ness of a number of government agencies is crucial for delivery of Outputs 1.1 to 1.4 (amended law and regulations, government lamp programme, certified labs, MRV actions) and achieving direct Outcome 1.1 (strengthened MVE capacities). This would include the Ministry of Energy to continue its support for the development of **the** necessary standards and regulations that informs suppliers and manufacturers of the lighting devices that will be accepted into the Chilean lighting market. This would also inform existing testing laboratories in Chile of potential business opportunities for the testing of lighting devices, and various government departments of the necessary personnel required to undertake MRV actions to regulate the entry of new lighting devices onto the Chilean market;
- the continued drivenness of the Ministry of Environment is crucial to deliver Outputs 2.1 to 2.4 (an endorsed Law of Extended Producer Responsibility, established training programs, international CRSO business model, and awareness raising and communication campaigns) and achieving direct Outcome 2.1 (an extended producer responsibility framework) on enacting national policies for sustainable development. As such, the Project will provide them with technical assistance to develop a stronger Law of Extended Producer Responsibility followed by outputs that train the necessary personnel ranging from government departments to retailers and collection services, to ensure the collection of waste lighting devices by an entity that performs the disposal services in an environmentally responsible manner. In addition, there is an assumption that the Ministry of Environment will ensure appropriate public awareness raising and communication campaigns will be conducted to increase the likelihood of compliance;
- delivery of Outputs 3.1 to 3.6 (supporting policies, standardized and comprehensive labels and/or MEPS, operational MVE scheme, compilation of information on increased awareness, evaluation of a demonstration program, and an implemented demonstration program) will be driven by the beneficiaries of the lighting demonstrations who will generate evidence of and be more aware of the economic and environmental benefits of LED technologies, and decision makers whose increased level of awareness of the economic benefits of LED technologies (Outcome 3.2) would contribute to the intended popularization of LEDs and lighting controls. By developing the proper support policies and labelling for LED technologies combined with an operational MVE scheme to ensure that MEPS compliant LEDs technologies on the market, consumers and decision makers will reach a consensus on the benefits of LED technologies (Outcome 3.1).

2.8.2 Causal pathways from Direct Outcomes to Impact

34. With regards to the TOC causal pathways from the direct outcomes of ChEEL to the intended impacts, achievement of the 4 intended outcomes of ChEEL that are driven by the Government's 2012 NES and ENIE (Para 15) was expected to lead to an intermediate state of "rapid uptake of LEDs and other high energy efficient lighting technologies". Reaching this intermediate state assumes that:

- Government does not delay passage of and implementation of the "Law of Extended Producer Responsibility";
- global prices of LEDs will decrease from expanding LED supplies to the extent that consumers do not believe that LEDs are too costly;
- Government enforces environmentally sound management that links disposal of old lighting devices with the replacement of new efficient LEDs;
- Government is able to setup supporting financial programmes that increases access to LEDs and other advanced lighting systems;
- Government continues to mandate that certification bodies provide services to manufacturers and retailers on certifying the quality of LEDs entering the Chilean market.

35. With these assumed Government interventions coupled with a global decrease in the price of LEDs, there would be increased confidence of all lighting consumers to purchase LEDs for a broad range

of uses. This would eventually lead to a rapid uptake of LEDs and other efficient lighting technologies. Moreover, the Government, through its improved MVE capacities, will be able to witness first-hand the benefits of the activities of ChEEL, its impact on lighting consumers to use higher energy efficiency lighting products, and reduced electricity demand and consumption that meets the objectives of the 2012 NES. This will positively reinforce the assumed Government actions listed in the Para 34, leading to a sustained period of time of rapid LED uptake until market saturation.

3 Evaluation Findings

3.1 Strategic Relevance

3.1.1 Alignment with UN Environment's strategy, policies and mandate

36. The ChEEL Project aligns with the UNEP Medium-Term Strategy (MTS) 2014 to 2017[18], specifically Climate Change Expected Accomplishment 2 (or EA2/low emission growth) where "energy efficiency is improved" in partner countries to reduce GHG emissions and other pollutants as part of their low emission development pathways, and Chemicals and Waste, Expected Accomplishment 3 (or EA3/Waste).

37. The ChEEL Project also aligns with the UNEP MTS for 2018 to 2021[19], specifically proposed outcomes in:

- Climate Change where there are "reduced emissions consistent with a 1.5/2^{0}C stabilization pathway" through "emission reductions of greenhouse gases and other pollutants from renewable energy and energy efficiency", and where countries "increasingly adopt and/or implement low greenhouse gas emission development strategies and invest in clean technologies";
- Chemicals, Waste and Air Quality where "prevention and sound management of waste leading to reduced negative impacts from waste on environmental and human health" leads to "increased percentage of urban solid waste regularly collected and well managed (disaggregated by type of waste)" and " policies and legal, institutional and fiscal strategies and mechanisms for waste prevention and sound management mainstreamed with the support of UNEP and enforced by countries within the frameworks of relevant MEAs and SAICM".

38. The Bali Strategic Plan (BSP)[20] has objectives to "strengthen the capacity of governments of developing countries through targeted capacity building within the mandate of UN Environment, using and sustaining the capacity of technology obtained through training or other capacity building efforts, and developing national research, monitoring and assessment capacity that supports national institutions in data collection, analysis and monitoring of environmental trends and in establishing infrastructure for scientific development and environmental management (that will ensure sustainability of capacity building efforts)".

39. The BSP also has other specific objectives of "promoting, facilitating and financing as appropriate, access to and support of environmentally sound technologies and corresponding know-how, especially for developing countries as well as countries with economies in transition", and "strengthening cooperation amongst UN Environment, multilateral agreement secretariats (that take into account their autonomous decision-making processes), and other bodies engaged in environmental capacity building including GEF". The ChEEL Project was aligned to the BSP through its emphasis and efforts to achieve these objectives through local capacity building activities, and providing inputs into the Project where appropriate from other developing countries (such as Mexico, Colombia and China). The results of local capacity building are discussed in the Section 3.4.4 of this report.

40. With regards to South-South Cooperation (SSC), the ChEEL Project was designed to foster partnerships between developed countries with best international practices and developing countries for the purpose of information exchanges to facilitate market transformation for energy efficient lighting devices in Chile. As such, SSC was not designed to be prominent in the Project notwithstanding that the Global Efficient Lighting Centre (GELC), the joint UN Environment and National Lighting Test of China

[18] https://wedocs.unep.org/bitstream/handle/20.500.11822/7670/-UNEP_Medium_Term_Strategy_2014-2017-2015MTS_2014-2017.pdf.pdf?sequence=3&isAllowed=y

[19] http://wedocs.unep.org/bitstream/handle/20.500.11822/7621/-UNEP_medium-term_strategy_2018-2021-2016MTS_2018-2021.pdf.pdf?sequence=3&isAllowed=y

[20] https://wedocs.unep.org/bitstream/handle/20.500.11822/26642/Annex%202%20to%20the%20briefing%20on%20South-South%20Cooperation.pdf?isAllowed=y&sequence=1

collaborating centre, are providing support on best international practices on energy efficient lighting. As mentioned in Para 41, there was also the involvement of Mexico in utilizing lessons learned from their implementation of similar market surveillance activities that could be replicated in Chile.

41. Environmental and social safeguards checklists were completed for ChEEL as contained in Annex M of the CEO Endorsement Document. The primary issue pertains to the end of the CFL service life and the responsible disposal of the CFLs where mercury may be released into the environment if the glass of the lamp is broken. While the checklist does mention that a system is being developed in Chile for responsible recycling and disposal of CFLs to effectively avoid the release of mercury into the environment, it also mentions that ChEEL will support policymakers in framing regulations and guidelines on recycling and safe disposal of the CFLs. This was addressed by Component 2, of which further details of it progress are provided in Paras 61-64.

The overall rating for alignment to UN Environment's strategic priorities is Highly Satisfactory.

3.1.2 Alignment with GEF focal areas and strategic priorities

42. The GEF provides grants for projects in focal areas of biodiversity, climate change, international waters, land degradation, the ozone layer, persistent organic pollutants, and chemicals and waste. The GEF funds for the ChEEL Project were approved at the end of the GEF-5 Operational Phase (2011 - 2014). At the time of approval for ChEEL, it had aligned with GEF strategic programs under:

- CCM-1: Technology Transfer Promote the demonstration, deployment, and transfer of innovative low-carbon technologies;
- CCM-2: Energy Efficiency: Promote market transformation for energy efficiency in industry and the building sector; and
- CHEM-3: Pilot sound chemicals management and mercury reduction.

43. However, with the commencement of the ChEEL Project in January 2016, ChEEL was to deliver outcomes consistent with the strategic programming objectives of the overlapping GEF-6 (2015-2018) and GEF-7 (2015-2018). For GEF-6, ChEEL was highly relevant under:

- CC 1: Promote Innovation, Technology Transfer, and Supportive Policies and Strategies to "develop and demonstrate innovative policy packages and market initiatives to foster new range of mitigation actions" (Program 2) [21]; and
- CW 1: Develop the enabling conditions, tools and environment for the sound management of harmful chemicals and wastes where "countries have appropriate decision-making tools and economic approaches to promote the removal of barriers preventing the sound management of harmful chemicals and waste" (Program 1)[22];

44. For GEF-7, the ChEEL Project remains relevant to the Climate Change Focal Strategy Objective 1: "Objective 1: Promote innovation, technology transfer for sustainable energy breakthroughs"[23], and the Chemicals and Waste Program, specifically the "Industrial Chemicals Program"[24].

The overall rating for alignment to UN Environment and GEF strategic priorities is Highly Satisfactory.

[21] https://www.thegef.org/sites/default/files/documents/GEF-6%20Programming%20Directions.pdf, see pg 57
[22] Ibid 19, see pg 91
[23] https://www.thegef.org/sites/default/files/publications/GEF-7%20Programming%20Directions%20-%20GEF_R.7_19.pdf, see pg 37
[24] Ibid 21, pgs 71-73

3.1.3 Relevance to global, regional and national environmental issues and needs and complementarity to other interventions

45. The ChEEL Project is highly relevant to a number of ongoing as well as recently completed national issues, policies and strategies including:

- National Climate Change Action Plan for 2016-2021. This action plan was built upon a participatory approach open to actors from all sectors and fields, following Chile's commitments on environmental democracy. The plan has a strong emphasis on implementation, with a special focus on those measures needed to fulfil Chile´s INDC;
- INDCs from 2015 that includes a number of energy-related actions[25];
- The 2012 National Energy Strategy that includes:
    - The Energy Efficiency Action Plan 2012-2020 (PAEE 2020), developed by the division of Energy Efficiency at the Ministry of Energy to achieve the target of a 12% decrease in the projected electricity demand for 2020, decreasing Chile's expected energy demand by 1122 MW. Actions in the PAEE2020 are to be undertaken by both public and private sectors;
    - The National Efficient Lighting Strategy (Estrategia Nacional de Iluminación Eficiente or ENIE) that was adopted by the GoC (under the Ministry of Energy with technical support from Fundación Chile) in 2013 and includes the elimination of halogen lamps by 2021 and CFLs by 2024;
- The Minamata Convention on Mercury is an international treaty designed to protect human health and the environment from anthropogenic emissions and releases of mercury and mercury compounds. It was adopted in October 2013. Chile signed on 10 October 2013.

The overall rating for relevance to national issues and needs is Highly Satisfactory.

The overall rating for complementarity to existing interventions is Highly Satisfactory.

3.2 Quality of Project Design

46. A review of the ChEEL Project design is crucial towards a comprehensive understanding of intended direct ChEEL outcomes and the actual outcomes achieved. A summary of this review is contained in the following paragraphs.

ChEEL Project Design Strengths:

47. The ChEEL Project was designed in 2015 with the intention of accelerating the adoption of high energy-efficient lighting products in the Chilean market as a means of rapidly reducing Chile's energy consumption and related GHG emissions. Considering the ongoing efforts of the GoC since 2005 to focus on energy-efficient lighting systems, the country still needs to overcome barriers mentioned in Para 14 to meet the PAEE goal of reducing energy demand by 12% in 2020. As such, the ChEEL Project serves as a useful project to augment the efforts of the en.lighten initiative prior to 2016, and lowering the remaining barriers to widespread adoption of LEDs and other highly energy efficient lighting devices.

48. The goal/objective of the ChEEL Project was "to promote the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions".

49. The design of the ChEEL Project focuses on a holistic approach to lowering the remaining barriers (as mentioned in Para 14) to widespread adoption of high energy efficient lighting devices. The decision to use ChEEL resources for the promotion of only LEDs was made during Year 1 of ChEEL (2016) when the Ministry of Energy decided to significantly increase its ambition. Moreover, the initial focus on

[25] https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Chile/1/INDC%20Chile%20english%20version.pdf, pg 12, Section 2.2

MVE systems and building the capacities of testing laboratories serve as solid building blocks to strengthen the GoC's capacities to respond to regulating the Chilean supply side of a rapidly changing market for highly energy efficient lighting devices. To enhance the supply side of this market transformation, the ChEEL Project was designed to increase the demand for these devices through demonstration lighting projects and campaigns to increase the awareness of the global and local benefits of energy efficient lighting devices. Given the issues concerning the large volume of CFLs to be disposed on this Project, the GoC have supported activities within ChEEL to ensure strong foundations of CRSOs (Collection Recycling System Organization) are in place to achieve the ENIE goal of controlling the level and limiting the release of mercury in lighting products into the environment.

50. As such, the incremental support strategically provided by the ChEEL Project was to augment baseline activities in 2015 to meet the intended results of ENIE by targeting:

- **the strengthening of competencies of professional staff** at regulatory entities, Ministry of Energy and SEC to manage a transformation towards efficient lighting;
- **the development of a national framework and strategy** for environmentally sound management of lighting products;
- **developing supporting policies** to increase user acceptance and demand for high efficiency products and systems; and
- **support for demonstration programmes** that increase awareness of consumers and decision makers of the economic benefits of advanced lighting systems.

51. In conclusion and considering the size of GEF support of US$2,485,713 over a period of 3 years, the design of the ChEEL Project was clearly scoped to provide incremental support to strengthen local capacities and enable government officials to regulate market transformation of these energy efficient lighting devices in an environmentally responsible manner. In conclusion, the strength of the ChEEL Project is in its holistic approach to achieving the intended ChEEL objective.

ChEEL Project Design Weaknesses:

52. A review of the ChEEL Project Logical Framework (PLF) reveals the intended objective as well as intended outcomes whose achievements are measured with objective and outcome indicators and targets. The Evaluator has been exposed to many styles of PLFs and Project Results Frameworks (PRF), as they are more commonly referred to in other projects. A best practice in preparing PRFs is the simplification and clarification of the means of achieving intended outcomes through the delivery of outputs as measured in terms of SMART indicators and targets. This clarity is important to the M&E activities of ChEEL where in its absence, issues may be encountered in the monitoring of some indicators in the original PRF.

53. While the ChEEL PLF (or herein referred to as the ChEEL PRF) does serve as the foundation on which to monitor key performance indicators of ChEEL, there are only a few minor comments to be made on how the ChEEL PRF would fully align with best practices observed:

- While the ChEEL PRF does have a clear objective as well as 4 clear intended outcomes, the achievement of the intended outcomes are each measured with indicators and targets that do not exactly correspond to the outputs listed in the Project document under Section A.5.2. Instead, the ChEEL outputs are paired with corresponding activities which are listed in the Project document as "indicators" of delivery of the outputs. The difference between the ChEEL PRF and activities to deliver ChEEL outputs only places an additional burden on the implementation team to efficiently and effectively monitor project progress. An improvement to this would be to harmonize the activities to achieve the outputs with the "outcome" indicators in the ChEEL PRF. This could be achieved through undertaking a PRF analysis through a Theory of Change and a clarification of the causal pathways to intended outcomes (as detailed in Section 2.8 or Paras 28-32 of this report);
- For indicators related to awareness or market share, the means of verification appeared to be information collected from the Ministry of Energy. With this scenario and as reported in subsequent PIRs, it is possible that FCH did not have control over the scope of these surveys, for

example, obtaining data related to the indicator of "increase of the % of population aware of the benefits of LED technology", and including gender disaggregated data; it is unclear if this is included in the Ministry of Energy survey. If there was no control, this indicator should not have been included in the ChEEL PRF, or the monitoring of this indicator should have been planned and costed accordingly (these are design issues as covered under Paras 87 and 88);

- Objective-level targets that are "post-project" should be dropped as these indicators are not measurable. This would include targets for 2027 on the number of lamps sold as well as targets for "direct post-project" and "indirect" energy savings and emission reductions.

The overall rating for project design is Satisfactory.

3.3 Nature of External Context

54. Project operations can be affected by externalities beyond the control of the Project. This may include externalities such as severe and unexpected climatic events, high-risk security situations, poor or lack of supporting infrastructure, economic instability, and politics. A review of the factors in assessing the nature of external context for Chile reveals that ChEEL project operations were not affected by climactic events, the security situation, infrastructure, economic conditions and political stability. Notwithstanding the October 2019 events of civil unrest (which occurred rather unexpectedly after the ChEEL EOP), the successful implementation of ChEEL over a 41-month period (against a 36-month project period design) is a strong indicator of the highly favorable assessment of the nature of external context for ChEEL.

The overall rating for nature of external context is highly favorable.

3.4 Effectiveness

55. ChEEL has been effective in meeting and exceeding its objective-level lifetime direct GHG emissions reduction target and lifetime direct energy saved by a factor of 5 (as shown in Table 7 and in Figure IV-7). Delivery of key incremental outputs as specified by the CHEEL Project Document related to Components 1 to 4 are described in Sections 3.4.1, 3.4.2, and 3.4.3. The outputs mentioned in this section are from the Table 6 where outputs (as listed in the TOC on Figure 3) and clarified from those presented in the Project Document in line with best practices for preparing PRFs.

Table 7: Summary information for GEF Tracking Tool

	CEO Endorsement	Terminal Evaluation
Lifetime energy saved (MJ)	177,335,065	**1,026,651,600**
Lifetime direct GHG emissions avoided	22,775	**116,354**
Lifetime direct post-project GHG emissions avoided	15,567,841	**9,125,953**
Lifetime indirect GHG emissions avoided (bottom-up)	83,372	**232,708**
Lifetime indirect GHG emissions avoided (top-down)	9,104,365	**9,896,945**

3.4.1 Delivery of Outputs for Component 1: Strengthening monitoring, verification and enforcement (MVE) capacities to ensure an effective transition to efficient lighting markets

56. Output 1.1: Amended Law 18.410 and regulations to improve compliance with national standards: Law 18.410 defines the products, machines, tools, equipment, appliances, apparatus and materials that must have a Certificate of Approval (CA) prior to the product being marketed and sold in Chile. The technical assistance provided by the ChEEL Project to amend this Law has facilitated the

streamlining of the legal and administrative processes to ensure more rapid availability of energy efficient lighting products in the Chilean market. Delivery of this output required a number of actions including:

- The inclusion of a MEPS proposal (from Output 3.2) and an EE labelling proposal, both of which had been developed through consultations with the private sector and approvals from SEC and Ministry of Energy for its publication;
- A modified regulation to simplify SEC authorization of new protocols for certification bodies, and allow the certification process to be more flexible in its implementation including the use of foreign certificates. Further assistance included gap identification in the certification system that resulted in the streamlining of certification procedures with measurement protocols now shortened to 1 month instead of 6 months;
- Roundtables for informing the lighting industry about mechanism for updating energy labels for Law 18.410;
- The amendments to Law 18.410 as of April 2020 are currently being reviewed in Congress and are expected to be published during mid-2020 according to the Ministry of Energy. Prior to this, the amendments to Law 18.410 were made to accommodate lighting MEPS and mandatory labels in line with their documented EE Agenda and scheduled for completion in the first half of 2020. The public consultation process for this amendment for MEPS and EE labels was completed during the period of October-December 2019.

57. Output 1.2: Government lamp testing program that provides timely contractual services for testing lamps coming into the Chilean lighting market. The delivery of this output has strengthened public confidence of the government-backed testing program for LEDs and other lighting devices coming into the Chilean lighting market, a prerequisite for rapid uptake of LEDs or other energy efficient lighting technologies. Actions taken by ChEEL to deliver this output included:

- The assignment of a new SEC team in 2017 dedicated to online market surveillance as well as the creation of a lighting commission, where the largest lighting brands could make self-declarations of their products. The lighting commission comprised close to 70% of the Chilean lighting market allowing SEC to more effectively focus its surveillance efforts. The impact of this commission was an LED promotion model by municipalities (see Paras 67-68) where they procured LEDs at a more discounted rate focusing market surveillance activities with selected retailing outlets, leaving behind retailers and suppliers who were reluctant to participate in market surveillance program;
- Support for training of SEC and the private sector on developing lighting test protocols at the Global Efficient Lighting Test Centre (GELC) in Beijing, China in January 2018. Benefits of this training were to observe best international practices at GELC and aligning these practices with Chilean testing practices. This professional training (for 1 woman and 5 men) included photometry concepts, provision of a technical report on specific technical gaps and recommendations to improve Chilean laboratories and regulatory functions of SEC. The outcome of this training has been SEC personnel being more aware of the increased accuracy of preparing test protocols, and the need for 4 months to test a lighting product for an international certificate;
- The establishment of a lamp testing program with certified laboratories (as detailed in Para 59) where local capacity was enhanced (in particular SEC and selected private sector companies) from training (as provided in Output 1.3).

58. Output 1.3: Strengthened certified laboratories that have increased their certification by at least one level. This output was delivered to provide the necessary training to integrate the training at GELC with Chilean working conditions with certified laboratories for testing lamps. ChEEL actions taken to deliver this output included:

- Training workshops in July and December 2017 to ensure the inputs from and comprehension of lighting manufacturers and certification bodies to the new streamlined certification system;
- Capacity assessment of potential certifiable labs in 2017 and mid-2018 accounting for the laboratory's ability to improve its procedures for handling samples and equipment and measuring;

- Three visits from GELC expert to build capacity of lighting laboratories and technicians in Chile[26] and make recommendations on improvements to be made with the national laboratories;
- A January 2019 visit from an international expert on LED technology on recommendations for the national laboratories and the SEC on the process to implement best practices and improve internal procedures. This included performance testing for the technicians of the laboratories FARADAY and CESMEC[27], and training for 11 men and 1 woman of SEC, most importantly, on implementing GELC recommendations with equipment available in Chile. The expert's training covered topics such as:
    - the reflectance of the sphere;
    - the use auxiliary lamps;
    - application of correction factors;
    - an inter-laboratory comparison test using an Australian LED Lab as a reference against CESMEC and FARADAY laboratories that helped to improve and identify weaknesses in their measurement procedures.
- The results of these performance tests concluded that the Chilean-based laboratories had accurate measurements, further improving the confidence of the Chilean process for performance testing of LEDs and other lighting devices.

59. Output 1.4: MRV actions to assess progress of a transition to efficient lighting (that may be included under a lighting NAMA). ChEEL provided technical assistance to deliver this output that assisted the Ministry of Energy and SEC in undertaking MVE actions including:

- Undertaking a trial surveillance of LEDs in other retailers in 2016 to verify quality of LEDs with random retailers. This trial demonstrated the need for effective MVE activities and a certified testing laboratory such as CESMEC;
- Support for a study tour of Mexico in August 2017 to observe the Mexican market surveillance model that has been effective in preventing the sale and commercialization of unsafe or inefficient products in the region;
- Support for the attendance to an MVE seminar in Uruguay in September 2017. The seminar provided the experience of market surveillance in Colombia with a model that included customs and municipalities for lamps and refrigerators, and the formation of a lighting commission made up of the main brands that self-declare their certified products (related to Output 1.2);
- Ministry of Energy and SEC undertaking their own MVE actions which provided information of the showed significant progress towards the improvement of LED market share of certified lamps increasing from 2% in 2015 to 40% in January 2019. Monitoring of the market share was carried out periodically by SEC using information from the sale of certified lamps including the number of certified units per year and by product type (such as LEDs, incandescent lamps, halogen, CFLs, and fluorescent tubes). This output has provided the Government with the necessary tools and capacity to undertake reliable MRV actions for market transformation of energy efficient lighting as well as appliances, to evaluate policies and adaptive management measures.

The overall rating for delivery of outputs for "Component 1: Strengthening monitoring, verification and enforcement (MVE) capacities to ensure an effective transition to efficient lighting markets" is Satisfactory.

[26] This included 5-day training sessions to strengthen participant technical expertise in quality testing and evaluation of efficient lighting products, the role of a lighting laboratory in quality control, fundamentals of photometry and colorimetry, calibration procedures, key technical measurement requirements and performance testing amongst other topics. Training was extended to 6 SEC personnel (5 men and 1 woman).
[27] At the time of the writing of this Evaluation, CESMEC is the only lab in use today with FARADAY going out of business.

3.4.2 Achievement of Outputs for Component 2: Ensuring an environmentally sound management and sustainable transition to efficient lighting

60. Output 2.1: A developed and endorsed Law of Extended Producer Responsibility (EPR). This output was delivered to develop a national framework and strategy for environmentally sound management of lighting products. While the Law was approved in April 2016, the supporting regulations and legislation for implementing the Law needed to be developed for waste electrical and electronic equipment (WEEE)[28]. ChEEL resources were utilized to deliver a developed and endorsed Law through:

- Collection of data to assess the social and economic impact of an EPR Law for electronic and electrical devices commencing in June 2017. The data from this activity is summarized in a January 2019 study that contains technical, social and economic analysis of environmental sound management of WEEE under the EPR Law. This report facilitated the elaboration of the WEEE decree for the Ministry of Environment including the establishment of broad goals for the collection, treatment, recycling and disposal of e-waste;
- Scoping activities in early 2018 to develop the EPR national framework and strategy for Law 20.920 and a working relationship with the Ministry of Environment that included the project stipulating how ChEEL resources would be used to support them in the development of Law 20.920;
- The recruitment of an international consultant in May 2018 for 6 months to establish a proposed strategy for the management of electrical and electronic waste (including lamps), and design an operational framework and strategy to establish a collection scheme, establish recycling facilities and sound disposal systems as appropriate, and ensure the sustainable end-of-life treatment of spent lamps. This resulted in a national framework proposal for the establishment of a "Collection Recycling System Organization" (CRSO) which spawned a number of other actions including:
    - The collection of baseline data on the treatment, recycling and disposal of WEEE. Data of waste light bulbs was obtained from Customs databases and visits to all re-cycling facilities in Chile. Collection of this data which was very difficult, was combined with the disposal of refrigerators;
    - Preparation of a baseline report on the "Analysis of the collection and recycling target of Electronical and Electric devices". With inputs provided through close consultation with companies, this report provides recommendations on implementing the EPR Law, which is expected to be decreed by 2021 for WEEE. The scope of this report covered not only lamps but also the 6 international categories of WEEE, serving as a significant input for a non-profit company to implement a CRSO for WEEE in Chile, providing details of a business model of how a legal CRSO should be organized to collect, recycle, and dispose e-waste that they produce or import into Chile. The preparation of a business model proposal for implementing a CRSO was informed by experiences with international e-waste and CRSOs. The business model includes a stipulation that the CRSO should be a non-profit entity through the collective efforts of several companies that import or produce waste.
- By the end of project, a framework for the Law of Extended Producer Responsibility for WEEE was delivered that will facilitate the EPR Law being decreed in 2021 for WEEE. Delivery of this output has strengthened the Government's legislation obligating manufacturers or suppliers (that includes lighting appliances) to conduct environmentally sound management of WEEE.

61. Output 2.2: Training programs for governmental authorities, retailers and collection services on environmentally sound management of lighting residues. These training programs were delivered exposing these ChEEL stakeholders to the best international practices on environmentally sound management of lighting residues allowing them to formulate feasible strategies for proper disposal of lighting residues in Chile. Training actions included:

[28] This Law only has decrees and supporting legislation for regulating plastic packaging.

- Training at the Ambilamp plant in Spain from 20-25 November 2016 for 10 persons (8 women and 2 men) from private and public sector entities. This 40-hour training in Spain exposed public authorities to an international CRSO expert in Spain who subsequently was assigned to develop a WEEE-CRSO business model in Chile, and to assist the MoE in approaches to implementing the EPR Law;
- Training for potential candidates who are employed with recycling companies. The only recycling company for lamps in Chile, Midas and Bolta, were invited to the Ambilamp training where they learned that their standards were similar to those of Ambilamp. The electronic producers pay for these services for e-waste recycling in Chile. However, it is known that lamp recycling alone is not profitable due to the small market of used lamps to be recycled.

62. Output 2.3: A developed and endorsed international CRSO business model that is disseminated to potential investors in the sector. This business model which was delivered using ChEEL resources, has catalysed the interest of a consortium of Chilean WEEE manufacturers and suppliers who are using the model for establishing the CRSO. The output was delivered as follows:

- An expert consultant from Ambilamp led work at the end of May 2018 to prepare a baseline report on the "Analysis of the collection and recycling target of Electronical and Electric devices" as detailed under Output 2.1. The business plan proposal for CRSO was developed with the support of technical working group meetings organized by the Ministry of Environment with the stakeholders involved. The plan also provided recommendations on CRSO organizational structure, fixed and variable costs and collection target scenarios, and stakeholder mapping in close collaboration with the Ministry of Environment and Fundación Chile;
- The business plan was disseminated in technical working group meetings with the different actors (i.e. producers, recyclers, consumer representatives, regulatory authorities among others). For producers, a specific working group meeting was organized to define their responsibility and evaluate the efficiency of other CRSO alternatives, either individual or collective. The meetings also covered the implications of the new legislation, importance of waste collection by major distributors, retailers and major waste generators, the new responsibilities of each type of actor in the market, CRSO implementation timings and how different CRSO models have been addressed in other countries. FCH issued a questionnaire after these meetings to all participants to ensure their feedback and addressing all their major issues concerns;
- Engagement of Cámara de Comercio Santiago (CCS) comprised of 16 companies[29] to establish a Clean Production Agreement in August 2019 to form Chile's first CRSO for WEEE in Chile. Through the aforementioned baseline report, CCS has the business plans over the next 2 years to transform into a legal CRSO through developing an integrated management system for e-waste, and driven by Chile's policies for a circular economy.

63. Output 2.4: Awareness raising and communication campaigns to promote collection and recycling of spent lamps. This output was delivered through the following actions:

- Development of a communication and dissemination plan that commenced implementation in late 2017;
- At its commencement, the communication campaign focused on LED technology. After completion of the demonstration programmes (Output 3.5), the communication campaign had an increased focus on environmental sound management aspects of disposing old light bulbs for LEDs. The outreach of the campaign was expanded to a wider spectrum of the population by municipalities and retailers of LEDs that included messaging on the proper disposal of CFLs;
- Though not directly related to promotion of the collection and re-cycling of spent lamps, there were presentations by an international WEEE expert with Ambilamp on the EPR Law and progress to establish collection target for WEEE in Chile at the Smart Energy Fest in December 2018 in Santiago. This output has thus been able to mobilize municipalities and lighting retailers of the linkage and importance of disposing CFLs with the purchase of new LEDs, notwithstanding

[29] Includes white appliance manufacturers and suppliers, cell phone companies, retailers, amongst other companies involved in the production, import and sale of electronic goods.

that the EPR Law has not yet been decreed and the limitations of infrastructure to collect used CFLs.

The overall rating for the delivery of outputs for "Component 2: Ensuring an environmentally sound management and sustainable transition to efficient lighting" is satisfactory.

3.4.3 Achievement of Outputs for Component 3: Lighting innovation: accelerating the use of solid-state lighting (including light emitting diodes (LEDs) and controls)

64. Output 3.1: Developed supporting policies to increase user acceptance and demand for higher efficiency lighting products and systems. Supporting policies to increase user acceptance and demand for higher efficiency lighting products and systems was mainly in the form of support for effective communication campaigns and studies for energy labelling. Delivery of this output has had the impact of increasing collaboration between all actors in the supply chain of LEDs (from suppliers to retailers) as well as the municipalities and utilities to convey a common message on the benefits of conversion to LED lighting. This output was delivered through the following activities:

- Formulation of a communication plan targeting end-user awareness on the benefits of the LED technology in early 2016. This was achieved through the mapping of stakeholders and formulation of a communication strategy with energy utilities and municipalities to leverage the messaging on increasing consumer acceptance of LEDs;
- Support to include an energy savings calculator in the communications campaign that is known to have a high impact in consumers at national level as well as internationally (with Argentina having replicated the calculator and the name of the campaign);
- A MEPS proposal that was effectively developed by a team of national consultants in 2019 with the support of an international expert, the details of which are provided in Output 3.2 (Para 65);
- A study proposing a unified energy label for all lighting technologies was developed after the MEPS proposal resulting in a unified energy label that was approved by lighting manufacturers, SEC and the Ministry of Energy, and delivered in March 2017**.** Further details are provided in Output 3.2 (Para 65);
- Intense collaborative work between the public and private sector where alliances were achieved with municipalities, ENEL (national utility), Dartel (a large hardware store company) and Signify (Philips). This alliance resulted in a mobile LED store truck being rented for visits throughout different areas and municipalities in Santiago, selling LED technology in locations such as exits to Metro stations. ENEL also placed key messages of the "Cambia el Foco" campaign on its utility bills to further improve messaging to end-users;
- Development and delivery of training courses at GELC in January 2018 on advanced technologies and systems including LEDs and controls to public and private sectors that is also detailed in Output 1.2 (Para 57).

65. Output 3.2: Standardized and comprehensive labels and/or MEPS for LED technologies adopted by the government: As mentioned in Output 3.1, MEPS and labeling proposals were prepared and submitted in 2019 for public consultation prior to adoption by Government that is expected by mid-2020. The delivery of proposals for MEPS and unified labels has provided a clear message to manufacturers and suppliers of LED technologies to Chile of the market standards required for successful sales in Chile. These proposals were prepared through the following actions:

- Seminars and training courses including important members of the Government and the private sector, to assist in their familiarization of trends in lighting technologies, and the application of MEPS and energy labelling. One seminar was delivered in December 2016 in Santiago by international experts to 130 attendees on advanced technologies and systems including LEDs and controls. A second event, Smart Energy Fest, was carried out in December 2018 in Santiago by international experts and U4E partners with 269 attendees (162 men and 68 women) covering advanced topics such as the certification process in market development (presented by Signify), international level market surveillance (MABE), and topics related to the EPR Law (see Output 2.4 under Para 62);

- Development of a MEPS proposal by national consultants with the support of an international expert in 2019, and defined lighting MEPS in terms of lumen and watts, specifically 40 lumens/watt by 2021 (to eliminate halogen lamps), and 85 lumens/watt by 2024 (to eliminate CFLs). This prepares the market for the Government's standards based on the Project guidance, and facilitates an appropriate phase-in period for the more efficient lamps;
- Preparation of a study proposing a unified energy label for all lighting technologies after completion of the MEPS proposal. This labeling proposal was approved by lighting manufacturers, SEC and the Ministry of Energy and delivered in March 2017. The proposal was to allow manufacturers to highlight the efficacy of LED technology over remaining lighting technologies, pushing the market to more highly efficient models. The MEPS and labelling proposal were posted for public consultation in September 2019, with the aim for implementation in mid-2020.

66. Output 3.3: Operational MVE scheme to ensure high quality lighting products on the market that meet MEPS for LED technologies. This output was delivered and ensures that local capacities for market surveillance (based on best international practices) for imported LED technologies into Chile were compliant with MEPS and proposed labeling schemes. Activities to deliver this output included:

- An analysis of the 2017 MVE scheme in Chile was undertaken to identify specific areas of the scheme that needed strengthening. This analysis, presented to the SEC and the Ministry of Energy in April 2017, identified the need to improve the enforcement activities in Chile, specifically closer working relationships with Customs, training for manufacturers on certification systems in Chile, the role and participation of manufacturers in enforcement, and the introduction of an alert system (based on the experience in Mexico);
- Two workshops on certification systems in alliance with the Ministry of Energy and the SEC in June and December 2017. The target audience consisting of 66 people (21 women and 45 men) included retailers, importers, testing laboratories, and certification bodies who were informed of several options to certify the products;
- Study tour of market surveillance in August 2017 in Mexico for one week where SEC, the Ministry of Energy and Fundación Chile have visited different public institutions related to product certification and enforcement;
- Due to the rapid penetration of different brands of LED light bulbs, an analysis on the e-commerce sales was conducted in March 2017 to test 13 LED models that appeared non-compliant to 2016 regulations. After testing in CESMEC, these models were proven to be non-compliant with SEC undertaking legal measures to remove these "free-rider" models from the market;
- Closer collaboration with Philips to collect information of all the lamp exports from China to Chile by mid-2018, and cross checking the information with SEC data to identify uncertified lamps;
- Creation of a lighting commission, CORNELEC (a Chilean institute affiliated with IEC) in August 2018, comprised of main lighting brands in Chile and to improve quality of market surveillance (related to Output 1.2 in Para 57). A self-declaration platform has been created to facilitate market monitoring;
- FCH, Ministry of Energy, SEC, Customs personnel and the certification body attended a seminar on market surveillance and border control in Montevideo, Uruguay in August 2018 organized by the Physikalisch Technische Bundesanstalt (PTB). Experiences on market surveillance from different countries were shared with the aim of harmonizing the regulatory frameworks of Latin American and Caribbean countries.

67. Output 3.4: Compilation of information to determine the increase in the population aware of the benefits of LED technology with information disaggregated by gender. This output was to be delivered in response to Indicator 9 of the ChEEL PRF: "Increase of the % of population aware of the benefits of LED technology (disaggregated by men/women) (proxy indicator) with a target of a 20% increase from a baseline value". In consideration of the proactive position of the Ministry of Energy to obtain this information, the PSC made the decision of increasing LED market share through awareness raising and demonstration programmes and to defer to their funded activities for the delivery of this Output. In this

manner, ChEEL resources could have been re-allocated to other purposes. As such, this Output was delivered largely through a number of information compilations as follows:

- in 2016 during the commencement of ChEEL, an LED market survey was financed and undertaken by the Ministry of Energy (see Para 59) indicating a 2% market share to 40% by January 2019[30]. This survey did serve as a proxy for the absence of awareness data of the population on LED benefits, and was driven by the need to understand LED market share to justify further promotion of LEDs;
- survey done by the University of Andres Bello in 2018 that is similar to the Ministry of Energy survey indicating that 54% of the population is aware of the energy label;
- a 2nd survey by the Chamber of Construction on household lighting has been published in December 2019 using data from 2018 and 2019 with more than 3,000 interviews which is publicly available[31].

Since none of these surveys were financed by Project, none of these surveys were conducted with gender disaggregated information.

68. Output 3.5: Evaluation of a locally implemented LED and lighting controls demonstration program that was designed for selected stakeholder groups (i.e. low-income residents). The design of a demonstration program was commenced in mid-2018 that undertook a complete analysis of the implemented replacement programs in different countries to highlight the advantages and disadvantages of each program. In addition, the successful lighting replacement at the Pablo Neruda High School in Arica (with a payback period of 2 years in from 2018 to 2019) was analyzed to serve as a guide for similar projects to be replicated in other schools. FCH and their marketing specialists used the U4E guidebook examining other country replacement programmes for this demonstration design for replacements using best practices during a roundtable brainstorming session involving a wide spectra of national stakeholders (including the lighting industry, the government, the municipalities, retailers and others) to define the best demo mechanism that should be implemented in Chile. Four demo programs were identified during 2017 and 2018 (some of which are depicted in Figure 4) as listed below:

- Awareness campaign in public and technical schools and colleges with energy efficiency in their curriculums: This demo model was based on "children to parents" phenomena where children can educate the parents about many subjects such as environment and energy efficiency. The model worked with technical schools to educate future electricians on energy efficiency and the benefits of efficient lighting. However, a primary campaign implemented through this model was "Cambia el Foco in public schools" contributing with energy efficiency education across the country including the teaching of smart energy tips to 147 schools and 73,910 students, teachers and other education professionals. By designating them as "ambassadors for efficient lighting", this action has had a significant impact on entire school communities. Cambia el Foco was approached by 5 TV stations and 130 e-media outlets (as arranged and facilitated by a resident FCH journalist), and promoted by national celebrities who also served as ambassadors at no cost to ChEEL. The estimated global impact was 3,544 MWH/year energy saving, 1,433 ton CO_2/year reduced, and US$522,000 of reduced energy bills;
- Municipalities: The objective of this demo model was to aggregate demand for LED lighting products followed by massive LED procurement packages through an official tender process to obtain lower prices for quality products that can be sold to more people. As an adaptation to the local business environment, roundtable participants proposed sales of the LED lighting products from an "LED truck" to be strategically parked. This was piloted in 2017 for 6 months in Providencia and Santiago with 3 trucks parked near Metro station exits and busy bus stops for sale of LEDs, as suggested and permitted by municipalities (costs of the truck operation were evenly split between Philips, ENEL and the ChEEL Project). In addition, municipalities granted

[30] This survey was based on customs data, and certification data from the LED suppliers.

[31] Key findings from this survey include: i) 27% of the population took action to reduce energy consumption with the most common action being the replacement of lamps, out of which 57% of this group took this action (pg 106 of Survey); ii) LEDs are the second most common technology after the CFLs in households (pg 64 of Survey); iii) the lighting household consumption reduced from 520.7 W/household in 2009 to 314.6 W/household in 2018. This is a reduction of 40% over a 10-year period due to the continuous efforts of the Ministry of Energy and the improvements in technology, but not solely related to ChEEL (pg 229 of Survey).

permission to the Cambia el Foco logo campaign to place adverts on bus stops and metro stations. More than 40,000 LED bulbs were sold during this time. The municipalities also strengthened their collaboration with the campaign, donating LEDs to 7 prominent institutions including Calvo Mackenna´s Hospital, Instituto Nacional, Cites in Santiago Centro, Museo de la Memoria, Palacio Cousiño, Intendencia de Santiago, as well as vulnerable sectors of society such as retired people. The estimated global impact was 746 MWH/year of energy saving, 337 ton CO_2/year reduced, and US$ 109,000 saving in energy bills. There were also 12,326 lamps collected for recycling;

Figure 4: ChEEL awareness raising activities[32]

- Energy Utilities: This model was intended to be an ESCO model where utility end-consumers could directly buy LED products from the energy utility. In the case of Chile's ENEL, their mechanism was to sell lamps at low price on their website: https://www.tiendaenel.cl/57-iluminacion-led. This model was applied to the Santiago Metropolitan region reaching around 7 million people. By the EOP, 2,988 lamps were replaced through this model with the estimated

[32] Upper left: LED displays in the Municipality of Providencia; Upper right: Truck selling LEDs at locations with high pedestrian volume; Lower left: LED booth at National Stadium during "Color Run"; Lower right: Fundación Chile appearing on CNN Chile

global impact of 27 MWH/year of energy savings, 13 ton CO_2 reduced, and US$ 4,534 saving in energy bills;

- Retail alliances: This model was designed to lower the barrier of the high LED purchase price, and to educate the public of the benefits of efficient lighting. This information would be passed onto consumers with the sale of discounted LEDs. Alliances were formed with COPEC (at their 550 petrol stations) where 1.2 million units were sold at 25% of the normal market rates (US$2.50 versus US$10.00). The estimated global impact of this model was 24,228 MWH/ year of energy savings, 9,694 ton CO_2 / year reduced, and US$ 4.0 million savings in energy bills;

69. Output 3.6: Demonstration program with procured and installed LED and lighting controls. This output was delivered in collaboration with the Ministry of Energy's lighting replacement programme that had been implemented in 2016 by replacing 704,376 incandescent bulbs with CFLs to 176,094 families throughout Chile[33]. With the commencement of ChEEL in 2016, the Ministry of Energy announced that the delivered light bulbs for their programme would be LED technology combined with the collection of waste lamps. ChEEL resources were used to:

- support FCH assistance to manage the tendering process for procurement of the LEDs under the Ministry of Energy's efficient home program;
- support procurement process and installation of 734,318 fluorescent lamps and LED lamps (62% and 38% respectively) that was co-financed by the Ministry of Energy between 2016 and 2018 with an estimated global impact of 71,000 MWH/yr of energy savings, 28,931 ton CO_2/year reduced avoided per year) that was combined with an awareness campaign on good energy efficiency practices for households (such as environmental and economic benefits of LED technology and suggestions for proper illumination of homes such as warm light for rooms and white light in the kitchen or study rooms);
- procure 294,000 Philips LED bulbs from Signify with ChEEL resources for installation in 110 public schools throughout Chile. This procurement was accompanied with energy efficiency training for 73,910 students, teachers and other education professionals;
- support the retail alliance with Dartel and ENEL for the sale of efficient LED bulbs through on-line sales at a 70% discounted price from the market;
- finance additional lighting replacements as listed in Table 8. These lighting replacements leveraged an additional US$ 0.5 million in co-financing from a variety of sources including private sector, municipalities and utilities;
- Waste CFLs and fluorescent tubes from these programs were properly managed to prevent the release of mercury to the environment. For all the aforementioned bulb replacement programs where LED bulbs were delivered to households, consumers were requested to deliver their spent CFLs and fluorescent bulbs to dispose responsible them. The LED truck also had containers where consumers could drop off their spent CFLs lamps. In total, the aforementioned programs collected and recycled an estimated 12,326 CFLs and fluorescent bulbs. There were no coordinated actions for the disposal of halogen lamps since these lamps do not contain hazardous materials such as mercury.

The overall rating for the achievement of outputs for "Component 3: Lighting innovation: accelerating the use of solid-state lighting (including light emitting diodes (LEDs) and controls)" is highly satisfactory.

The combined overall rating of the achievement of outputs for all three project components is satisfactory.

Table 8: Listing of LEDs installed or sold under Output 3.6 demonstration program

Stakeholder or place	LEDs	Annual energy savings (MWh)	Annual CO2 reduced (tons CO2eq)
Colegio Arica	491	236	96

[33] Includes Antofagasta where the Ministry of Energy programme delivered 25,000 LED lamps to 6,250 families.

Stakeholder or place	LEDs	Annual energy savings (MWh)	Annual CO2 reduced (tons CO2eq)
FCV	324	108	44
Calvo Mackenna	966	90	37
Intituto nacional	18	12	5
Intendencia RM	334	17	7
Museo Memoria	450	21	9
Palacio Cousiño	964	85	35
Cerro Navia	1,800	18	7
Cite Santiago	2,500	26	11
Cerro Navia	2,500	26	11
Providencia	6,000	61	25
Providencia	2,500	26	11
COPEC[34]	1,200,000	24,024	9,802
Dartel[35]	20,000	204	83
ENEL LED Truck	40,000	408	166
Campana Colegios	293,000	3,000	1,224
Recambio Colegios	1,137	156	64
ENEL E-Commerce[36]	2,988	27	11
Total:	**1,575,972**	**28,545**	**11,646[37]**

3.4.4 Achievement of direct outcomes as defined in the reconstructed TOC

70. The reconstructed Theory of Change in Section 2.8 illustrates the outputs and outcomes that the ChEEL Project sought to achieve to contribute to an overall objective of "promoting the rapid uptake of high energy efficient lighting technologies through the transformation of efficient lighting products markets, thereby reducing electrical demand and consumption and the related greenhouse gas (GHG) emissions". In the reconstructed ToC in Figure 3, this "objective" is spread along a development pathway with "promoting the rapid uptake of high energy efficient lighting technologies" as an "intermediate state" prior to achieving "impacts" from the ChEEL Project which is "reduced electricity demand and consumption", and "reduced related greenhouse gas (GHG) emissions". The evaluation of the effectiveness of the ChEEL Project consisted of an assessment of causal pathways from the baseline to the outputs of the Project to generate the intended direct outcomes that would have impacts and generate global environmental benefits (all based on the reconstructed ToC in Figure 3). As such, the intended direct outcomes of the ChEEL Project include:

- Intended Direct Outcome 1.1: "Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened";
- Intended Direct Outcome 2.1: "Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behaviour";
- Intended Direct Outcome 3.1: "Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/ industrial and outdoor lighting applications";
- Intended Direct Outcome 3.2: "Consumers and decision makers are aware of economic benefits of advanced lighting systems through demonstration programmes".

71. The achievement of the intended Direct Outcome 1.1 of "Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened" can be described as follows:

[34] Leverage contributions from private sector, not using GEF sources
[35] Ibid 32
[36] Ibid 32
[37] This is the direct GHG emission reduction. Lifetime direct GHG reductions are provided in Table 7 assuming 10 years

- The capacities of SEC and the Ministry of Energy have been strengthened to undertake MVE activities that streamline the transition to energy efficient lighting in Chile. The well-rounded design of the ChEEL Project has benefitted both the SEC and the Ministry of Energy in addressing their need for exposure to best practices for MVE and equipment necessary for effective MVE schemes. However, SEC who do the bulk of market surveillance to ensure lamps sold are the ones they approve and are to standard, undertake this work, mainly with Customs. They are understaffed with 5 personnel undertaking these market surveillance activities at Customs for all incoming electronic products;
- The ChEEL project has enabled the Government of Chile to develop their own MEPS and labelling systems for efficient lighting under a new National Energy Efficiency Law that is passing through the Chamber prior to Senate approval by mid-2020. At the time of the evaluation, the latest proposal for MEPS and a unified labeling system for lighting devices was undergoing public consultation prior to these proposals coming into force in early 2021;
- Their strengthened capacities have resulted from the involvement of international experts to expose ChEEL stakeholders to best practices on MVE as applied to market transformation to efficient lighting. This included inputs from GELC and Mr. Steve Coyne with regards the upgrading of equipment and Chilean testing labs along with testing protocols for efficient lighting devices. They also travelled to Mexico to observe their MVE scheme for efficient lighting and other electronic devices, and to Uruguay to network with other Latin American countries to share their experiences and learn of other MVE programmes regionally. The outcome has been the increased confidence of SEC and the Ministry of Energy personnel in setting up appropriate structures and entities necessary to ensure only the entrance of certified lighting devices into the Chilean lighting market;
- One testing laboratory, CESMEC has emerged as the only certified testing laboratory for lighting devices in Chile. They are able to sustainably offer this service in Chile since they also maintain other business lines in product testing and certification, allowing them to withstand an uneven demand for such services in a small market such as Chile[38]. The other potential testing laboratory for lighting devices in Chile, FARADAY, was recently closed;
- These actions have sent clear messages to the lighting industry resulting in the formation of a lighting association for voluntary testing of LED products by importers, suppliers and manufacturers of LEDs in Chile;
- Despite ChEEL support for vocational training of electricians (for example, 25 electricians trained at Fundacion Cristo Vive, an institute that provides free training and support to increase employability of vulnerable groups), there is a possible shortage of electricians in the Chilean market with a high degree of vocational skill to identify appropriate LED lighting technologies that provide the best qualities of maximize energy savings and service life of the lamps. This high degree of skill involves the identification of the different types of LEDs available in the Chilean market that are appropriate for a specific installation. Many LEDs available in Chile are made with different metals for the back-plating of the LEDs which affects their heat dissipation that possibly adversely affects their service life. The current market surveillance system is not likely to track this quality aspect of LEDs that is outside of MEPS. Moreover, electricians should have the knowledge of the LEDs that they are installing to ensure not only maximum energy savings but also service life of the appliance.

The overall rating for achievement of Direct Outcome 1.1 of "capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened" is Satisfactory.

72. The achievement of intended Direct Outcome 2.1 of "Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behavior" can be described as follows:

- The government of Chile is currently in a position to enact a national policy that extends producer responsibilities for environmentally sound management of waste electronic products. Specialized inputs of the ChEEL project have assisted the Government of Chile (GoC), specifically

[38] www.cesmec.cl/link.cgi/esp

the Ministry of Environment, to formulate the framework for supporting regulations and legislation (that includes baseline assessments, environmental and social impact studies, proposed strategies to manage WEEE through establishing CRSOs, a study tour to Spain to visit recycling plants for electronic waste that meet international standards, and the delivery of a CRSO business model developed by industrial representatives). As a result, the GoC, specifically the Ministry of Environment, have sufficient information and the national framework to enact an EPR Law by 2021;

- By the end of 2018, with an operational framework in place for a CRSO, a pilot CRSO was being formed with a group of 16 companies that will form a legal CRSO by late 2020. This will also inform the Government of Chile of specific requirements to enact the EPR Law as well as its enforcement. While ChEEL was able to enable the GoC to enact a national EPR Law, it has not had the requisite time to create the enabling conditions for its enforcement. Considering the time to prepare such legislation, the 3-year period of ChEEL to enable the GoC to enact as well as enforce the EPR Law appears overly ambitious.

The overall rating for achievement of Direct Outcome 2.1 of "Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behaviour" is Moderately Satisfactory.

73. The achievement of intended Direct Outcome 3 "Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/ industrial and outdoor lighting applications" can be described as follows:

- Consensus was achieved between consumers, decision makers and the private sector on increasing the use of LEDs in numerous applications based on the participation of these stakeholders in market transformation activities towards LEDs. This was demonstrated by the entrance of municipalities into LED sales who eventually convinced retailers, the electric utility (ENEL) and lighting suppliers to partner with them to promote and sell LEDs for household and commercial use as well for the environment. The LED truck is an example of this cooperation;
- Further consensus was achieved through the participation of municipalities, utilities and lighting companies on national committees to formulate communication plans for raising end-user awareness of LED benefits, and cooperating on market surveillance activities to ensure the prevention of non-compliant lighting devices into the Chilean market;
- There was continued and sustained promotion of LEDs (highlighted by the "Cambia el Foco" campaign) throughout the duration of ChEEL by municipalities, retailers, the electric utility (ENEL), lighting suppliers, the Chilean press and social media. This only served to increase demand and sales of LEDs that reduced LED prices to an extent where they were the same prices as CFLs by EOP, eventually convincing consumers that LEDs represented the best value for serving lighting needs;
- improvement of LED market share of certified lamps increasing from 2% in 2015 to 40% in January 2019 as mentioned in Para 59, exceeding the LED EOP 6% target in the Project Document.

The overall rating for achievement of Direct Outcome 3.1 of "Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/ industrial and outdoor lighting applications" is Highly Satisfactory.

74. The achievement of intended Direct Outcome 3.2 of "Consumers and decision makers are aware of economic benefits of advanced lighting systems through demonstration programmes" can be described as follows:

- Awareness of LEDs and advanced lighting systems in Chile was enhanced through careful design and implementation of demonstration projects designs, one of which was funneled through public and technical schools and colleges that provided donations and installations of LED lighting systems to schools and technical colleges engaging students in learning about and promoting LEDs and advanced lighting systems;

- Sale of LEDs at reduced prices was implemented in a collaboration with municipalities, the electric utilities, and retailers. By working with these groups of stakeholders, the coverage of LED sales throughout Chile was extensive to the extent that 40% of the lighting market was comprise of LEDs by the EOP (as mentioned in Para 59);
- The 40% share of LEDs in the lighting market at the EOP (against an EOP target of 6%) is a strong indicator heightened awareness of the economic benefits of LEDs through these demonstrations in Chile, and the compilation of information from the Ministry of Energy and other sources (as listed in Para 67) of estimates of increased awareness of LEDs and advanced lighting systems in Chile.

The overall rating for achievement of Direct Outcome 3.2 of "consumers and decision makers are aware of economic benefits of advanced lighting systems through demonstration programmes" is Highly Satisfactory.

The overall rating for achievement of all Direct Outcomes is Satisfactory.

3.4.5 Likelihood of impact

75. The "likelihood of impact assessment" (LIA) was made with the assistance of a LIA Decision Tree that is provided in Annex VII. With the assessment based mainly on the holding of assumptions and drivers being in place to advance developmental results towards desired impacts, the following comments are made in the "responses" for the LIA in Annex VII:

- Drivers such as mandatory labelling for all lighting devices and the promotion of energy efficiency labels to consumers are only partially in place with a new "National Energy Efficiency Law" currently being developed by government, and expected to come into force in late 2020 or early 2021. As such, drivers to support the transition from outputs to direct outcomes are only "partially in place";
- All intended outcomes of the ChEEL project have either been fully achieved or partially achieved, with the level of direct outcome achievements in most cases being partially achieved. This would include Outcome 2.1 where the Government of Chile was only able to enact a national policy creating an extended producer responsibility for environmentally sound management as it pertains to the lighting market. This was probably due to the fact that the 3-year duration of the ChEEL project was insufficient time to achieve such an outcome of enacting as well as in forcing this national policy;
- Drivers that support the transition from direct intended outcomes to the intermediate state of "rapid uptake of high energy efficient lighting technologies", are mostly in place with the exception of the promotion of energy efficiency labels which is not yet fully in place until full promulgation of the aforementioned National Energy Efficiency Law;
- With the intermediate state of "rapid uptake of high energy efficient lighting technologies" being achieved with a 40% share of the LED market, the drivers to support the transition from intermediate state to impacts, again, are only partially in place due to the National Energy Efficiency Law that will be in force in 2021.

76. In addition, LIA can also be evaluated against the ToC assumptions (from Figure 3):

- With regards to "the Government not delaying the passage of and implementation of the Law of Extended Producer Responsibility" and "Government enforces environmentally sound management", a new EPR Law will be decreed in 2021 for WEEE (Para 60) to include lighting waste, obligating manufacturers and suppliers of lighting devices for their environmentally responsible disposal. This EPR Law provides indicators that these assumptions hold partially true;
- With regards to "LEDs are not perceived by consumers to be too costly", the Ministry of Energy surveys of 2016 and 2019 indicating an increase from 2% to 40% market share for LEDs (Para 67) provides a strong indicator that this assumption hold true;

- With regards to "Government is able to setup supporting financial programmes to increase access to LEDs and other advanced lighting systems", the Government has already demonstrated its capacity at the national and municipal levels to provide financial support for increasing LED market access if deemed necessary. Various Government schemes are mentioned in Para 68 with actual Government involvement in demonstration schemes mentioned in Para 69. These provide strong indicators that this assumption holds true; and
- With regards to the "continuance of certification bodies to provide services to manufacturers and retailers on the quality of LEDs entering the Chilean market", there is the emergence of CESMEC as Chile's certified laboratory for the testing of lighting devices (Paras 71 and 92). This is a strong indicator that this assumption holds true.

The overall rating for likelihood of impact of the ChEEL Project is Likely.

3.5 Financial Management

3.5.1 Completeness of project financial information

77. The following financial information was made available to the Evaluation:

- for the FCH technical assistance amount of US$1,818,365, 4 cash advance requests were made from FCH to DGEF's FMO[39]. This resulted in GEF funds being made available to FCH for ChEEL activities based on annual work plans prepared by FCH, the terms and conditions of the November 2015 Project Cooperation Agreement (PCA) between FCH and UN Environment, and 3 subsequent amendments to the PCA[40];
- Expenditure statements prepared by FCH against UNEP budget lines and cash remaining at the end of the reporting period. These were prepared on a quarterly basis;
- Semi-annual expenditure reports prepared by UNEP en.lighten for their US$617,348 portion of the GEF grant;
- The December 2016 and December 2017 independent financial audits of FCH determined that there were no issues with regards to financial statements of the ChEEL project including the cash received, disbursed and cumulative investments for the year ending 31 December 2017 (in accordance with the accounting policies described in the financial statements) and the value of in-kind contributions from co-financers of ChEEL;
- Separate co-financing reports prepared by FCH (using UNEP budget lines) to track co-financing from FCH as well as other stakeholders such as GELC, Ministry of Energy, Ministry of Environment, Philips, and UNEP. There is also a co-financing summary report for ChEEL prepared by FCH.

78. Overall, the completeness of financial information for the Project is rated **satisfactory**. The only issue related to the financial information has been the inability of the existing UMOJA system used by UNEP for managing GEF projects to monitor component and project management expenditures[41]. All GEF expenditures fall under set UNEP budget lines for the entire project without separating these expenditures into each component as laid out in the CEO Endorsement Document. Otherwise, most of the financial information including expenditures was complete. This includes all financial information listed in UNEP's Evaluation Criteria from 2017 as further detailed in Annex V.

The rating for completeness of financial information is Satisfactory.

[39] 1st advance made on 18 December 2015, 2nd advance on 1 August 2017, 3rd advance on 5 June 2018, and 4th advance on 15 November 2018 and final payment made on 23 December 2019.
[40] Amendment No 1 dated 14 September 2017, Amendment no. 2 dated 15 January 2018, and Amendment no. 3 dated 31 December 2018.
[41] When ChEEL was started implementation, the budget was changed from the IMIS format to UMOJA with UNEP staff just learning how to use the system. As such, there was no opportunity for staff to set up in UMOJA to capture expenditures at the component level.

3.5.2 Communication between finance and project management staff

79. In rating the communication between UNEP finance personnel and project management staff of FCH, the communication aspects between finance and project management staff is assessed as follows:

- work plans and annual budgets were prepared by FCH on an annual basis and updated after each PSC meeting (generally, there were 2 PSC meetings annually). These were submitted to UN Environment's DGEF for approval. Cash advance requests for implementing the FCH aspects of the ChEEL Project were less frequent and made depending on fund availability. The PCA stipulated that Fundación Chile would implement these activities initially at their cost with ChEEL reimbursement after submission of all required reports and financial audits;
- adjustments being made by FCH to align actual expenditures with reported expenditures that clarify GEF expenditures to UN Environment's DGEF;
- FCH communications with UN Environment to inform them of the rationale for proposed budgets and future expenditures, and PSC decision from 9 August 2018 of a need for a no-cost extension from December 2018 to May 2019;
- There is evidence in discussions with FCH personnel of their close collaboration with DGEF FMO and UNEP Task Manager on reporting project progress.

The aforementioned provides the Evaluation with sufficient evidence that communications between the FCH Project Manager, the UNEP FMO (within DGEF), and UN Environment Task Manager all being aware of the financial status of the Project.

The rating for communication between finance and project management staff is Satisfactory.

3.6 Efficiency

3.6.1 Timeliness

80. The Project was originally scheduled for a period of 3 years from 4 January 2016 to 4 January 2019 2016 in the Project Document. However, the Project did receive a 5-month no-cost extension at the request of the Chilean GEF OFP to extend the terminal date of ChEEL from 4 January 2019 to 31 May 2019, to provide more time for the PMU to collect lessons learned. The request for this no-cost extension was initiated by the PSC on its 9 August 2018 meeting minutes.

81. By the EOP, the ChEEL Project grant resulted in:

- A critical mass of stakeholders in Chile who are involved in effective MVE activities that ensure a smooth transition of the Chilean market towards energy efficiency lighting that includes LED lighting devices;
- The Government of Chile being able to enact a Law of Extended Producer Responsibility that was informed by foreign experience, a study of the business feasibility of a CRSO, and the setup of an operational pilot CRSO;
- Strengthened collaboration between the private sector, municipalities, relevant government agencies and the local electricity utilities in Chile on the promotion and sale of LEDs to consumers as a means of catalyzing LED usage and higher LED market penetration;
- Demonstration LED projects in strategic locations to provide tangible evidence of the benefits of energy efficient lighting for Chile.

82. The approaches of ChEEL activities are all strongly connected to achieving the targets of the Project. Though some of the targets were not achieved (such as the enforcement of the EPR Law), this was not due to poor sequencing of ChEEL activities. It was mainly due to the 3-year implementation period of ChEEL, which is likely too short a time to formulate and promulgate a piece of legislation followed by its implementation and enforcement. Under the circumstances, ChEEL's achievements on Component 2 likely could not have been done in a shorter period of time. As such, the timeliness of ChEEL according to UNEP's evaluation criteria on efficiency is rated as satisfactory.

3.6.2 Cost Efficiencies

83. Cost-effectiveness of the ChEEL Project was gauged by the use of well-qualified specialists recruited under the en.lighten-UNEP technical assistance, the activities involving engagement of local stakeholders and consultants as coordinated by FCH, and the Project taking advantage of opportunities for economies of scale. For example, under en.lighten-UNEP technical assistance:

- an international expert from Berkeley University was recruited to support national preparation of a MEPS proposal for lighting devices;
- the involvement of GELC (based in Beijing) was instrumental in exposing best international practices to Chilean labs and market surveillance personnel for testing of lighting devices;
- another international expert, Mr. Steve Coyne was recruited to guide SEC and testing laboratories in Chile on the development of testing protocols, and to identify the best approaches to becoming certified testing lamps based on their existing laboratory setups;
- an international expert, Mr. Ignacio Duque, was recruited to assist in the design of an operational framework for a CRSO as a pilot measure and means to comply with the new EPR Law;
- the November 2016 Ambilamp trainings in Spain were provided to both Peru and Chile UNEP-GEF efficient lighting projects through their linkages with UNEP-U4E technical support, generating economies of scale and allowing for experience sharing.

The overall highly satisfactory performances of these consultants can be attributed to the detailed terms of references (ToRs) prepared by FCH to articulate in precise terms the assistance required from these experts. This understandably was time consuming but worth the effort considering the opportunity costs and possible project delays if the consultancy did not deliver the required technical assistance.

84. Approaches undertaken by FCH include:

- recruitment of national consultants to assist in the preparation of proposals for MEPS and a unified lighting energy labelling system. This was necessary to streamline the country's transition to efficient lighting;
- identifying and assembling a group of stakeholders with interest in compliance with the EPR Law and getting their assistance and cooperation in characterizing baseline waste management processes and contributing to a locally developed framework for operational CRSO. This approach was critical towards local collaboration in the compliance to the EPR Law; and
- Identification of sites for LED demonstrations and dissemination models for LED bulbs that would maximize the promotion of LEDs, generating interest in the use of LEDs as a primary technology for lighting. This includes demonstrations at schools and municipalities, and sales of LEDs in busy public locations such as bus stops and metro stations.

85. The Evaluation also notes that at the EOP, US$3,858 (0.06% of the total UNEP funds from ChEEL funds) was still unexpended. This is a satisfactory result notwithstanding that there was already one no-cost extension request that was approved (Para 78). The Evaluation also notes that these expenditures have also catalyzed more than US$15.36 million in co-financing from various partners (see Table V-2 for details), exceeding the target of US$ 5.94 million. The US$15.36 million does not even include the additional co-financing of more than US$ 0.52 million leveraged from municipalities, utilities and retailers that were not considered during the design of ChEEL (see Table V-4). Considering the efficient sequencing of all ChEEL Project activities and high co-financing levels, the cost efficiencies for ChEEL were rated as highly satisfactory.

The overall rating for efficiency is Satisfactory.

3.7 Monitoring and Reporting

3.7.1 Monitoring design and budgeting

86. Section C and Annex G of the ChEEL CEO Endorsement Document provides the description of the monitoring and evaluation (M&E) design. While it is assumed that the M&E design is consistent with GEF Monitoring and Evaluation policy, the budgeted "M&E plan" in Section C only contains details on the mid-term review and the terminal evaluation with a reference to Annex G for details of M&E activities and budget. Annex G does contain a table of M&E activities consisting of the Inception Workshop and report, half-yearly progress reports and quarterly financial reports, technical and thematic reports, PIRs, the MTR and TE, the Final Report and financial audits. An indicative M&E budget was provided.

87. This table does tie each M&E activity with responsible parties and frequency of the activity with indicative cost estimates. However, as mentioned in Paras 52 and 53, the ChEEL PRF does not fully conform to best practices, with suggestions made on how the PRF could have been improved which would have improved the efficiencies of implementing an M&E plan, eliminating a number of indicators that were not measurable (such as the indicators on future sales and post project energy savings and emission reductions, targets that cannot be measured during the implementation of ChEEL).

88. Overall, the design and budgeting of the ChEEL M&E plan does provide cursory guidance that could have been improved using best practices in the preparation of the PRF. Moreover, gender disaggregation is not covered in the M&E plan, which if covered, may have uncovered some useful gender-biased information on LEDs and lighting in general. As such, the M&E design and budgeting are deemed to be **moderately satisfactory**.

The rating monitoring design and budget is Moderately Satisfactory.

3.7.2 Monitoring of project implementation

89. The monitoring of project implementation has been rated as **satisfactory.** Primary reasons for this rating not being higher was evidence of the FCH team monitoring ChEEL indicators despite the flaws in the ChEEL PRF as outlined in Paras 52 and 53, that probably reduced the efficiency and effectiveness of monitoring some of these indicators and targets which are not SMART. As an example, there were indicators related to awareness or market share, where PIRs did report that the Ministry of Energy has been undertaking these surveys. With this scenario, it is possible that FCH did not have control over the scope of these surveys, for example, obtaining data related to the indicator of "increase of the % of population aware of the benefits of LED technology", and including gender disaggregated data; it is unclear if this is included in the Ministry of Energy survey.

The rating for monitoring project implementation is Satisfactory.

3.7.3 Project reporting

90. The evaluation had access to project reporting of the ChEEL Project implementation primarily through 2017 and 2018 Project Implementation Reviews or PIRs. These reports provided details of progress towards objectives, implementation progress, and risk management for the ChEEL Project against the component indicators. These progress reviews provided details of all component efforts to establish the MVE system, the framework for the EPR Law and CRSOs, and implementation of LED demonstrations. These reports provided evidence of substantial coordination, collaboration and communication efforts of FCH to advance the ChEEL Project as far as possible during a 41-month implementation period. The quality of these PIRs provided an adequate level of detail on the progress of activities funded by the GEF grant.

91. These PIRs also do provide result-based monitoring and reporting that were instrumental in providing continual improvements and adaptive management measures to ChEEL implementation[42]. A

[42] In the PIR section of "3. Rating Project Performance and Risk", there is a section after each component entitled "Action plan to address MS, MU, U and HU rating" which essentially requests the PM to propose adaptive

ChEEL mid-term review was deemed not necessary due to the fact that that ChEEL was less than 4-years of duration and PIRs indicating successful progress towards achieving its outcomes. However, there appears to be little if any reporting with gender disaggregated information. Project reporting for the ChEEL Project has been rated as **satisfactory**.

The rating for project reporting is Satisfactory.

3.8 Sustainability of Outcomes

3.8.1 Financial sustainability

92. The financial sustainability of ChEEL is primarily assessed against the 4 Direct Outcomes:

- For Outcome 1.1, there appears to be a low dependency on future financing to sustain the capacities for MVE to effectively transition to efficient lighting markets. The future financing of the certified testing laboratories appears to be in place, especially with the emergence of CESMEC as the primary certified testing laboratory available in Chile for new lighting products. As such, the financial sustainability for Outcome 1.1 is ranked as satisfactory;
- For Outcome 2.1, there is a pilot CRSO being formed to comply with the new EPR Law. This CRSO is comprised of 16 companies who have an interest in complying with the new EPR Law, and will provide finances towards its development and operationalization. As such, sustainability for Outcome 2.1 is ranked as satisfactory;
- For Outcome 3.1, there appears to be no dependency on future funding since the sustainability of this outcome is mainly driven by supporting policies, national programs, and standardized and comprehensive labels and MEPS for LED-equivalent lighting technologies or better. As such, the sustainability of Outcome 3.1 is ranked as highly satisfactory;
- For Outcome 3.2, there appears to be no dependency on future funding since the sustainability of this outcome is market driven by lower LED prices and higher consumer awareness of the benefits of LED lighting that translates into a preference for LED lighting. As such, the sustainability ranking for Outcome 3.2 is highly satisfactory.

93. In conclusion, the financial sustainability of the ChEEL Project is rated as satisfactory based on a low dependency on future funding for the CRSO (Outcome 2.1) and the sustainable business model for CESMEC, the testing laboratory.

The financial sustainability rating is Satisfactory.

3.8.2 Socio-Political sustainability

94. The socio-political sustainability of ChEEL is primarily assessed against the 4 Direct Outcomes:

- For Outcome 1.1, there appears to be strong ownership by governments and its stakeholders on the MVE system in place. The MVE system is also supported by the new National Energy Efficiency Law that will include MEPS as well as a unified system for labels for lighting devices. This system also augments the Government's resolve towards achieving its ENIE goals that includes controlling the level and limiting the release of mercury in lighting products into the environment. As such, the sociopolitical sustainability of Outcome 1.1 is assessed as satisfactory.
- For Outcome 2.1, There is a fairly strong ownership group with interest to develop and operationalize a CRSO. This ownership group which is comprised of electronic producers and suppliers, is driven by the need to comply with the new EPR Law. As such, these sociopolitical sustainability assessment for Outcome 2.1 is satisfactory.
- For Outcome 3.1, There appears to be a moderate dependency on sociopolitical factors based on the Government's mandate to meet the targets of ENIE. However, there are high

management measures to rectify less than satisfactory ratings. This Evaluation notes this has been done in the 2017 and 2018 PIRs.

levels of ownership commitment with the various levels of governments, the electric utility, retailers and end-users in the transition of the lighting market in Chile to efficient lighting devices. Considering the soon-to-be-promulgated National Energy Efficiency Law, which specifies MEPS and mandatory labels, LEDs are likely to be the main lighting technology in Chile. As such, the sociopolitical sustainability of Outcome 3.1 is highly satisfactory.

- For Outcome 3.2, there is a moderate degree of dependency on sociopolitical factors but a high level of ownership by the Government in its mandate to meet the targets of ENIE. As in Outcome 3.1, there is also the new National Energy Efficiency Law which is driving the lighting market towards a greater market share of LEDs in Chile. As such, the sociopolitical sustainability of Outcome 3.2 is highly satisfactory.

95. In conclusion, the sociopolitical sustainability of the ChEEL Project is rated as satisfactory based on strong ownership demonstrated by all stakeholders to ensure smooth transitions towards an energy efficient lighting market, coupled with a fairly strong ownership group for a CRSO that is interested in compliance with the new EPR Law obligating producers and suppliers of electronic products to manage electronic waste in a environmentally responsible manner.

The overall socio-political sustainability rating is Satisfactory.

3.8.3 Institutional framework sustainability

96. The institutional framework sustainability of ChEEL is primarily assessed against the 4 Direct Outcomes:

- For Outcome 1.1, There is a high dependency on institutional support to enforce the new National Energy Efficiency Law. While supporting rules and regulations are being formulated for this new Law, there are strong mechanisms in place such as the MVE system to ensure minimal presence of "free riders" in the lighting market in Chile. The capacities of relevant stakeholders to the MVE system, having been enhanced by the project, serves as the initiation of an exit strategy for the institutional aspects of ChEEL. As such, the institutional framework sustainability of Outcome 1.1 is assessed as satisfactory;
- For Outcome 2.1, There is also a high dependency on institutional support to enforce the new EPR Law. However, the EPR Law mechanism that is in place is a CRSO, which is being piloted in a partnership consortium of 16 companies which when operationalized, will continue to inform the development of the new EPR Law. As such, the institutional framework sustainability of Outcome 2.1 is assessed as satisfactory;
- For Outcome 3.1, While there is a low degree of dependency on institutional support, strong mechanisms are in place with the expected implementation of the new National Energy Efficiency Law by early 2021. This Law will make all lighting devices of a high energy efficient standard with mandatory labels available on the Chilean market. As such, the institutional framework sustainability of Outcome 3.1 is assessed as highly satisfactory;
- For Outcome 3.2, There is no dependency on institutional support with the new National Energy Efficiency Law complete with MEPS and mandatory labelling for lighting devices about to be in place. With end-users having demonstrated their preferences for LEDs, an increased market penetration of LEDs is expected. As such, the institutional framework sustainability of Outcome 3.2 is assessed as highly satisfactory.

97. In conclusion, the institutional framework sustainability of the ChEEL Project is rated as satisfactory based on the advent of strong supporting legislation (the new National Energy Efficiency Law) that will only make energy efficient lighting devices available on the Chilean market, and low dependency of institutional support for the increase in market share of LEDs sales in Chile (that is mainly market driven).

The institutional framework sustainability rating is Satisfactory.

3.9 Factors affecting performance

3.9.1 Preparation and readiness

98. This section provides an assessment of the ChEEL Project's readiness and preparation between the approval date of the project (January 2016) and the Inception Workshop of 22 March 2016. During this period of time, Project activities included preparations for the Inception Workshop, collection of information relevant to the baseline scenarios for energy efficiency, labelling and MEPS in Chile, and baseline assessment of the capacity of testing laboratories in Chile.

99. Much of the evidence of the readiness of the ChEEL Project is reflected in the Inception Workshop report from April 2016. This report provides evidence of:

- a comprehensive inception meeting in the presence of all relevant stakeholders as listed in the CEO Endorsement Document for ChEEL;
- the development of an appropriate and detailed work plan for the entire 3-year duration of the project;
- the establishment and naming of members of the Project Steering Committee (PSC);
- ChEEL Project Management Unit (PMU) staff mobilization undertaken;
- ChEEL governance and management arrangements established;
- full mobilization of the ChEEL project took only 4 months.

100. There is also evidence:

- of the procurement modalities for the ChEEL Project as defined under the PCA;
- that no changes were made to the ESE safeguards as contained in Annex G in the CEO Endorsement Document;
- that partner capacities on the ChEEL Project were already confirmed with analysis of the capacities of these partners and stakeholders having been previously done (from involvement of these partners in previous projects);
- that there was a Project Review Committee that commented on the need for the involvement of the UNEP Regional Office (which resulted in the involvement of 2 persons from the regional office to support ChEEL implementation).

The rating for preparation and readiness is satisfactory.

3.9.2 Quality of project management and supervision

101. Management and supervision of the ChEEL Project took place mainly between January 2016 and May 2019 over a 41-month period when GEF grant funds were disbursed. UNEP was the implementing agency providing oversight management and international technical assistance to the ChEEL Project while the executing agency, FCH, was responsible for leadership and supervision in the delivery of assistance to local stakeholders to develop the enabling regulatory and investment environment towards a transition to energy efficient lighting in Chile.

102. With regards to ChEEL management and supervision of Project inputs, there is evidence of:

- a well-established and functional PSC that had 6 official meetings and served as a critical part of the decision-making process for ChEEL. The PSC was comprised of representatives from MoE, the GEF OFP, UNEP, Ministry of Environment, SEC, FCH, CORNELEC (the lighting association), and national expert consultants. The consensus decision-making process of this group served as a key to effective management of ChEEL activities;
- the presence of a Technical Working Group (TWG) with the mandate for convening public and private stakeholders in a formal setting that met twice during implementation. TWG members

were comprised of personnel from UNEP-en.lighten, FCH, SEC, CORNELEC, SERNAC, and various lighting suppliers and manufacturers;

- FCH providing excellent management and coordination functions as the ChEEL PMU. This includes frequent communications with all stakeholders, most importantly the MoE, SEC and the Ministry of Environment. PMU personnel have remained the same since the commencement of ChEEL in January 2016;
- timely provision of international technical assistance to ChEEL through the UNEP en.lighten team in Paris. All local stakeholders have mentioned the high quality of international expertise provided to ChEEL that has been a major contribution to the knowledge of best practices to the Ministry of Energy, SEC, the Ministry of Environment, the testing laboratories, and lighting suppliers and retailers in Chile;
- there was excellent adaptive management of activities including:
    - the need to adjust ChEEL activities (including various workshops and seminars) to the November 2017 Presidential elections in Chile to minimize Project delays;
    - a decision to bring in an international expert on LED technology to assist local testing labs and SEC on the most appropriate approaches to certification of lighting products and operationalizing MVE systems in consideration of the equipment available and systems in place in Chile;
    - the dropping of efforts for a lighting NAMA due to market conditions for efficient lighting which precluded any benefits of preparing a NAMA to finance efficient lighting transition;
- the efficient and effective institutional and management arrangements of the ChEEL Project were extended to the UNEP-implemented GEF project entitled "Leapfrogging Chilean's Markets to More Efficient Refrigerator and Freezers" (GEF ID. 9496) that utilized Fundacion Chile and UNEP-U4E for management and technical support, and the approach working with private sector based on the success of ChEEL. This project commenced in mid-2018 at a time when ChEEL was winding down its activities. Furthermore, clear synergies between the two projects were demonstrated during a large event organized in December 2018, when both projects conducted PSC meetings on the same day.

The rating for quality of project management and supervision is highly satisfactory.

3.9.3 Stakeholder participation and cooperation

103. Evidence based on available documents and discussions with Project personnel indicates that the executing agency, FCH and the UNEP en.lighten teams, had a key role in the engagement of stakeholders into the activities of the ChEEL Project:

- FCH was able to easily identify the roles and responsibilities of all key stakeholders (i.e. Ministry of Energy, Ministry of Environment, SEC, Philips, GELC) due to their previous involvement on the global en.lighten project;
- FCH outreach and engagement on ChEEL with other relevant stakeholders included municipalities (many around Santiago), retail outlets and the electric utility in Chile (ENEL) on the basis of identification of 4 models to implement an LED demonstration program (see Para 67);
- there is evidence of excellence support in Paras 66, 68 and 69 to facilitate collaborative consultations and communications with these stakeholders with the sole purpose of increasing and catalyzing LEDs sales throughout Chile;
- FCH along with the PSC made decisions on the location of various LED demonstrations that included considerations of vulnerable groups and linkages to poverty alleviation. Examples of this approach included ChEEL demonstrations being conducted at Providencia where there are a high proportion of retired people, hospitals (such as Calvo Mackenna's Hospital), and educational institutes that focus on education of low income communities (such as Fundación Cristo Vive).

104. Discussions during the Evaluation with ChEEL stakeholders revealed a high degree of satisfaction with the technical assistance and collaboration of FCH and the international consultants recruited by UNEP en.lighten teams. This is a strong indicator of the high effectiveness of the stakeholder recruitment process for the ChEEL Project. Moreover, the effectiveness of stakeholder participation and cooperation is strongly linked to the Ministry of Energy's survey of the increased LED market share from 2% in 2016 to 40% at the EOP, a key indicator of success for the ChEEL Project, and the leveraging of additional co-financing of US$ 0.52 million from 3 municipalities, 2 private companies and 1 utility (as shown on Table V-4).

The rating for stakeholder participation and cooperation is Highly Satisfactory.

3.9.4 Responsiveness to human rights and gender equality

105. The ChEEL CEO Endorsement Document only partially mainstreams gender issues. While gender issues are reflected in the context and PRF of the project, there is an absence of detailed budget to implement gender related activities. Some examples of this are related to the awareness raising activities and surveys of LED market share where disaggregation of survey data into age and gender may identify different needs with respect to lighting technologies (and possibly facilitate greater participation in the promotion of energy efficient lighting in consumer information messaging), as well as addressing gender as a topic during stakeholder and project meetings.

106. Despite partial mainstreaming of gender in ChEEL design, the Evaluator notes that the awareness raising surveys of ChEEL were under the financing, management and control of the Ministry of Energy, and not ChEEL due to the high cost of these surveys. Discussions with FCH and the Ministry of Energy in October 2019 reveal that the LED market survey questions focused on LED market share without any confirmation that the survey will have any gender disaggregated data. Notwithstanding, implementation of ChEEL activities did not appear to have a bias to either gender with photo evidence of gender balance in all ChEEL activities (though FCh did make efforts to track the number of people trained by gender in the PIR and final reports). As such, the rating for this Project's responsiveness to human rights and gender equality based on current UNEP evaluation criteria would be **1 or gender partially mainstreamed**.

3.9.5 Country ownership and driven-ness

107. To assess country ownership and driven-ness, evidence was reviewed to confirm that all government ministries and public sector agencies working with ChEEL undertook leadership roles on various activities including:

- the Ministry of Energy through their co-financing of LED procurement for demonstration projects (both cash and in-kind), their selection of communities and vulnerable stakeholders where LED demonstrations were conducted, and their in-kind contributions through SEC to facilitate the setup of MVE systems and close collaboration with testing laboratories;
- the Ministry of Environment and their in-kind co-financing to process information collected by ChEEL on baseline practices for managing waste electronics, and incorporating study findings of ChEEL international experts into their new EPR Law;
- municipalities whose cooperation[43] was not originally expected in the Project Document but resulted in being able to sell LEDs with the LED truck that was strategically located at bus stops and metro station exits with the permission of the municipality; and
- the electric utility, ENEL, who provided in-kind contributions[44] to the setup of the LED truck as well as a website for online sales of LEDs.

The rating for country ownership and driven-ness is highly satisfactory.

[43] This is reflected in their in-kind co-financing of USD$ 315.890 as shown in Table V-4.
[44] This is reflected in their in-kind co-financing of USD$ 172,727 (retailers) and US$$ 34,848 (ENEL) as shown in Table V-4.

3.9.6 Communication and public awareness

108. Communication and public awareness activities of ChEEL were implemented under Component 2 and 3 covering national awareness raising and experiences of implementing LED demonstrations. Based on available information provided to the evaluation, mainly through the Project's "Cambia el Foco" website (https://www.cambiaelfoco.fch.cl/), there is evidence to suggest that:

- The communication activities were well targeted to specific audiences given the content of the website that is dedicated to the sale of LEDs in Chile and to the dissemination of LED benefit information to all users and the public;
- The involvement of several of ChEEL's stakeholders in the content of the Cambia el Foco website has been largely effective in the increase in knowledge to LED end-users and of the market share of LEDs in Chile's lighting market;
- ChEEL alliances with the public and private sectors, namely the municipalities, ENEL, suppliers and retailers (such as Signify with Philips, Dartel and COPEC gas stations) has provided added muscle to ChEEL communications and public awareness efforts. For example, ENEL placed key messages from Cambia el Foco on its electricity bills, and municipalities permitted free posting of this campaign's messages on shelters at city bus stops and metro stations;
- ChEEL partnered with the Ministry of Energy's lighting replacement program in 150 schools that was accompanied by training in energy efficiency with lighting replacements. The teachers that received the training were then able to pass on their knowledge of energy efficiency through lighting replacements to their students, leveraging the key messages of Cambia el Foco. There were also children in this partnership who became "ambassadors for good energy"; and
- ChEEL had outreach through television and media to spread the messages of Cambia el Foco to the general public with a focus to increase the usage of LEDs.

The rating for communication and public awareness is Highly Satisfactory.

4 Conclusions, Recommendations and Lessons Learned

4.1 Conclusions

109. The ChEEL project has been effective in its efforts to promote the rapid uptake of high energy efficient LEDs in Chile. In its efforts to implement the Government of Chile's National Efficient Lighting Strategy 2013 – 2017 (ENIE) as developed by the Ministry of Energy under an integrated policy approach, ChEEL was designed to assist the Government of Chile in i) developing MEPS and labelling systems; ii) formulating support mechanisms and policies to avail and promote the demand for highly energy efficient lighting devices in the Chilean market; iii) MVE systems to ensure maximized compliance to MEPS; and iv) setting up frameworks for environmentally sustainable actions related to the disposal of used lighting devices.

110. There were efforts to bring in best international practices using the professional network of the UNEP en.lighten team for developing minimum energy performance standards (MEPS) for lighting devices and unified labels that will increase the availability of high-quality energy efficient lighting devices in Chile. This has led to an outcome of the Ministry of Energy incorporating the proposal for a lighting MEPS along with a unified labelling system into a National Energy Efficiency Law to be implemented in mid-2021 (with the MEPS and labelling proposal public consultation process completed in late 2019) (Para 71).

111. The ChEEL Project is leaving behind several trained personnel within the SEC who are able to manage an MVE system to ensure the minimal presence of "free-rider" lighting devices on the Chilean market. This includes 6 trained personnel (1 woman and 5 men) and the availability of a certified testing lab, SECMEC, that is able to efficiently and accurately determine the compliance of lighting devices on the Chilean market for safety and MEPS (Para 71). Only time will tell if one certified testing lab for lighting devices in Chile is sufficient, or if another one is required.

112. The Project is also leaving behind the framework for enacting an Extended Producer Responsibility Law, which will obligate producers and suppliers of waste electronic goods to dispose of them in an environmentally sound manner. This also includes an agreement of a consortium of 16 companies, all of whom are agreeable to form and finance a "Collection Recycling System Organization" or CRSO that should begin operations in 2021 on a pilot basis; an operational CRSO will inform supporting rules and regulations for the EPR Law (Para 72). While this was not a full achievement of the outcome for enacting and enforcing and EPR Law, the achievement is nevertheless significant given that the time to collect baseline information on current practices in managing e-waste in Chile, assemble a pilot CRSO, and organize and conduct this study to work of best practices for e-waste management in Spain, was conducted in a fairly efficient manner. In addition to providing assistance towards improving the capacity of Chile to enact the EPR Law, especially in dealing with spent and waste lamps, the success of ChEEL's contribution in Component 2 can serve as a template for other WEEEs to improve CRSO operations who are managing multiple WEEE waste streams.

113. Lastly, there remains significant interest in the sale of LEDs through retail outlets and ENEL, based on the key indicator from the Ministry of Energy which states that the market share of LEDs in Chile has grown from 2% in 2016 to 40% in 2019. This can be attributed to the dramatic increase in availability of quality LEDs in Chile facilitated by the project's awareness raising campaigns and effective information dissemination programmes, and the government's driven-ness ensure the necessary legislation is promulgated with energy efficiency labelling and MEPS for lighting devices in place. While ChEEL has focused mainly on the residential sector and vulnerable groups for efficient lighting, the Ministry of Energy is positioned well to promote efficient lighting to the commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. Moreover, a number of ChEEL actions can be and are being replicated for rapid uptake of efficient lighting and other highly energy efficient electronic devices in Chile such as refrigerators (using the 4 demo program models mentioned in Para 68 and management arrangements on another UNEP-GEF project in Chile as mentioned in Para 102, 6th bullet). The Government of Chile has institutions and agencies to manage such processes but will require periodic inputs of international expertise to ensure compliance to best international practices.

Table 9: Summary of the evaluation criteria ratings

Criterion	Summary Assessment	Rating
A. Strategic Relevance		**HS**
1. Alignment to MTS and POW	Strong alignment with MTS, BSP and SSC (Paras 36-41)	HS
2. Alignment to UN Environment /Donor/GEF strategic priorities	Though a GEF 5 project, ChEEL strongly aligned with GEF 6 CC1 and CW1, and GEF 7's CC Focal Strategy Objective 1 (Paras 42-44)	HS
3. Relevance to regional, sub-regional and national environmental priorities	Relevance to Chile's NCCAP, INDC's from 2015, the 2012 National Energy Strategy, and the Minamata Convention on Mercury (Para 45)	HS
4. Complementarity with existing interventions	Complements ENIE interventions that started in 2013. (Para 45)	HS
B. Quality of Project Design	Although strength of ChEEL design is in its holistic approach, improvements could have been made to align the preparation of the PRF with best practices (Para 53)	**S**
C. Nature of External Context	ChEEL not affected by climactic events, the security situation, infrastructure, economic conditions and political stability, notwithstanding the October 2019 events of civil unrest that occurred after the EOP (Para 54)	**HF**
D. Effectiveness[45]	All ChEEL outcomes achieved with most of the outputs being delivered.	**S**
1. Delivery of outputs	All outputs delivered (Paras 55-69).	S
2. Achievement of direct outcomes	Most of the targets of all 4 direct outcomes of ChEEL being achieved (Paras 70-74).	S
3. Likelihood of impact	Impact is likely due to several strong market drivers such as mandatory labelling, higher consumer level of awareness and lower ad affordable LED prices for consumers (Paras 75-76).	L
E. Financial Management	ChEEL financial information was complete with exception of inability of the existing UMOJA system to manage GEF projects to monitor component and project management expenditures due to the manner in which the project was set up in UMOJA (Para 78)	**S**
1.Completeness of project financial information	All relevant documents reviewed including financial audits and co-financing reports (Paras 77-78)	S
2.Communication between finance and project management staff	FCH communications with UNEP finance personnel and task manager sufficiently frequent and effective (Para 79)	S
F. Efficiency	CHEEL completed disbursements in 41 months though not all targets achieved (such as the enforcement of the EPR Law), mainly due to 3-year implementation period of ChEEL being too short (Para 82).	**S**
G. Monitoring and Reporting	PRF preparation not fully compliant with best practices making M&E less efficient for FCH (Para 87).	**S**
1. Monitoring design and budgeting	M&E plan does provide cursory guidance that could have been improved using best practices in the preparation of the PRF including gender disaggregation in the M&E plan (Para 88)	MS
2. Monitoring of project implementation	FCH team monitored ChEEL indicators notwithstanding monitoring difficulties associated with indicators and targets which are not SMART (Para 89)	S
3.Project reporting	PIRs do provide result-based monitoring and reporting that can be instrumental in providing continual	S

[45] Where a project is rated, through the assessment of Project Design Quality template during the evaluation inception stage, as facing either an Unfavourable or Highly Unfavourable external operating context, ratings for Effectiveness, Efficiency and/or Sustainability may be increased at the discretion of the Evaluation Consultant and Evaluation Manager together.

Criterion	Summary Assessment	Rating
	improvements and adaptive management measures to ChEEL implementation (Para 91)	
H. Sustainability	Due to strong stakeholder ownership, low dependency for future funding, and an increase in LED sales that is mainly market-driven (Paras 92-97.	**L**
1. Socio-political sustainability	Based on strong ownership demonstrated by all CHEEL stakeholders to ensure smooth transitions towards an energy efficient lighting market (Para 92-93)	L
2. Financial sustainability	Based on a low dependency on future funding for the CRSO and the sustainable business model for the testing laboratory, CESMEC (Para 94-95).	L
3. Institutional sustainability	Based on the advent of strong supporting legislation (the new National Energy Efficiency Law) that will make only EE lighting devices available on the Chilean market, and low dependency of institutional support for a mainly market-driven increase in LEDs sales (Para 96-97).	L
I. Factors Affecting Performance[46]	The involvement of FCH has been crucial to the success of ChEEL, notably their ability to effectively collaborate with all relevant stakeholders and coordinate key ChEEL activities that are important to LED market transformation.	**HS**
1. Preparation and readiness	High level of readiness and preparation as reflected in the Inception Workshop report of April 2016 (Paras 98-100)	S
2. Quality of project management and supervision[47]	Manly due to same FCH providing excellent management and coordination functions as the PMU throughout ChEEL duration including frequent communications with all stakeholders, most importantly the MoE, SEC and the Ministry of Environment (Paras 101-102).	HS
3. Stakeholders participation and cooperation	ChEEL stakeholders revealed a high degree of satisfaction with CHEEL technical assistance and collaboration (Paras 103-104).	HS
4. Responsiveness to human rights and gender equity	CHEEL gender issues only partially mainstreamed compounded by an absence of detailed budget to implement gender related activities (Paras 105-106).	MS
5. Country ownership and driven-ness	All government ministries and public sector agencies working with ChEEL undertook leadership roles on various ChEEL activities (Para 107).	HS
6. Communication and public awareness	ChEEL's website of "Cambia el Foco" provides ample evidence of the national awareness raising and experiences of ChEEL LED activities (https://www.cambiaelfoco.fch.cl/) (Para 108)	HS
Overall Project Rating	ChEEL has served as an excellent vehicle for Chile's market transition towards energy efficient LED technology and significant national energy savings	**S**

[46] While ratings are required for each of these factors individually, they should be discussed within the Main Evaluation Report as cross-cutting issues as they relate to other criteria. Catalytic role, replication and scaling up should be discussed under effectiveness if they are a relevant part of the TOC.

[47] In some cases 'project management and supervision' will refer to the supervision and guidance provided by UN Environment to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the Executing Agency and the technical backstopping provided by UN Environment, as the Implementing Agency.

4.2 Lessons Learned

114. The implementation of ChEEL has generated several national benefits including the smooth transition to energy efficient lighting. This achievement alone is a strong indicator of the excellent management of the implementation of ChEEL. To this end, there are a number of lessons that have been learned that would serve to be useful for future projects in the energy sector globally:

Context:	Fundación Chile is a non-profit organization and perceived as an honest broker that has a track record of fostering public (through ENEL and several municipalities) and private alliances to amplify the impact of ChEEL. FCH had been providing excellent management and coordination functions as the ChEEL PMU. This includes frequent communications with all stakeholders, most importantly the Ministry of Energy, SEC and the Ministry of Environment. PMU personnel have remained the same since the commencement of ChEEL in January 2016 (Para 102). The collaborative working relationship between FCH and the Ministry of Energy was a benefit to ChEEL. As an example, this working relationship was able to secure the involvement of the new Minister of Energy in ChEEL in late 2018 without delay during the course of a 36-month project. There were also periodical meetings with the ChEEL task manager, U4E and the main partners such as the Ministry of Energy and Ministry of Environment mainly to brief and obtain approvals for activities with the stakeholders involved with a specific topic.
Lesson # 1:	**To provide the highest likelihood of a successful project, the management arrangements for a project need to include an execution entity that:** • **can be viewed as an honest broker;** • **can foster a collaborative and transparent working relationship amongst partners that maximizes their participation and influence to achieve the project objective.**
Application:	Future projects in market transformation or green urban development where there is a need to collaborate with a wide spectrum of stakeholders.

Context:	Cost-effectiveness of the ChEEL Project was gauged by the use of well-qualified specialists recruited under the en.lighten-UNEP technical assistance. The overall highly satisfactory performances of these consultants can be attributed to the detailed terms of references (ToRs) prepared by FCH to articulate in precise terms the assistance required from these experts. This understandably was time consuming but worth the effort considering the opportunity costs and project delays if the consultancy did not deliver the required technical assistance (Para 83).
Lesson #2:	**Preparing precise and specific ToRs for consultant inputs is necessary and time consuming to provide effective and efficient consulting inputs for a project. Their preparation must identify the specific focus areas where the consultants are to provide useful inputs. This also requires persons preparing the ToRs to have a good understanding of the subject matter where the consultant will be providing assistance.**

Application:	For all future development projects.

Context:	A MEPS proposal was effectively developed under ChEEL by a team of national consultants with support and validation from an international consultant. This provided efficiency benefits to ChEEL to accelerate the implementation of the MEPS in Chile (Paras 65 and 66).
Lesson # 3:	**Project teams tasked with developing and delivering draft national legislation should be more efficient if the team consisted of national and international consultants. The national consultant's prime responsibility being to provide a local context to the work and the international consultant complementing the local context into the work. The international consultants must have the willingness to adapt and incorporate improvements and recommendations suggested by the national consultant and stakeholders involved in the study. In addition, it is important that the international consultants visit the country to understand ground conditions, and to get stakeholder feedback on the work progress.**
Application:	To all energy-related multi-lateral donor projects involving international inputs.

Context:	The development of a MEPS proposal by national consultants with the support of an international expert (in 2019, defined lighting MEPS in terms of lumen and watts, specifically 40 lumens/watt by 2021 (to eliminate halogen lamps), and 85 lumens/watt by 2024 (to eliminate CFLs). This prepares the market for the Government's standards based on the Project guidance), and facilitates an appropriate phase-in period for the more efficient lamps; After completion of the MEPS proposal, a study proposing a unified energy label for all lighting technologies was prepared resulting in the quick approval of the proposal by lighting manufacturers, SEC and MoE in March 2017. The proposal was to allow manufacturers to highlight the efficacy of LED technology over remaining lighting technologies that were compliant with the new MEPS, pushing the market to more highly efficient models (Para 65).
Lesson # 4:	**It is important that a MEPS proposal is developed before any energy labelling proposal for electronic appliances. In this way, the labelling design will not consider those technologies and models that do not comply with MEPS. It is counterproductive to design an energy label contemplating a product that cannot be sold later due to its non-compliance with MEPS.**
Application:	To all energy-related multi-lateral donor projects in dealing with MEPS and labeling.

Context:	The introduction of LEDs during ChEEL through municipalities, energy utilities and retailers was executed with a 75% discount and information on energy savings benefits of LEDs as a means of overcoming the high price barrier of the LED technology. With the demo model working with municipalities, massive LED procurement packages through an official tender process resulted in lower LED prices that increased access to quality LED products to more people. The alliance with Chile's ENEL electric utility also resulted in discounted LED products that were sold on-line, also increasing access to a greater proportion of ENEL consumers. The alliance with a retailer was a more effective means of public education on the benefits of efficient lighting while also lowering of the LED prices in the Chilean lighting market. LED pricing information would be passed onto consumers with the sale of discounted LEDs. Alliances were formed with COPEC (at their 550 petrol stations) where 1.2 million units were sold at 25% of the normal market rates, from US$2.50 versus US$10.00 (Para 68).
Lesson # 5:	**Successful market transformation activities need to involve public and private sector support as a measure to lower the barrier to the high cost of a new electrical appliance (such as an LED or a refrigerator). Public sector support should involve municipalities and energy utilities (that are generally public) and private retailers, all of whom should have the capacity for providing significant discounts for lowering the price barrier to new electric appliances, and to provide education to the consumer on the benefits of these appliances.**
Application:	To all energy-related multi-lateral donor projects involved with market transformation.

Context:	The demo model of awareness campaign in public and technical schools and colleges with energy efficiency in their curriculums was based on "children to parents" phenomena where children can educate the parents about LED and many related subjects such as environment and energy efficiency. The model worked with technical schools to educate future electricians on energy efficiency and the benefits of efficient lighting. However, a primary campaign implemented through this model was "Cambia el Foco in public schools" contributing with energy efficiency education across the country including the teaching of smart energy tips to 147 schools and 73,910 students, teachers and other education professionals (Para 68, 1st bullet). With the demo model working with municipalities, …. an adaptation to the local business environment, roundtable participants proposed sales of the LED lighting products from an "LED truck" to be strategically parked. This was piloted in 2017 for 6 months in Providencia and Santiago with 3 trucks parked near Metro station exits and busy bus stops for sale of LEDs, as suggested and permitted by municipalities (costs of the truck operation were evenly split between Philips, ENEL and the ChEEL Project). In addition, municipalities granted permission to the Cambia el Foco logo campaign to

	place adverts on bus stops and metro stations. More than 40,000 LED bulbs were sold during this time (Para 68, 2nd bullet).
Lesson # 6:	**Maximizing the leverage of a demonstration can be achieved through careful and thoughtful designs that place the demonstration in strategic locations to maximize exposure of the technology being demonstrated. This could be in schools where children can be participants in disseminating information to their parents or family members (for example in ChEEL with LED lighting). Demonstrations could also be strategically located within public buildings such as hospital, emblematic schools, museums, public institutions amongst others to expose or promote conversions to energy efficient lighting systems. These public locations will also have the potential for getting more press coverage and increased dissemination of LED information.**
Application:	To all energy-related multi-lateral donor projects involved with market transformation.

Context:	With regards to achievement of intended Direct Outcome 2.1, ChEEL was able to enable the GoC to enact a national EPR Law but did not have the requisite time to create the enabling conditions for its enforcement. Considering the time to prepare such legislation, the 3-year period of ChEEL to enable the GoC to enact as well as enforce the EPR Law appears overly ambitious (Paras 72 and 75)
Lesson # 7:	**The duration of a project needs to carefully consider the time required to achieve all the intended direct outcomes. The outcome of enacting and enforcing a national Law (such as the EPR Law) appears too ambitious for a 3-year project implementation period. A 4-year project implementation period would be more appropriate.**
Application:	Future design of development projects.

4.3 Recommendations

4.3.1 Recommendations for Government of Chile

Context:	Many LEDs are available in Chile that have different metals for the back-plating of the LEDs which affects their heat dissipation that possibly adversely affects their service life. The current market surveillance system is not likely to track this quality aspect of LEDs that is outside of MEPS (Para 71, 6th bullet).
Recommendation #1	**<u>Continual training is required to sustain the capacities of market surveillance personnel to identify a broad range of qualities of LEDs and other electronic devices such as service life and product materials</u>. This will require sustained resourcing of the training of market surveillance personnel to apply these skills to other LEDs and other electronic devices and appliances such as air conditioners, refrigerators, pumps and other high energy consuming**

	equipment. This is important to sustain confidence of Chile's consumers on the quality of energy efficient equipment that falls under its Energy Efficiency Strategy.
Responsibility:	Ministry of Energy and SEC
Time-frame:	Future energy efficiency programs in Chile

Context:	There is a possible shortage of electricians in the Chilean with a high degree of vocational skill to identify appropriate LED lighting technologies that provide the best qualities of maximize energy savings and service life of the lamps. This high degree of skill involves the identification of the different types of LEDs available in the Chilean market that are appropriate for a specific installation. Many LEDs are available in Chile that have different metals for the back-plating of the LEDs which affects their heat dissipation that possibly adversely affects their service life (see Recommendation #1). These electricians should have the knowledge of the LEDs that they are installing to ensure not only maximum energy savings but also service life of the appliance (Para 71, 6th bullet).
Recommendation #2	**There needs to be sustained resources available for dedicated training of electricians for the installation of lighting systems as well as for updating of best practices. This is important for the country if there is a strong transition to energy efficient lighting as well as other energy efficient appliances that fall under the Energy Efficiency Laws that support the National Energy Strategy.**
Responsibility:	Ministry of Energy
Time-frame:	Future energy efficiency programs in Chile

Context:	ChEEL has focused mainly on the residential sector and vulnerable groups for efficient lighting. The Ministry of Energy is positioned well to promote efficient lighting to the commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. Moreover, a number of ChEEL actions that can be replicated for rapid uptake of efficient lighting and other highly energy efficient electronic devices in Chile using the 4 demo program models mentioned in Para 69 (Para 113).
Recommendation #3	**Future EE lighting initiatives should focus on EE lighting for commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. This will likely not be achieved through ESCOs since the ESCO model in Chile has not been successful, and due to the lack of ESCO legislation where rules and regulations with regards to the determination of energy baselines has not been defined. Instead, lessons from deployment models for the residential sector under ChEEL can be considered wherever appropriate but will require time to develop approaches that will interest these sectors. It is likely that personnel in industrial and commercial entities consider that the time spent on their production lines or in sales is more valuable than spending time searching for energy efficient lighting, thus requiring some incentive to make this change to their business operations.**

	The transaction of changing of lighting systems for an industrial or commercial establishment could involve a business-to-business transaction that would minimize the down-time of a commercial or industrial entity.
Responsibility:	Ministry of Energy
Time-frame:	Future energy efficiency programs in Chile

Context:	In addition to providing assistance towards improving the capacity of Chile to enact the EPR Law, especially in dealing with spent and waste lamps, the success of ChEEL's contribution in Component 2 can serve as a template for other WEEEs to improve CRSO operations who are managing multiple WEEE waste streams (Para 112).
Recommendation #4	**The Ministry of Environment should seek a linkage for the provision of international best practices for managing other WEEE waste streams, similar to the ChEEL approach to building local capacity for CRSOs for inefficient waste lamps. With local knowledge having been recently improved for WEEE management for lighting devices and cell phones and refrigerators, the Ministry of Environment could help the focus on other WEEEs that are high in volume such as air conditioners and small electrical appliances.**
Responsibility:	Ministry of Environment
Time-frame:	Future energy efficiency programs in Chile

4.3.2 Recommendations for UN Environment

Context:	While ChEEL has focused mainly on the residential sector and vulnerable groups for efficient lighting, the Ministry of Energy is positioned well to promote efficient lighting to the commercial and industrial sectors where greater national energy savings and GHG emission reductions can be generated. Moreover, a number of ChEEL actions that can be replicated for rapid uptake of efficient lighting and other highly energy efficient electronic devices in Chile using the 4 demo program models mentioned in Para 68 (Para 113).
Recommendation #5	**Approach the Government of Chile through:** • **the Ministry of Energy to discuss its desired approaches to its National Energy Strategy and its needs for technical assistance to bring best practices to implement the Strategy that will support achievement of NES targets; and** • **the Ministry of Environment to identify its desired approaches for environmentally sound management of a wider range of waste streams of WEEE and technical assistance needs.**
Responsibility:	UN Environment
Time-frame:	Subsequent phases of assistance to the Government of Chile

5 Annexures

Annex I. Terms of Reference for the Evaluation of the UN Environment/Global Environment Facility project "Delivering the transition to energy efficient lighting in Chile"

1. Key Evaluation principles

I- 1. Evaluation findings and judgements should be based on **sound evidence and analysis**, clearly documented in the evaluation report. Information will be triangulated (i.e. verified from different sources) as far as possible, and when verification is not possible, the single source will be mentioned (whilst anonymity is still protected). Analysis leading to evaluative judgements should always be clearly spelled out.

I- 2. **The "Why?" Question.** As this is a terminal evaluation and similar interventions are envisaged for the future, particular attention should be given to learning from the experience. Therefore, the "Why?" question should be at the front of the consultants' minds all through the evaluation exercise and is supported by the use of a theory of change approach. This means that the consultants need to go beyond the assessment of "what" the project performance was, and make a serious effort to provide a deeper understanding of "why" the performance was as it was. This should provide the basis for the lessons that can be drawn from the project.

I- 3. **Baselines and counterfactuals**. In attempting to attribute any outcomes and impacts to the project intervention, the evaluators should consider the difference between what has happened with, and what would have happened without, the project. This implies that there should be consideration of the baseline conditions, trends and counterfactuals in relation to the intended project outcomes and impacts. It also means that there should be plausible evidence to attribute such outcomes and impacts to the actions of the project. Sometimes, adequate information on baseline conditions, trends or counterfactuals is lacking. In such cases this should be clearly highlighted by the evaluators, along with any simplifying assumptions that were taken to enable the evaluator to make informed judgements about project performance.

I- 4. **Communicating evaluation results.** A key aim of the evaluation is to encourage reflection and learning by UN Environment staff and key project stakeholders. The consultant should consider how reflection and learning can be promoted, both through the evaluation process and in the communication of evaluation findings and key lessons. Clear and concise writing is required on all evaluation deliverables. Draft and final versions of the main evaluation report will be shared with key stakeholders by the Evaluation Manager. There may, however, be several intended audiences, each with different interests and needs regarding the report. The Evaluation Manager will plan with the consultant which audiences to target and the easiest and clearest way to communicate the key evaluation findings and lessons to them. This may include some or all of the following; a webinar, conference calls with relevant stakeholders, the preparation of an evaluation brief or interactive presentation.

2. Objective of the Evaluation

I- 5. In line with the UN Environment Evaluation Policy[48] and the UN Environment Programme Manual[49], the Terminal Evaluation (TE) is undertaken at completion of the project to assess project performance (in terms of relevance, effectiveness and efficiency), and determine outcomes and impacts (actual and potential) stemming from the project, including their sustainability. The evaluation has two primary purposes: (i) to provide evidence of results to meet accountability requirements, and (ii) to promote operational improvement, learning and knowledge sharing through results and lessons learned among UN Environment and the Chilean government. Therefore, the evaluation will identify lessons of operational relevance for future project formulation and

[48] http://www.unep.org/eou/StandardsPolicyandPractices/UNEPEvaluationPolicy/tabid/3050/language/en-US/Default.aspx

[49] http://www.unep.org/QAS/Documents/UNEP_Programme_Manual_May_2013.pdf . This manual is under revision.

implementation, especially under the "The Global Market Transformation for Energy Efficient Lighting project" (known as "the en.lighten initiative") which serves as the global umbrella initiative for all GEF efficient lighting projects.

3. Key Strategic Questions

I- 6. In addition to the evaluation criteria outlined in Section 10 below, the evaluation will address the **strategic questions** listed below. These are questions of interest to UN Environment and to which the project is believed to be able to make a substantive contribution:

- In its efforts to promote the rapid uptake of high-energy efficient lighting technologies, to what degree of success has this intervention overcome the identified barriers, gaps and challenges to the transformation of the lighting market in Chile?
- For the challenges in efficiency-energy lighting market transformation that persist post-project, to what extent have the factors identified by this evaluation as the key assumptions in achieving the desired Impact, been found likely to hold?
- Pertaining to the sustainability of results that can be attributed to this intervention, which opportunities exist or have already been set in motion to stimulate replication or a catalytic effect of positive outcomes and best practice experiences within the country and/or region?
- Has the evaluation identified any unintended results (positive or negative) deriving from the project's implementation, and if so, what was it and how might it affect the intended Impact?

4. Evaluation Criteria

I- 7. All evaluation criteria will be rated on a six-point scale. Sections A-I below, outline the scope of the criteria and a link to a table for recording the ratings is provided in Annex 1). A weightings table will be provided in excel format (link provided in Annex 1) to support the determination of an overall project rating. The set of evaluation criteria are grouped in nine categories: (A) Strategic Relevance; (B) Quality of Project Design; (C) Nature of External Context; (D) Effectiveness, which comprises assessments of the delivery of outputs, achievement of outcomes and likelihood of impact; (E) Financial Management; (F) Efficiency; (G) Monitoring and Reporting; (H) Sustainability; and (I) Factors Affecting Project Performance. The evaluation consultants can propose other evaluation criteria as deemed appropriate.

Strategic Relevance

I- 8. The evaluation will assess, in line with the OECD/DAC definition of relevance, 'the extent to which the activity is suited to the priorities and policies of the target group, recipient and donor'. The evaluation will include an assessment of the project's relevance in relation to UN Environment's mandate and its alignment with UN Environment's policies and strategies at the time of project approval. Under strategic relevance an assessment of the complementarity of the project with other interventions addressing the needs of the same target groups will be made. This criterion comprises four elements:

- Alignment to the UN Environment Medium Term Strategy[50] (MTS) and Programme of Work (POW). The evaluation should assess the project's alignment with the MTS and POW under which the project was approved and include, in its narrative, reflections on the scale and scope of any contributions made to the planned results reflected in the relevant MTS and POW;
- Alignment to UN Environment/Donor/GEF Strategic Priorities. Donor, including GEF, strategic priorities will vary across interventions. UN Environment strategic priorities include the Bali Strategic Plan for Technology Support and Capacity Building51 (BSP) and South-South Cooperation (S-SC). The BSP relates to the capacity of governments to: comply with international agreements and obligations at the national level; promote, facilitate and finance environmentally sound technologies and to strengthen frameworks for developing coherent international environmental policies. S-SC is regarded as the exchange of resources, technology and knowledge between developing countries. GEF priorities are specified in published programming priorities and focal area strategies;

[50] UN Environment's Medium Term Strategy (MTS) is a document that guides UN Environment's programme planning over a four-year period. It identifies UN Environment's thematic priorities, known as Sub-programmes (SP), and sets out the desired outcomes, known as Expected Accomplishments (EAs), of the Sub-programmes.
[51] http://www.unep.org/GC/GC23/documents/GC23-6-add-1.pdf

- Relevance to Regional, Sub-regional and National Environmental Priorities. The evaluation will assess the extent to which the intervention is suited, or responding to, the stated environmental concerns and needs of the countries, sub-regions or regions where it is being implemented. Examples may include: national or sub-national development plans, poverty reduction strategies or Nationally Appropriate Mitigation Action (NAMA) plans or regional agreements etc;
- Complementarity with Existing Interventions. An assessment will be made of how well the project, either at design stage or during the project mobilization, took account of ongoing and planned initiatives (under the same sub-programme, other UN Environment sub-programmes, or being implemented by other agencies) that address similar needs of the same target groups . The evaluation will consider if the project team, in collaboration with Regional Offices and Sub-Programme Coordinators, made efforts to ensure their own intervention was complementary to other interventions, optimized any synergies and avoided duplication of effort. Examples may include UN Development Assistance Frameworks or One UN programming. Linkages with other interventions should be described and instances where UN Environment's comparative advantage has been particularly well applied should be highlighted. Factors affecting this criterion may include:
    - Stakeholders' participation and cooperation
    - Responsiveness to human rights and gender equity
    - Country ownership and driven-ness

Quality of Project Design

I- 9. The quality of project design is assessed using an agreed template during the evaluation inception phase, ratings are attributed to identified criteria and an overall Project Design Quality rating is established (www.unep.org/evaluation). This overall Project Design Quality rating is entered in the final evaluation ratings table as item B. In the Main Evaluation Report a summary of the project's strengths and weaknesses at design stage is included, while the complete Project Design Quality template is annexed in the Inception Report.

I- 10. Factors affecting this criterion may include (at the design stage):

- Stakeholders participation and cooperation
- Responsiveness to human rights and gender equity

Nature of External Context

I- 11. At evaluation inception stage a rating is established for the project's external operating context (considering the prevalence of conflict, natural disasters and political upheaval). This rating is entered in the final evaluation ratings table as item C. Where a project has been rated as facing either an Unfavourable or Highly Unfavourable external operating context, and/or a negative external event has occurred during project implementation, the ratings for Effectiveness, Efficiency and/or Sustainability may be increased at the discretion of the Evaluation Consultant and Evaluation Manager together. A justification for such an increase must be given.

Effectiveness

I- 12. Delivery of Outputs. The evaluation will assess the project's success in producing the programmed outputs (products, capital goods and services resulting from the intervention) and achieving milestones as per the project design document (ProDoc). Any formal modifications/revisions made during project implementation will be considered part of the project design. Where the project outputs are inappropriately or inaccurately stated in the ProDoc, reformulations may be necessary in the reconstruction of the TOC. In such cases a table should be provided showing the original and the reformulation of the outputs for transparency. The delivery of outputs will be assessed in terms of both quantity and quality, and the assessment will consider their ownership by, and usefulness to, intended beneficiaries and the timeliness of their delivery. The evaluation will briefly explain the reasons behind the success or shortcomings of the project in delivering its programmed outputs and meeting expected quality standards. Factors affecting this criterion may include:

- Preparation and readiness
- Quality of project management and supervision[52]

[52] In some cases 'project management and supervision' will refer to the supervision and guidance provided by UN Environment to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping provided by UN Environment.

I- 13. Achievement of Direct Outcomes**.** The achievement of direct outcomes (short and medium-term effects of the intervention's outputs; a change of behaviour resulting from the use/application of outputs, which is not under the direct control of the intervention's direct actors) is assessed as performance against the direct outcomes as defined in the reconstructed53 Theory of Change. These are the first-level outcomes expected to be achieved as an immediate result of project outputs. As in 1, above, a table can be used where substantive amendments to the formulation of direct outcomes is necessary. The evaluation should report evidence of attribution between UN Environment's intervention and the direct outcomes. In cases of normative work or where several actors are collaborating to achieve common outcomes, evidence of the nature and magnitude of UN Environment's 'substantive contribution' should be included and/or 'credible association' established between project efforts and the direct outcomes realised. Factors affecting this criterion may include:

- Quality of project management and supervision
- Stakeholders' participation and cooperation
- Responsiveness to human rights and gender equity
- Communication and public awareness

I- 14. Likelihood of Impact. Based on the articulation of longer-term effects in the reconstructed TOC (i.e. from direct outcomes, via intermediate states, to impact), the evaluation will assess the likelihood of the intended, positive impacts becoming a reality. Project objectives or goals should be incorporated in the TOC, possibly as intermediate states or long-term impacts. The Evaluation Office's approach to the use of TOC in project evaluations is outlined in a guidance note available on the EOU website, web.unep.org/evaluation and is supported by an excel-based flow chart, 'Likelihood of Impact Assessment Decision Tree'. Essentially the approach follows a 'likelihood tree' from direct outcomes to impacts, taking account of whether the assumptions and drivers identified in the reconstructed TOC held. Any unintended positive effects should also be identified and their causal linkages to the intended impact described.

I- 15. The evaluation will also consider the likelihood that the intervention may lead, or contribute to, unintended negative effects. Some of these potential negative effects may have been identified in the project design as risks or as part of the analysis of Environmental, Social and Economic Safeguards.[54]

I- 16. The evaluation will consider the extent to which the project has played a catalytic role or has promoted scaling up and/or replication[55] as part of its Theory of Change and as factors that are likely to contribute to longer term impact.

I- 17. Ultimately UN Environment and all its partners aim to bring about benefits to the environment and human well-being. Few projects are likely to have impact statements that reflect such long-term or broad-based changes. However, the evaluation will assess the likelihood of the project to make a substantive contribution to the high-level changes represented by UN Environment's Expected Accomplishments, the Sustainable Development Goals[56] and/or the high-level results prioritized by the funding partner.

I- 18. Factors affecting this criterion may include:

- Quality of Project Management and Supervision (including adaptive management);
- Stakeholders participation and cooperation;

[53] UN Environment staff are currently required to submit a Theory of Change with all submitted project designs. The level of 'reconstruction' needed during an evaluation will depend on the quality of this initial TOC, the time that has lapsed between project design and implementation (which may be related to securing and disbursing funds) and the level of any changes made to the project design. In the case of projects pre-dating 2013 the intervention logic is often represented in a logical framework and a TOC will need to be constructed in the inception stage of the evaluation.

[54] Further information on Environmental, Social and Economic Safeguards (ESES) can be found at http://www.unep.org/about/eses

[55] Scaling up refers to approaches being adopted on a much larger scale, but in a very similar context. Scaling up is often the longer term objective of pilot initiatives. Replication refers to approaches being repeated or lessons being explicitly applied in new/different contexts e.g. other geographic areas, different target group etc. Effective replication typically requires some form of revision or adaptation to the new context. It is possible to replicate at either the same or a different scale.

[56] A list of relevant SDGs is available on the EO website www.unep.org/evaluation

- Responsiveness to human rights and gender equity;
- Country ownership and driven-ness;
- Communication and public awareness.

Financial Management

I- 19. Financial management will be assessed under two themes: completeness of financial information and communication between financial and project management staff. The evaluation will establish the actual spend across the life of the project of funds secured from all donors. This expenditure will be reported, where possible, at output level and will be compared with the approved budget. The evaluation will assess the level of communication between the Project/Task Manager and the Fund Management Officer as it relates to the effective delivery of the planned project and the needs of a responsive, adaptive management approach. The evaluation will verify the application of proper financial management standards and adherence to UN Environment's financial management policies. Any financial management issues that have affected the timely delivery of the project or the quality of its performance will be highlighted.

I- 20. Factors affecting this criterion may include:

- Preparation and readiness
- Quality of project management and supervision

Efficiency

I- 21. In keeping with the OECD/DAC definition of efficiency the evaluation will assess the extent to which the project delivered maximum results from the given resources. This will include an assessment of the cost-effectiveness and timeliness of project execution. Focusing on the translation of inputs into outputs, cost-effectiveness is the extent to which an intervention has achieved, or is expected to achieve, its results at the lowest possible cost. Timeliness refers to whether planned activities were delivered according to expected timeframes as well as whether events were sequenced efficiently. The evaluation will also assess to what extent any project extension could have been avoided through stronger project management and identify any negative impacts caused by project delays or extensions. The evaluation will describe any cost or time-saving measures put in place to maximise results within the secured budget and agreed project timeframe and consider whether the project was implemented in the most efficient way compared to alternative interventions or approaches.

I- 22. The evaluation will give special attention to efforts by the project teams to make use of/build upon pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. to increase project efficiency. The evaluation will also consider the extent to which the management of the project minimised UN Environment's environmental footprint.

I- 23. The factors underpinning the need for any project extensions will also be explored and discussed. As management or project support costs cannot be increased in cases of 'no cost extensions', such extensions represent an increase in unstated costs to implementing parties.

I- 24. Factors affecting this criterion may include:

- Preparation and readiness (e.g. timeliness);
- Quality of project management and supervision;
- Stakeholders participation and cooperation.

Monitoring and Reporting

I- 25. The evaluation will assess monitoring and reporting across three sub-categories: monitoring design and budgeting, monitoring implementation and project reporting.

I- 26. Monitoring Design and Budgeting. Each project should be supported by a sound monitoring plan that is designed to track progress against SMART[57] indicators towards the delivery of the project's outputs and achievement of direct outcomes, including at a level disaggregated by gender, vulnerability or marginalisation. The evaluation will

[57] SMART refers to indicators that are specific, measurable, assignable, realistic and time-specific.

assess the quality of the design of the monitoring plan as well as the funds allocated for its implementation. The adequacy of resources for mid-term and terminal evaluation/review should be discussed if applicable.

I- 27. Monitoring of Project Implementation. The evaluation will assess whether the monitoring system was operational and facilitated the timely tracking of results and progress towards projects objectives throughout the project implementation period. This should include monitoring the representation and participation of disaggregated groups in project activities. It will also consider how information generated by the monitoring system during project implementation was used to adapt and improve project execution, achievement of outcomes and ensure sustainability. The evaluation should confirm that funds allocated for monitoring were used to support this activity.

I- 28. Project Reporting. UN Environment has a centralised Project Information Management System (PIMS) in which project managers upload six-monthly status reports against agreed project milestones. This information will be provided to the Evaluation Consultant(s) by the Evaluation Manager. Some projects have additional requirements to report regularly to funding partners, which will be supplied by the project team (e.g. the Project Implementation Reviews and Tracking Tool for GEF-funded projects). The evaluation will assess the extent to which both UN Environment and donor reporting commitments have been fulfilled.

I- 29. Factors affecting this criterion may include:

- Quality of project management and supervision;
- Responsiveness to human rights and gender equity (e.g disaggregated indicators and data).

Sustainability

I- 30. Sustainability is understood as the probability of direct outcomes being maintained and developed after the close of the intervention. The evaluation will identify and assess the key conditions or factors that are likely to undermine or contribute to the persistence of achieved direct outcomes (ie. 'assumptions' and 'drivers'). Some factors of sustainability may be embedded in the project design and implementation approaches while others may be contextual circumstances or conditions that evolve over the life of the intervention. Where applicable an assessment of bio-physical factors that may affect the sustainability of direct outcomes may also be included.

I- 31. Socio-political Sustainability. The evaluation will assess the extent to which social or political factors support the continuation and further development of project direct outcomes. It will consider the level of ownership, interest and commitment among government and other stakeholders to take the project achievements forwards. In particular, the evaluation will consider whether individual capacity development efforts are likely to be sustained.

I- 32. Financial Sustainability. Some direct outcomes, once achieved, do not require further financial inputs, e.g. the adoption of a revised policy. However, in order to derive a benefit from this outcome further management action may still be needed e.g. to undertake actions to enforce the policy. Other direct outcomes may be dependent on a continuous flow of action that needs to be resourced for them to be maintained, e.g. continuation of a new resource management approach. The evaluation will assess the extent to which project outcomes are dependent on future funding for the benefits they bring to be sustained. Secured future funding is only relevant to financial sustainability where the direct outcomes of a project have been extended into a future project phase. Even where future funding has been secured, the question still remains as to whether the project outcomes are financially sustainable.

I- 33. Institutional Sustainability. The evaluation will assess the extent to which the sustainability of project outcomes (especially those relating to policies and laws) is dependent on issues relating to institutional frameworks and governance. It will consider whether institutional achievements such as governance structures and processes, policies, sub-regional agreements, legal and accountability frameworks etc. are robust enough to continue delivering the benefits associated with the project outcomes after project closure. In particular, the evaluation will consider whether institutional capacity development efforts are likely to be sustained.

I- 34. Factors affecting this criterion may include:

- Stakeholders participation and cooperation;
- Responsiveness to human rights and gender equity (e.g. where interventions are not inclusive, their sustainability may be undermined);
- Communication and public awareness;
- Country ownership and driven-ness.

Factors and Processes Affecting Project Performance

I- 35. These factors are rated in the ratings table, but are discussed within the Main Evaluation Report as cross-cutting themes as appropriate under the other evaluation criteria, above)

I- 36. Preparation and Readiness**.** This criterion focuses on the inception or mobilisation stage of the project (ie. the time between project approval and first disbursement). The evaluation will assess whether appropriate measures were taken to either address weaknesses in the project design or respond to changes that took place between project approval, the securing of funds and project mobilization. In particular the evaluation will consider the nature and quality of engagement with stakeholder groups by the project team, the confirmation of partner capacity and development of partnership agreements as well as initial staffing and financing arrangements. (Project preparation is included in the template for the assessment of Project Design Quality).

I- 37. Quality of Project Management and Supervision. In some cases 'project management and supervision' will refer to the supervision and guidance provided by UN Environment to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping and supervision provided by UN Environment.

I- 38. The evaluation will assess the effectiveness of project management with regard to: providing leadership towards achieving the planned outcomes; managing team structures; maintaining productive partner relationships (including Steering Groups etc.); communication and collaboration with UN Environment colleagues; risk management; use of problem-solving; project adaptation and overall project execution. Evidence of adaptive management should be highlighted.

I- 39. Stakeholder Participation and Cooperation. Here the term 'stakeholder' should be considered in a broad sense, encompassing all project partners, duty bearers with a role in delivering project outputs and target users of project outputs and any other collaborating agents external to UN Environment. The assessment will consider the quality and effectiveness of all forms of communication and consultation with stakeholders throughout the project life and the support given to maximise collaboration and coherence between various stakeholders, including sharing plans, pooling resources and exchanging learning and expertise. The inclusion and participation of all differentiated groups, including gender groups should be considered.

I- 40. Responsiveness to Human Rights and Gender Equity. The evaluation will ascertain to what extent the project has applied the UN Common Understanding on the human rights based approach (HRBA) and the UN Declaration on the Rights of Indigenous People. Within this human rights context the evaluation will assess to what extent the intervention adheres to UN Environment's Policy and Strategy for Gender Equality and the Environment.

I- 41. In particular the evaluation will consider to what extent project design, implementation and monitoring have taken into consideration: (i) possible gender inequalities in access to, and the control over, natural resources; (ii) specific vulnerabilities of women and children to environmental degradation or disasters; and (iii) the role of women in mitigating or adapting to environmental changes and engaging in environmental protection and rehabilitation.

I- 42. Country Ownership and Driven-ness**.** The evaluation will assess the quality and degree of engagement of government / public sector agencies in the project. While there is some overlap between Country Ownership and Institutional Sustainability, this criterion focuses primarily on the forward momentum of the intended projects results, ie. either a) moving forwards from outputs to direct outcomes or b) moving forward from direct outcomes towards intermediate states. The evaluation will consider the involvement not only of those directly involved in project execution and those participating in technical or leadership groups, but also those official representatives whose cooperation is needed for change to be embedded in their respective institutions and offices. This factor is concerned with the level of ownership generated by the project over outputs and outcomes and that is necessary for long term impact to be realised. This ownership should adequately represent the needs of interest of all gendered and marginalised groups.

I- 43. Communication and Public Awareness**.** The evaluation will assess the effectiveness of: a) communication of learning and experience sharing between project partners and interested groups arising from the project during its life and b) public awareness activities that were undertaken during the implementation of the project to influence attitudes or shape behaviour among wider communities and civil society at large. The evaluation should consider whether existing communication channels and networks were used effectively, including meeting the differentiated needs of gendered or marginalised groups, and whether any feedback channels were established. Where knowledge sharing platforms have been established under a project the evaluation will comment on the sustainability of the communication channel under either socio-political, institutional or financial sustainability, as appropriate.

5. Evaluation Deliverables and Review Procedures

I- 44. The Terminal Evaluation will be an in-depth evaluation using a participatory approach whereby key stakeholders are kept informed and consulted throughout the evaluation process. Both quantitative and qualitative evaluation methods will be used as appropriate to determine project achievements against the expected outputs, outcomes and impacts. It is highly recommended that the consultant(s) maintains close communication with the project team and promotes information exchange throughout the evaluation implementation phase in order to increase their (and other stakeholder) ownership of the evaluation findings. Where applicable, the consultant(s) should provide a geo-referenced map that demarcates the area covered by the project and, where possible, provide geo-reference photographs of key intervention sites (e.g. sites of habitat rehabilitation and protection, pollution treatment infrastructure, etc).

I- 45. The findings of the evaluation will be based on the following:

[a]. A **desk review** of:

- Relevant background documentation;
- Project design documents (including minutes of the project design review meeting at approval); Annual Work Plans and Budgets or equivalent, revisions to the project (Project Document Supplement), the logical framework and its budget;
- Project reports such as six-monthly progress and financial reports, progress reports from collaborating partners, meeting minutes, relevant correspondence and including the Project Implementation Reviews (PIRs); supervision mission reports, etc.;
- GEF Tracking Tool, Steering Committee Minutes;
- Quarterly expenditure reports, co-financing records, budget revisions,
- Technical reports on project Outputs, studies, publications, outreach material, etc.;
- Mid-Term Review or Mid-Term Evaluation of the project;
- Terminal Report (or draft) of the project including final project output, audit report, and final financial statements;
- Other reports deemed useful to the terminal evaluation of the project.

[b]. **Interviews** (individual or in group) with:

- UN Environment Task Manager (TM);
- Project management team in Fundación Chile;
- UN Environment Fund Management Officer (FMO);
- Sub-Programme Coordinator;
- Project partners, including Ministry of Energy, Ministry of Environment, Osram AG, Philips Lighting B. V., National Lighting Test Centre (China), en.lighten Global Partnership Programme, etc.;
- Other relevant resource persons and private sector partners.

[c]. **Survey** (this will be determined at the inception phase)

[d]. **Field visits** to Chile

[e]. **Other data collection tools** as may be deemed useful by the Evaluator

I- 46. Review of the draft evaluation report. The evaluation team will submit a draft report to the Evaluation Manager and revise the draft in response to their comments and suggestions. Once a draft of adequate quality has been peer-reviewed and accepted, the Evaluation Manager will share the cleared draft report with the Project Manager, who will alert the Evaluation Manager in case the report contains any blatant factual errors. The Evaluation Manager will then forward revised draft report (corrected by the evaluation team where necessary) to other project stakeholders, for their review and comments. Stakeholders may provide feedback on any errors of fact and may highlight the significance of such errors in any conclusions as well as providing feedback on the proposed recommendations and lessons. Any comments or responses to draft reports will be sent to the Evaluation Manager for consolidation. The Evaluation Manager will provide all comments to the evaluation team for consideration in preparing the final report, along with guidance on areas of contradiction or issues requiring an institutional response.

I- 47. Based on a careful review of the evidence collated by the evaluation consultants and the internal consistency of the report, the Evaluation Manager will provide an assessment of the ratings in the final evaluation report. Where there are differences of opinion between the evaluator and the Evaluation Manager on project ratings, both viewpoints will be clearly presented in the final report. The Evaluation Office ratings will be considered the final ratings for the project.

I- 48. The Evaluation Manager will prepare a quality assessment of the first and final drafts of the main evaluation report, which acts as a tool for providing structured feedback to the evaluation consultants. The quality of the report will be assessed and rated against the criteria specified in template listed in Annex 1 and this assessment will be appended to the Final Evaluation Report.

I- 49. At the end of the evaluation process, the Evaluation Office will prepare a Recommendations Implementation Plan in the format of a table, to be completed and updated at regular intervals by the Task Manager. The Evaluation Office will track compliance against this plan on a six monthly basis.

6. The Consultants' Team

I- 50. For this evaluation, one consultant will work under the overall responsibility of the Evaluation Office represented by an Evaluation Manager (Pauline Marima), in consultation with the UN Environment Task Manager (Ruth Zugman Do Coutto), Project Officer (Tania Daccarett), Fund Management Officer (Leena Darlington), Coordinator of UN Environment's subprogramme on Climate Change (Niklas Hagelberg), and Director of the Climate Change Mitigation Unit (Ligia Noronha). The consultant will liaise with the Evaluation Manager on any procedural and methodological matters related to the evaluation. It is, however, the consultant's individual responsibility to arrange for their travel, visa, obtain documentary evidence, plan meetings with stakeholders, organize online surveys, and any other logistical matters related to the assignment. The UN Environment Task Manager and project teams will, where possible, provide logistical support (formal introductions, meetings etc.) allowing the consultant to conduct the evaluation as efficiently and independently as possible.

I- 51. The consultant will be hired the over the period **June 2019 to November 2019** during which time the evaluation deliverables listed in Section 11 'Evaluation Deliverables' above should be submitted.

I- 52. S/he should have: an advanced university degree, at least 10 years' experience in evaluation of programs and projects, with experience in the area of climate change and energy management. Knowledge of **English** and along with excellent writing skills in English is required. Working knowledge of **Spanish** language is desired. Experience in managing partnerships, knowledge management and communication is desirable for all evaluation consultants.

I- 53. The consultant will be responsible, in close consultation with the Evaluation Office of UN Environment, for overall management of this evaluation and timely delivery of the outputs described in Section 11 Evaluation Deliverables, above. The consultant will ensure that all evaluation criteria and questions are adequately covered. Detailed guidelines for the Evaluation Consultant can be found on the Evaluation Office of UN Environment website: (http://web.unep.org/evaluation/working-us/working-us).

Specific Responsibilities:

I- 54. The Consultant will be responsible, in close consultation with the Evaluation Office of UN Environment, for overall management of the evaluation and timely delivery of its outputs, described in Section 10 Evaluation Deliverables, above. The consultant will ensure that all evaluation criteria and questions are adequately covered. S/he will be responsible for the evaluation design, data collection and analysis, and report-writing. More specifically, the Inception phase of the evaluation, including:

- preliminary desk review and introductory interviews with project staff;
  - draft the reconstructed Theory of Change of the project;
  - prepare the evaluation framework;
  - develop the desk review, interview protocols, and data collection and analysis tools;
  - plan the evaluation schedule;
  - prepare the Inception Report, incorporating comments received from the Evaluation Office.
- **Data collection and analysis phase** of the evaluation, including:
  - conduct further desk review and in-depth interviews with project implementing and executing agencies, project partners and project stakeholders;
  - conduct an evaluation mission to **Chile** to visit the project locations, interview project partners and stakeholders, including a good representation of private sector stakeholders. Ensure independence of the evaluation and confidentiality of evaluation interviews.
  - regularly report back to the Evaluation Office on progress and inform of any possible problems or issues encountered and;
  - keep the Project/Task Manager informed of the evaluation progress and engage the Project/Task Manager in discussions on emerging findings throughout the evaluation process.

- **Reporting phase**, including:
  - draft the Main Evaluation Report, ensuring that the evaluation report is complete, coherent and consistent with the Evaluation Office guidelines both in substance and style;
  - liaise with the Evaluation Office on comments received and finalize the Main Evaluation Report, ensuring that comments are taken into account
  - prepare a Response to Comments annex for the main report, listing those comments not accepted by the Evaluation Consultant and indicating the reason for the rejection; and
  - prepare a 2-page summary of the key evaluation findings and lessons;
- **Managing relations**, including:
  - maintain a positive relationship with evaluation stakeholders, ensuring that the evaluation process is as participatory as possible but at the same time maintains its independence;
  - communicate in a timely manner with the Evaluation Office on any issues requiring its attention and intervention.

7. Schedule of the evaluation

I- 55. Table I-1 below presents the tentative schedule for the evaluation.

Table I-1: Tentative schedule for the evaluation

Milestone	Tentative schedule*
Consultant recruitment proces	May/June 2019
Kick-off meeting (via Skype)	June 2019
Inception Report	July 2019
Data collection and analysis, desk-based interviews and surveys	July/August 2019
Field Mission (based on meeting arrangements and available budget)	August 2019
Draft report to UN Environment (Evaluation Manager and Peer Reviewer)	September 2019
Draft Report shared with UN Environment Task Manager and Project Team	October 2019
Draft Report shared with wider group of stakeholders	November 2019
Final Report	November 2019

8. Contractual Arrangements

I- 56. Evaluation Consultants will be selected and recruited by the Evaluation Office of UN Environment under an individual Special Service Agreement (SSA) on a "fees only" basis (see below). By signing the service contract with UN Environment/UNON, the consultant(s) certify that they have not been associated with the design and implementation of the project in any way which may jeopardize their independence and impartiality towards project achievements and project partner performance. In addition, they will not have any future interests (within six months after completion of the contract) with the project's executing or implementing units. All consultants are required to sign the Code of Conduct Agreement Form.

I- 57. Fees will be paid on an instalment basis, paid on acceptance by the Evaluation Manager of expected key deliverables. The schedule of payment is as follows:

Table I-2: Schedule of Payment for the consultant:

Deliverable	Percentage Payment
Approved Inception Report (document 9 in Annex 1)	30%
Approved Draft Main Evaluation Report (document 16 in Annex 1)	40%
Approved Final Main Evaluation Report	30%

I- 58. **Fees only contracts:** Air tickets will be purchased by UN Environment and 75% of the DSA for each authorised travel mission will be paid up front. Local in-country travel will only be reimbursed where agreed in advance with the Evaluation Office and on the production of acceptable receipts. Terminal expenses and residual DSA entitlements (25%) will be paid after mission completion.

I- 59. The consultant may be provided with access to UN Environment's Programme Information Management System (PIMS) and if such access is granted, the consultant agrees not to disclose information from that system to third parties beyond information required for, and included in, the evaluation report. In case the consultant is not able to provide the deliverables in accordance with these guidelines, and in line with the expected quality standards by the UN Environment Evaluation Office, payment may be withheld at the discretion of the Director of the Evaluation Office until the consultants have improved the deliverables to meet UN Environment's quality standards.

I- 60. If the consultant fails to submit a satisfactory final product to UN Environment in a timely manner, i.e. before the end date of their contract, the Evaluation Office reserves the right to employ additional human resources to finalize the report, and to reduce the consultants' fees by an amount equal to the additional costs borne by the Evaluation Office to bring the report up to standard.

I- 61. The tools, templates and guidance notes listed in Table I-3, and available on the Evaluation Office website (www.unep.org/evaluation), are intended to help Evaluation Managers and Evaluation Consultants to produce evaluation products that are consistent with each other and which can be compiled into a biennial Evaluation Synthesis Report. The biennial summary is used to provide an overview of progress to UN Environment and the UN Environmental Assembly. This suite of documents is also intended to make the evaluation process as transparent as possible so that all those involved in the process can participate on an informed basis. It is recognised that the evaluation needs of projects and portfolio vary and adjustments may be necessary so that the purpose of the evaluation process (broadly, accountability and lesson learning), can be met. Such adjustments should be decided between the Evaluation Manager and the Evaluation Consultant in order to produce evaluation reports that are both useful to project implementers and that produce credible findings.

Table I-3: List of Documents for guidelines in preparing UN Environment evaluations [58]

Document	Name
1	Evaluation Process Guidelines for Consultants
2	Generic guidance Evaluation Consultants Team Roles (Team Leader and Supporting Consultant)
3	Evaluation Ratings Table
4	Weighting of Ratings (excel)
5	Evaluation Criteria (summary of descriptions, as in the general terms of reference)
6	Matrix Describing Ratings by Criteria
7	Structure and Contents of the Inception Report
8	Template for the Assessment of the Quality of Project Design
9	Guidance on Stakeholder Analysis
10	Use of Theory of Change in Project Evaluations
11	Assessment of the Likelihood of Impact Decision Tree (Excel)
12	Possible Evaluation Questions
13	Structure and Contents of the Main Evaluation Report
14	Cover Page, Prelims and Style Sheet for Main Evaluation Report
15	Financial Tables
16	Template for the Assessment of the Quality of the Evaluation Report

[58] The UNEP Evaluation office is currently revising its templates and guidelines. Application of the tools and guidelines need to be discussed with the evaluation manager.

Annex II. Evaluation Program

Date	Persons Met	Function	Topic of Discussion	Means of Contact
	Ms. Ruth Coutto	UNEP Task Manager	Introduction to ChEEL Project and background	Skype
	Ms. Tania Daccarett Pinzás	UNEP Task Manager Assistant		Skype
	Mr. Asher Lessels	UNEP Regional Manager, Latin America		Skype
22-23 and 25 October 2019	Ms. Karien Volker	Water and Energy Team Leader, Fundación Chile	ChEEL component progress, achievements, issues, and recommendations	Meetings at Fundación offices in Vitacura, Santiago
22-23 and 25 October 2019	Ms. Gisela Illesca	Energy Efficiency Specialist, Fundación Chile		
24 October 2019	Ms. Claudia Guerrero	Environmental Manager	EPR Law	Meeting at Ministry of Environment offices in Santiago
24 October 2019	Marcelo Padilla	National Project Director, Ministry of Energy		Meeting at Ministry of Energy offices in Santiago
24 October 2019	Ms. Cecila Moya	Professional,SEC	MVE program, MEPS and labeling	Meeting at SEC offices in Santiago
	Ms. Paulina Silva	Head of Norms and Regulations Unit, SEC		
	Mr. Christian Baeza	Professional of the Technical Division of Products, SEC		
24 October 2019	Mr. Sebastian Bayer	Lead Trainer, Fundación Cristo Vive		Meeting at Fundación Cristo Vive office in Huechuraba

Annex III. Bibliography

1. UNEP ChEEL CEO Endorsement Document of June 2015;
2. ChEEL (GEF Project ID 5150 “Delivering the transition to energy efficient lighting in Chile”) Inception Report, April 2016;
3. UNEP-GEF Project Implementation Reviews for ChEEL 2017 to 2018;
4. ChEEL Final Report, 11 September 2019;
5. Public Consultation Document for Energy Effiicent Lighting Products (Informe Técnico Preliminar para la Actualización Estándar Mínimo de Eficiencia Energética Productos para uso de Iluminación Interior DIVISIÓN DE ENERGÍAS SOSTENIBLES), Ministry of Energy, 2019;
6. “Border Control and Market Surveillance: Instruments, Experiences, Lessons Learnt” Workshop by Quality Infrastructure for Renewable Energy Sources and Energy Efficiency in Latin America and the Caribbean, September 2018;
7. Project Audits for December 2016 and December 2017;
8. ChEEL Cash Advance forms (4);
9. Co-Finance reports from all stakeholders involved with ChEEL;
10. ChEEL Quarterly Expenditure Reports 2016-18;
11. Documentation on 3 Project Amendments;
12. Half-Yearly ChEEL Progress Reports for 2017 and 2018;
13. ChEEL Steering Committee meeting minutes from 2016 to 2018.

Annex IV. GHG emission reduction estimates

This Annex provides details of direct post project energy savings and GHG emission reductions from project activities (direct energy savings and GHG emission reductions are found on Table 7 in the Main Report and Table IV-7 in this Annex).

Figure IV-1: Screen Shot of Direct Post-Project results from standards and labels during ChEEL

Step 3: Model Activity Components

Standards and Labeling Module

Project Information

Project Title	Delivering the transition to energy efficient lighting in Chile
Country	Chile
Contact Name	Ruth Coutto
First Year of Project	2016
Last Year of Project	2019

Results: Standards and Labeling Activity Components

	Cumulative			Annual			
	Total	*2016-2019*	*2020-2029*	*2016*	*2019*	*2025*	*2035*
Direct Electricity Savings (MWh)	0	0	0	0	0	0	0
N/A	0	0	0	0	0	0	0
N/A	0	0	0	0	0	0	0
N/A	0	0	0	0	0	0	0
Direct Total Energy Savings (GJ)	0	0	0	0	0	0	0
Direct GHG Emission Savings (tCO2)	**0**	0	0	0	0	0	0
Direct Post-project GHG Emission Savings (tCO2)	**9,125,953**		9,125,953	0	0	1,123,996	939,198
Indirect Bottom-up Emission Savings (tCO2)							

Figure IV-2: Screen Shot of Direct Post-Project results of LEDs replacing halogens during ChEEL

Component 1: LEDs replacing HAL -- General Inputs			
Technology Specifications	***Default***	***User-Specified***	***Notes***
Target Technology	LED Lighting	LED Lighting	
Fuel Used	Electricity	Electricity	
Displaced Technology	Improved CFL	Halogen lamp	
Useful Technology Lifetime (years)	5	15	Lifetime of LEDs
Power Consumption: LED Lighting (W)	14	12	
Power Consumption: Halogen lamp (W)	15	68	
Annual Energy Consumption			
User may enter either daily or annual energy information	***Default***	***User-Specified***	***Notes***
Daily Usage (hr/day)	8.0	4.1	This daily usage is a proportional average considering all sectors
Days Used Each Year (days/yr)	200	365	
Annual Energy Consumption: LED Lighting (kWh/yr)	22	18	
Annual Energy Consumption: Halogen lamp (kWh/yr)	24	102	
Percentage Energy Savings		82%	
Market Assumptions	***Default***	***User-Specified***	***Notes***
Annual Sales in Year 2016		4,914,446	Total market of Halogens and the equivalent % of LED market (because Halogen represents 58% of the market that can be replaced by LEDs). Calculated based on SEC data for 2016,2017 and 2018, and then with a 1.5% growth rate.
Annual Sales Growth Rate		1.5%	Maintaining growth using in initial estimations
Baseline Assumptions	***Default***	***User-Specified***	***Notes***
Market Share of LED Lighting in Year 2016		15.5%	LED share over HAL+LED in 2016
Baseline Annual Increase in LED Lighting Market Share	5%	5%	using standard GEF suggestion, LEDs are naturally increasing. U4E exp
Annual reduction in energy consumption: LED Lighting	0%	4%	
Annual reduction in energy consumption: Improved CFL	1%	1%	
Standard/Labeling Program Effectiveness	***Default***	***User-Specified***	***Notes***
Year Standard in Force		2020	
Percent New Sales Compliant with Standard		90%	

Figure IV-3: Screen Shot of Direct Post-Project results of LEDs replacing CFLs during ChEEL

Component 2: LEDs replacing CFL -- General Inputs			
Technology Specifications	***Default***	***User-Specified***	***Notes***
Target Technology	LED Lighting	LED Lighting	
Fuel Used	Electricity	Electricity	
Displaced Technology	Improved CFL	CFL	
Useful Technology Lifetime (years)	5	15	Lifetime of LEDs
Power Consumption: LED Lighting (W)	14	12	
Power Consumption: CFL (W)	15	18	
Annual Energy Consumption			
User may enter either daily or annual energy information	***Default***	***User-Specified***	***Notes***
Daily Usage (hr/day)	8.0	4.1	
Days Used Each Year (days/yr)	200	365	
Annual Energy Consumption: LED Lighting (kWh/yr)	22	18	
Annual Energy Consumption: CFL (kWh/yr)	24	27	
Percentage Energy Savings		33%	
Market Assumptions	***Default***	***User-Specified***	***Notes***
Annual Sales in Year 2016		25,079,435	Total maket of CFLs and 56% of LED market (because CFL represents (56% of the market that can be replaced by LEDs). Calculated based on SEC in 2016,2017,2018 and estimating the next years with a 1.5% growth rate.
Annual Sales Growth Rate		1.5%	
Baseline Assumptions	***Default***	***User-Specified***	***Notes***
Market Share of LED Lighting in Year 2016		4.7%	Share of LED/(LED+CFL) in BAU in 2015
Baseline Annual Increase in LED Lighting Market Share	5%	5%	
Annual reduction in energy consumption: LED Lighting	0%	4%	U4E predicted efficiency improvement
Annual reduction in energy consumption: Improved CFL	1%	1%	
Standard/Labeling Program Effectiveness	***Default***	***User-Specified***	***Notes***
Year Standard in Force		2020	
Percent New Sales Compliant with Standard		90%	Share of LED/(LED+CFL) in GEF scenario in 2020

Figure IV-4: Screen Shot of Direct Post-Project results of stringent MEPS for high intensity discharge lamps during ChEEL

Component 3: Stringent MEPS for High Intensity Discharge Lamps -- General Inputs				
Technology Specifications	***Default***	***User-Specified***		***Notes***
Target Technology	T-8 Fluor. Lamp	Efficient HID		
Fuel Used	Electricity	Electricity		
Displaced Technology	T-12 Fluor. Lamp	HID		
Useful Technology Lifetime (years)	5	4		
Power Consumption: Efficient HID (W)	28	120		
Power Consumption: HID (W)	40	150		
Annual Energy Consumption				
User may enter either daily or annual energy information	***Default***	***User-Specified***		***Notes***
Daily Usage (hr/day)	5.0	10.0		
Days Used Each Year (days/yr)	350	365		
Annual Energy Consumption: Efficient HID (kWh/yr)	49	438		
Annual Energy Consumption: HID (kWh/yr)	70	548		
Percentage Energy Savings		20%		
Market Assumptions	***Default***	***User-Specified***		***Notes***
Annual Sales in Year 2016		2,186,000		
Annual Sales Growth Rate		1.5%		
Baseline Assumptions	***Default***	***User-Specified***		***Notes***
Market Share of Efficient HID in Year 2016		19.9%		
Baseline Annual Increase in Efficient HID Market Share	5%	6%		
Annual reduction in energy consumption: Efficient HID	0%	0%		
Annual reduction in energy consumption: T-12 Fluor. Lamp	1%	1%		
Standard/Labeling Program Effectiveness	***Default***	***User-Specified***		***Notes***
Year Standard in Force		2020		
Percent New Sales Compliant with Standard		90%		

Figure IV-5: Screen Shot of Direct Post-Project results of stringent MEPS for tubular lamps during ChEEL

Component 4: Stringent MEPS for Tubular lamps -- General Inputs				
Technology Specifications	***Default***	***User-Specified***		***Notes***
Target Technology	T-8 Fluor. Lamp	T-8 Fluor. Lamp		
Fuel Used	Electricity	Electricity		
Displaced Technology	T-12 Fluor. Lamp	T-12 Fluor. Lamp		
Useful Technology Lifetime (years)	5	6		
Power Consumption: T-8 Fluor. Lamp (W)	28	27		
Power Consumption: T-12 Fluor. Lamp (W)	40	36		
Annual Energy Consumption				
User may enter either daily or annual energy information	***Default***	***User-Specified***		***Notes***
Daily Usage (hr/day)	5.0	6.7		
Days Used Each Year (days/yr)	350	365		
Annual Energy Consumption: T-8 Fluor. Lamp (kWh/yr)	49	66		
Annual Energy Consumption: T-12 Fluor. Lamp (kWh/yr)	70	88		
Percentage Energy Savings		25%		
Market Assumptions	***Default***	***User-Specified***		***Notes***
Annual Sales in Year 2016		10,061,000		
Annual Sales Growth Rate		1.5%		
Baseline Assumptions	***Default***	***User-Specified***		***Notes***
Market Share of T-8 Fluor. Lamp in Year 2016		12%		
Baseline Annual Increase in T-8 Fluor. Lamp Market Share	5%	6%		
Annual reduction in energy consumption: T-8 Fluor. Lamp	0%	0%		
Annual reduction in energy consumption: T-12 Fluor. Lamp	1%	1%		
Standard/Labeling Program Effectiveness	***Default***	***User-Specified***		***Notes***
Year Standard in Force		2020		
Percent New Sales Compliant with Standard		90%		

Figure IV-6: Screen Shots of calculation of top-down market share

Actual market share data from customs per technology per year in units:

Technology (units)	2010	2011	2012	2013	2014	2015	2016	2017	2018
Incandescent	22,135,657	21,191,460	14,330,856	42,901,749	30,034,337	17,195,538	1,934,980	206,002	134,200
Halogen	0	0	0	0	0	4,303,108	16,388,486	8,892,646	11,402,584
Fluorescent	4,753,931	12,767,463	13,677,043	15,787,053	22,117,358	21,758,745	21,187,745	9,179,742	7,973,857
LED	0	0	0	0	52	1,568,771	6,901,869	8,593,560	13,037,236
Total by year	**26,889,588**	**33,958,923**	**28,007,899**	**58,688,802**	**52,151,747**	**44,826,162**	**46,413,080**	**26,871,950**	**32,547,877**
LED Market share (%)	0%	0%	0%	0%	0%	3%	15%	32%	40%

Source: customs database

Variables to calculate the energy consumption per technology:

Annual energy consumption per technology

	Power W	Hrs/Year	MWh/Year
CFL	18	1496.5	0.026937
CFL PLC	26	1496.5	0.038909
TUBE FL	36	2445.5	0.088038
INCANDESCENT	70	1496.5	0.104755
HALOGEN	50	1496.5	0.074825
HALOGEN	50	1496.5	0.074825
LED	9	1496.5	0.0134685

Estimation of energy savings and related GHG emission reductions per technology based on actual lamp units from 2016 to 2018 compared to 2015:

	Benefits during project implementation based on actual units data per technology													
	2015		2016		Savings year 1		2017		Savings year 2		2018		Savings year 3	
	Units	MWh/Year	Units	MWh/Year	MWH	Ton CO2	Units	MWh/Year	MWH	Ton CO2	Units	MWh/Year	MWH	Ton CO2
CFL	14,675,034	395,301	14,403,876	387,997	7,304	2,980	4,646,823	125,171	270,130	110,213	3,274,138	88,195	307,106	125,299
CFL PLC	1,404,472	54,647	1,416,343	38,152	16,495	6,730	604,075	23,504	31,143	12,706	1,065,827	41,470	13,176	5,376
TUBE FL	5,679,239	499,989	5,367,526	144,585	355,404	145,005	3,928,844	345,888	154,101	62,873	3,633,892	319,921	180,068	73,468
INCANDESCENT	17,195,538	1,801,319	1,934,980	52,123	1,749,196	713,672	206,002	21,580	1,779,739	726,133	134,200	14,058	1,787,260	729,202
HALOGEN	4,303,108	321,980	15,729,257	423,699	- 101,719	- 41,501	8,431,174	630,863	- 308,883	- 126,024	11,097,776	830,391	- 508,411	- 207,432
HALOGEN	-	-	659,229	17,758	- 17,758	- 7,245	461,472	34,530	- 34,530	- 14,088	304,808	22,807	- 22,807	- 9,305
LED	1,568,771	21,129	6,901,869	185,916	- 164,787	- 67,233	8,593,560	115,742	- 94,613	- 38,602	13,037,236	175,592	- 154,463	- 63,021
		3,094,364		**1,250,229**	**1,844,135**	**752,407**		**1,297,277**	**1,797,087**	**733,212**		**1,492,435**	**1,601,930**	**653,587**

To calculate the impact during the period of influence, saving estimations are done conservatively using the 2018 actual savings as constant until year 10. To these cumulative savings, the project direct impacts have been subtracted. In addition, it is estimated that there is part of the lighting market that is not covered by these technologies. Due to lack of information about the other technologies, experts have estimated a correction factor to have the top-down estimation for the full market.

	Cumulative Savings MWh during period of influence based on actual data.
Year 1	1,844,135
Year 2	3,641,222
Year 3	5,243,152
Year 4*	6,845,082
Year 5*	8,447,012
Year 6*	10,048,941
Year 7*	11,650,871
Year 8*	13,252,801
Year 9*	14,854,730
Year 10*	16,456,660
Total	**16,456,660**

For projections, it is assumed that 2018 savings remain constant

Correction to reduce the impact already considered as direct	**Correction to consider total market saving and causality**
tCO2	**tCO2**
6,597,963	**9,896,945**

Figure IV-7: Screen Shots of summary calculations to determine Bottom-up market share

10 years (linear) direct impact		*Replication factor*	10 years savings indirect bottom up	
MWh	**Ton CO2**		**MWh**	**Ton CO2**
285,181	**116,354**	*2*	570,362	**232,708**

Figure IV-8: Screen Shot of summary information for GEF Tracking Tool

	CEO Endorsement	Terminal Evaluation
Lifetime energy saved (MJ)	177,335,065	**1,026,651,600**
Lifetime direct GHG emissions avoided	22,775	**116,354**
Lifetime direct post-project GHG emissions avoided	15,567,841	**9,125,953**
Lifetime indirect GHG emissions avoided (bottom-up)	83,372	**232,708**
Lifetime indirect GHG emissions avoided (top-down)	9,104,365	**9,896,945**

Figure IV-8: Screen Shot of GEF Tracking Tool (General Data)

Tracking Tool for Climate Change Mitigation Projects (For Terminal Evaluation)

Special Notes: reporting on lifetime emissions avoided

Lifetime direct GHG emissions avoided: Lifetime direct GHG emissions avoided are the emissions reductions attributable to the investments made **during the project's supervised implementation period**, totaled over the respective lifetime of the investments.
Lifetime direct post-project emissions avoided: Lifetime direct post-project emissions avoided are the emissions reductions attributable to the investments made outside the project's supervised implementation period, but supported by financial facilities put in place by the GEF project, totaled over the respective lifetime of the investments. These financial facilities will still be operational after the project ends, such as partial credit guarantee facilities, risk mitigation facilities, or revolving funds.
Lifetime indirect GHG emissions avoided (top-down and bottom-up): indirect emissions reductions are those attributable to the long-term outcomes of the GEF activities that remove barriers, such as capacity building, innovation, catalytic action for replication.
Please refer to the Manual for Calculating GHG Benefits of GEF Projects.

Manual for Energy Efficiency and Renewable Energy Projects
Manual for Transportation Projects

For LULUCF projects, the definitions of "lifetime direct and indirect" apply. Lifetime length is defined to be 20 years, unless a different number of years is deemed appropriate. For emission or removal factors (tonnes of CO2eq per hectare per year), use IPCC defaults or country specific factors.

General Data	Results at Terminal Evaluation	Notes
Project Title	Delivering the transition to energy efficient lighting in Chile	
GEF ID	5150	
Agency Project ID	928	
Country	Chile	
Region	LCR	
GEF Agency	UNEP	
Date of Council/CEO Approval		**July 8, 2015**
GEF Grant (US$)	2,485,713	
Date of submission of the tracking tool		**Month DD, YYYY (e.g., May 12, 2010)**
Is the project consistent with the priorities identified in National Communications, Technology Needs Assessment, or other Enabling Activities under the UNFCCC?	1	**Yes = 1, No = 0**
Is the project linked to carbon finance?	0	**Yes = 1, No = 0**
Cumulative cofinancing realized (US$)	9,419,843	
Cumulative additional resources mobilized (US$)	5,944,277	**additional resources means beyond the cofinancing committed at CEO endorsement**

Figure IV-9: Screen Shot of GEF Tracking Tool (Objective 2: Energy Efficiency)

Objective 2: Energy Efficiency		
Please specify if the project targets any of the following areas		
Lighting	1	Yes = 1, No = 0
Appliances (white goods)		Yes = 1, No = 0
Equipment		Yes = 1, No = 0
Cook stoves		Yes = 1, No = 0
Existing building		Yes = 1, No = 0
New building		Yes = 1, No = 0
Industrial processes		Yes = 1, No = 0
Synergy with phase-out of ozone depleting substances		Yes = 1, No = 0
Other (please specify)		
Policy and regulatory framework	3	0: not an objective/component 1: no policy/regulation/strategy in place 2: policy/regulation/strategy discussed and proposed 3: policy/regulation/strategy proposed but not adopted 4: policy/regulation/strategy adopted but not enforced 5: policy/regulation/strategy enforced
Establishment of financial facilities (e.g., credit lines, risk guarantees, revolving funds)	0	0: not an objective/component 1: no facility in place 2: facilities discussed and proposed 3: facilities proposed but not operationalized/funded 4: facilities operationalized/funded but have no demand 5: facilities operationalized/funded and have sufficient demand
Capacity building	5	0: not an objective/component 1: no capacity built 2: information disseminated/awareness raised 3: training delivered 4: institutional/human capacity strengthened 5: institutional/human capacity utilized and sustained
Lifetime energy saved	1,026,651,600	MJ (Million Joule, IEA unit converter: http://www.iea.org/stats/unit.asp) Fuel savings should be converted to energy savings by using the net calorific value of the specific fuel. End-use electricity savings should be converted to energy savings by using the conversion factor for the specific supply and distribution system. These energy savings are then totaled over the respective lifetime of the investments.
Lifetime direct GHG emissions avoided	116,354	tonnes CO2eq (see Special Notes above)
Lifetime direct post-project GHG emissions avoided	9,125,953	tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (bottom-up)	232,708	tonnes CO2eq (see Special Notes above)
Lifetime indirect GHG emissions avoided (top-down)	9,896,945	tonnes CO2eq (see Special Notes above)

Annex V. Project Costs and Financial Management

Table V-1: ChEEL Project Costs GEF funds

Component	Budget (from CEO Endorsement Document)	2016	2017	2018	2019[59]	Actual Cost	Remainder for Project	Expenditure Ratio (actual/ planned)
OUTCOME 1.1: Capacities to Monitor, Verify and Enforce (MVE) for effective transition to efficient lighting markets are strengthened	290,381	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OUTCOME 2.1: Government of Chile is able to enact and enforce a national policy creating an extended producer responsibility framework and to influence user behavior	725,008	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OUTCOME 3.1: Consensus by consumers and decision makers in government and private sector on the increased use of solid-state lighting and lighting controls in the domestic, commercial/industrial and outdoor lighting applications	654,587	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OUTCOME 3.2: Consumers and decision makers are aware of the economic benefits of advanced lighting systems through demonstration programmes (TA)	192,780	n/a	n/a	n/a	n/a	n/a	n/a	n/a
OUTCOME 3.2: Consumers and decision makers are aware of the economic benefits of advanced lighting systems through demonstration programmes (INV)	431,447	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Project Management and M&E Plan	**191,510**	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sub-Total (Fundacion Chile)	**1,818,365**	152,455	560,616	884,949	220,345	**1,818,365**	-	1.0
Sub-Total (U4E)	**617,348**	86,785	321,427	205,777	(498)	**613,490**	3,858	0.99
Sub-Total (UNEP Evaluation Office)	**50,000**				27,943	**27,943**	22,057	n/a
Total (Actual)	**2,485,713**	**239,240**	**882,043**	**1,090,726**	**247,790**	**2,459,798**	**25,915**	**1**
Total (Cumulative Actual)	2,485,713	239,240	1,121,282	2,212,008	2,459,798			

[59] Up to 15 January 2020

Table V-2: ChEEL Project Co-Financing

Co-financing (type/source)	UNEP own financing (million USD)		Government (million USD)		Partner Agency (million USD)		Private Sector (million USD)		Total (million USD)	
	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
Grants			5.000	0.000					5.000	0.000
Loans										
Credits										
Equity Investments										
In-kind support	0.100	0.135	0.650	12.338[60]	0.370	0.373	3.300	2.519	4.420	15.364
Other										
Totals	**0.100**	**0.135**	**5.650**	**12.338**	**0.370**	**0.373**	**3.300**	**2.519**	**9.420**	**15.364**

[60] Planned Government grant (US$5.0 million) was reported as in-kind support from Fundación Chile.

Table V-3: ChEEL Project Co-Financing

Sources of Financing	Name of Financier (source)	Type of Financing	Financing Amount Committed (USD)	Financing Actual Amount (USD)
Government Contribution	Ministry of Energy	In-kind and in cash	5,600,000	12,284,646
Government Contribution	Ministry of Environment	In-kind	50,000	53,300
NGO	Fundación Chile	In-kind	369,843	372,843
GEF Implementing Agency	UNEP	In-kind	100,000	134,830
Private Sector	Osram	In-kind	1,500,000	0
Private Sector	Philips Lighting	In-kind	1,500,000	2,218,500
Private Sector (select)	National Lighting Test Center, China (NLTC)	In-kind	300,000	300,000
		Total Financing	**9,419,843**	**15,364,119**

Table V-4: Additional Leveraged Co-Financing:

Municipalities (Providencia, Santiago and Cerro Navia)	US$ 315,890
Retail (Dartel and COPEC)	US$ 172,727
Utilities (Enel)	US$ 34,848
Total amount	**US$ 523,466**

Annex VI. Summary of the evaluation criteria ratings

Evaluation criteria	Rating	Score	Weight	Weighted Score
Strategic Relevance (select the ratings for sub-categories)	Highly Satisfactory	6	6	**0.4**
Alignment to MTS and POW	Highly Satisfactory	6	0.5	
Alignment to UNEP/GEF/Donor strategic priorities	Highly Satisfactory	6	0.5	
Relevance to regional, sub-regional and national issues and needs	Highly Satisfactory	6	2.5	
Complementarity with existing interventions	Highly Satisfactory	6	2.5	
Quality of Project Design	Satisfactory	5	4	**0.2**
Nature of External Context	Highly Favourable			
Effectiveness (select the ratings for sub-categories)	Satisfactory	5	45	**2.3**
Delivery of outputs	Satisfactory	5	5	
Achievement of direct outcomes	Satisfactory	5	30	
Likelihood of impact	Likely	5	10	
Financial Management (select the ratings for sub-categories)	Satisfactory	5	5	**0.3**
Completeness of project financial information	Satisfactory	5		
Communication between finance and project management staff	Satisfactory	5		
Efficiency	Satisfactory	5	10	0.5
Monitoring and Reporting (select the ratings for sub-categories)	Satisfactory	**5**	5	0.2
Monitoring design and budgeting	Moderately Satisfactory	4		
Monitoring of project implementation	Satisfactory	5		
Project reporting	Satisfactory	5		
Sustainability (select the ratings for sub-categories)	Likely	5	**20**	**1.0**
Socio-political sustainability	Likely	5		
Financial sustainability	Likely	5		
Institutional sustainability	Likely	5		
Factors Affecting Performance (select the ratings for sub-categories)	Highly Satisfactory	6	**5**	**0.3**
Preparation and readiness	Satisfactory	5		
Quality of project management and supervision	Highly Satisfactory	6		
Stakeholder participation and cooperation	Highly Satisfactory	6		
Responsiveness to human rights and gender equity	Moderately Satisfactory	4		
Country ownership and driven-ness	Satisfactory	5		
Communication and public awareness	Highly Satisfactory	6		
			100	5.07
Overall Rating:			**Satisfactory**	

Annex VII. Likelihood of Impact Decision Tree

Reset Form	Select Response		Likelihood of impact						Likelihood of impact					
			HU	U	MU	ML	L	HL	HU	U	MU	ML	L	HL
Drivers to support transition from outputs to direct outcomes are?	Partially in place		Not in place	Partially in place	Partially in place	In place	In place	in place		1	1			
Assumptions for the change process from outputs to direct outcomes	Hold		Do not hold	Partially hold	Partially hold	Hold	Hold	Hold				1	1	1
Proportion of direct outcomes fully or partially achieved	All		None	Some	Some	Some	Some	All						1
Which outcomes? (the most important to attain intermediate states / impact or others)		Answer not required	n/a	Others	Others	Most important	Most important	n/a						1
Level of direct outcome achievement	Partial		n/a	Partial	Full	Partial	Full	Full		1		1		
Drivers to support transition from direct outcome(s) to intermediate states are?	Partially in place		n/a	Not in place	Not in place	Partially in place	Partially in place	in place				1	1	
Assumptions for the change process from direct outcomes to intermediate states	Partially hold		n/a	Do not hold	Do not hold	Partially hold	Hold	Hold				1		
Proportion of Intermediate states achieved	All		n/a	n/a	None	None	Some	All						1
Level of Intermediate state achievement	Partial		n/a	n/a	n/a	n/a	Partial	Full					1	
Drivers to support transition from intermediate states to impact are?	In place		n/a	Not in place	Not in place	Not in place	Partially	in place						1
Assumptions for the change process from intermediate states to impact	Hold		n/a	Do not hold	Do not hold	Do not hold	Partially	Hold						1
									0	2	1	4	3	6

Annex VIII. Consultant's Resume

Name:	ROLAND WONG	
Position:	Chief Executive Officer of Clean Energy Alternatives Inc. International Energy and Environment Expert	
Nationality:	Canadian	
Education:	M.Eng., Civil Engineering (Water Resources and Environment), University of British Columbia, 1981 B.Eng., Civil Engineering, McGill University, Montreal, 1977	
Professional Affiliations:	Registered Professional Engineer in British Columbia	
Areas of Expertise:	Renewable energy development with a focus on waste to energy, hydropower and solar energy Energy efficiency in transport Evaluations of climate change mitigation projects	
Countries of work experience:	Canada, Bangladesh, India, Pakistan, the Maldives, Cambodia, China, Malaysia, Thailand, Viet Nam, the Philippines, Indonesia, Fiji, Solomon Islands, Tuvalu, Tonga, Samoa, Georgia, Belarus, Bosnia and Herzegovina, Serbia, Slovakia, Romania, Russian Federation, Montenegro, Turkey, Kyrgyz Republic, Kazakhstan, Tajikistan, Egypt, Ethiopia, South Africa, Costa Rica, Dominican Republic, Haiti, St. Vincent and the Grenadines, Dominica and Peru.	
Employment:	Clean Energy Alternatives Inc President, Vancouver, Canada Manager, Business Development, Vancouver, Canada Klohn Crippen Consultants Limited	2005 to date 2002-2005
	Environmental Management Specialist, Dhaka, Bangladesh and Halifax, Nova Scotia, Canada KPMG Consulting	1999-2002
	Manager, Watershed Division, Richmond, B.C., Canada Klohn Crippen Consultants Limited	1993-1999
	Water Resources Technical Advisor, Dhaka, Bangladesh Northwest Hydraulics Consultants	1988-1993
	Area Engineer/President, Williams Lake, B.C., Canada Ducks Unlimited/Cariboo Engineering Limited	1984-1988
	Hydropower Intermediate and Area Engineer, Vancouver, B.C. and Nipawin, Saskatchewan, Canada Klohn Crippen Consultants Limited	1981-1984
	Junior Hydraulics Engineer, Montreal, Quebec, Canada Montreal Engineering Company Limited	1978-1980

Roland has over 25 years' experience with a recent focus on the development and management of projects in sustainable transport, green city development, renewable energy and energy efficiency. These projects encompass his experience in environmental management, institutional capacity building, policy and economic analysis, planning, management, monitoring and evaluation for projects in more than 35 countries. His demonstrated abilities and experience include adoption and market transformation of sustainable low carbon technologies; formulation and preparation of low carbon and climate change investment projects; partnership building as a means to achieving adoption of clean technologies and energy efficiency practice; development and mentoring of energy, environmental and water resource professionals; networking, coordinating and negotiating projects in low carbon and climate change in several countries.

Key assignments that he is undertaken in climate change mitigation includes:

- Serving as a Senior Director since 2008 for a private sector company based in Vancouver, Canada developing investments in biomass waste-to-energy and solar power development using patented technologies. This includes the use of a unique gasification / thermo-oxidizer unit to produce heat sufficient for 5.7 MW of power generation. This has involved preparation of "white papers" for the firm, studies on the comparative advantages of the WTE technology to competitors and dissemination of technical and financial information to prospective investors, financers, government policymakers and international donor institutions;
- Lead consultant in the formulation, preparation and evaluation (midterm and terminal) of several GEF projects since 2008 in low carbon/renewable energy development, energy efficiency, sustainable transport and green cities for several countries mainly in Asia, Eastern Europe and the Caribbean. Also involved with providing technical assistance in the management of these projects, sourcing of technical experts, strategic planning and strengthened monitoring and evaluation activities;
- Principal designer and international team leader for UNDP Bangladesh and UNDP-GEF (2002-2010) for a project to reduce GHGs from the brick making industry in Bangladesh. Completed concept formulation and PDF B (project preparation) phase that resulted in GEF commitment for full project funding in August 2006. GHG emission reductions based on market transformation and adoption to cleaner coal-fired kiln technology from China, increased awareness of the economic, environmental and social benefits on the use of a cleaner technology, increasing industry capacity to attract financial support for clean technologies, dissemination of a cleaner burning kiln throughout the industry. Facilitated discussions with stakeholders in the brick industry in Bangladesh, and provided a logical framework analysis in collaboration with a high calibre Bangladeshi team consisting of engineers, economists, financial and ex-government officers, and facilitated South-South cooperation on the project to access less energy intensive Chinese brick making technology. Provided assistance and negotiations to develop carbon finance that served as a means to reduce debt servicing costs for entrepreneurs;
- Served as environmental management specialist (1999-2002) for a CIDA-funded demonstration project in Bangladesh to introduce natural gas as an alternate fuel to mitigate urban air pollution for the Government of Bangladesh's Department of Environment. Activities were geared towards providing better stakeholder outreach in the planning and implementation of environmental management projects, to demonstrate credible efforts required to effect changes in environmental quality, to allow DoE an opportunity to review their policies and standards against project results, and to improve enforcement capacities. The project started with the conversion demonstration of the highly polluting two-stroke auto-rickshaws to CNG, a domestically available fuel. A monitoring program comparing CNG and gasoline-fueled auto-rickshaws revealed operational costs and emissions of CNG converted auto-rickshaws were reduced by over 75%. The project was widely viewed by all to be a major success since it catalyzed the alternate fuel debate and industry development and transformed the alternate fuels market in Bangladesh where over a 24-month period, the number of alternate fuel vehicles rose from 1,000 to over 20,000, and the sale of compressed natural gas (CNG) increased 10-fold.

Annex IX. Quality assessment of the Evaluation Report

Quality Assessment of the Evaluation Report

Terminal Evaluation of the UNEP-GEF Project: "Delivering the transition to energy efficient lighting in Chile" (GEF 5150)

All UN Environment evaluations are subject to a quality assessment by the Evaluation Office. This is an assessment of the quality of the evaluation product (i.e. evaluation report) and is dependent on more than just the consultant's efforts and skills. Nevertheless, the quality assessment is used as a tool for providing structured feedback to the evaluation consultants, especially at draft report stage. This guidance is provided to support consistency in assessment across different Evaluation Managers and to make the assessment process as transparent as possible.

	UN Environment Evaluation Office Comments	**Final Report Rating**
Substantive Report Quality Criteria		
Quality of the Executive Summary: The Summary should be able to stand alone as an accurate summary of the main evaluation product. It should include a concise overview of the evaluation object; clear summary of the evaluation objectives and scope; overall evaluation rating of the project and key features of performance (strengths and weaknesses) against exceptional criteria (plus reference to where the evaluation ratings table can be found within the report); summary of the main findings of the exercise, including a synthesis of main conclusions (which include a summary response to key strategic evaluation questions), lessons learned and recommendations.	Adequate summary presenting the most pertinent findings of the evaluation in a clear and precise manner	6
I. Introduction A brief introduction should be given identifying, where possible and relevant, the following: institutional context of the project (sub-programme, Division, regions/countries where implemented) and coverage of the evaluation; date of PRC approval and project document signature); results frameworks to which it contributes (e.g. Expected Accomplishment in POW); project duration and start/end dates; number of project phases (where appropriate); implementing partners; total secured budget and whether the project has been evaluated in the past (e.g. mid-term, part of a synthesis evaluation, evaluated by another agency etc.) Consider the extent to which the introduction includes a concise statement of the purpose of the evaluation and the key intended audience for the findings?	Precise, well written and captures all the main introductory points recommended in the TOR	6

II. Evaluation Methods This section should include a description of how the TOC at Evaluation[61] was designed (who was involved etc.) and applied to the context of the project? A data collection section should include: a description of evaluation methods and information sources used, including the number and type of respondents; justification for methods used (e.g. qualitative/quantitative; electronic/face-to-face); any selection criteria used to identify respondents, case studies or sites/countries visited; strategies used to increase stakeholder engagement and consultation; details of how data were verified (e.g. triangulation, review by stakeholders etc.). The methods used to analyse data (e.g. scoring; coding; thematic analysis etc.) should be described. It should also address evaluation limitations such as: low or imbalanced response rates across different groups; extent to which findings can be either generalised to wider evaluation questions or constraints on aggregation/disaggregation; any potential or apparent biases; language barriers and ways they were overcome. Ethics and human rights issues should be highlighted including: how anonymity and confidentiality were protected and strategies used to include the views of marginalised or potentially disadvantaged groups and/or divergent views.	This section is complete, concise, and the approach and methods used for data collection and analysis have been described in sufficient detail.	6
III. The Project This section should include: • Context: Overview of the main issue that the project is trying to address, its root causes and consequences on the environment and human well-being (i.e. synopsis of the problem and situational analyses). • Objectives and components: Summary of the project's results hierarchy as stated in the ProDoc (or as officially revised) • Stakeholders: Description of groups of targeted stakeholders organised according to relevant common characteristics • Project implementation structure and partners: A description of the implementation structure with diagram and a list of key project partners • Changes in design during implementation: Any key events that affected the project's scope or parameters should be described in brief in chronological order • Project financing: Completed tables of: (a) budget at design and expenditure by components (b) planned and actual sources of funding/co-financing	This section is also complete and sufficiently covers all the required sub-topics in a detailed yet clear and concise manner.	6

61 During the Inception Phase of the evaluation process a TOC at Design is created based on the information contained in the approved project documents (these may include either logical framework or a TOC or narrative descriptions). During the evaluation process this TOC is revised based on changes made during project intervention and becomes the TOC at Evaluation.

IV. Theory of Change A summary of the project's results hierarchy should be presented for: a) the results as stated in the approved/revised Prodoc logframe/TOC and b) as formulated in the TOC at Evaluation. The two results hierarchies should be presented as a two column table to show clearly that, although wording and placement may have changed, the results 'goal posts' have not been 'moved'. The TOC at Evaluation should be presented clearly in both diagrammatic and narrative forms. Clear articulation of each major causal pathway is expected, (starting from outputs to long term impact), including explanations of all drivers and assumptions as well as the expected roles of key actors.	The TOC diagram is a result of a consultative process. The narrative is clear and provides a suitable explanation of causal pathways. Drivers and Assumptions, as well as the change agents along these pathways are sufficiently described in the narrative.	5
V. Key Findings **A. Strategic relevance:** This section should include an assessment of the project's relevance in relation to UN Environment's mandate and its alignment with UN Environment's policies and strategies at the time of project approval. An assessment of the complementarity of the project with other interventions addressing the needs of the same target groups should be included. Consider the extent to which all four elements have been addressed: 1. Alignment to the UN Environment Medium Term Strategy (MTS) and Programme of Work (POW) 2. Alignment to UN Environment/GEF/Donor Strategic Priorities 3. Relevance to Regional, Sub-regional and National Environmental Priorities 4. Complementarity with Existing Interventions	Section is well done and covers the four main aspects of relevance prescribed in the TOR.	6
B. Quality of Project Design To what extent are the strength and weaknesses of the project design effectively summarized?	A summary of the project's strengths and weaknesses at design stage are summarized in sufficient detail to adequately explain the sub-optimal rating given for this criterion.	5
C. Nature of the External Context For projects where this is appropriate, key external features of the project's implementing context that may have been reasonably expected to limit the project's performance (e.g. conflict, natural disaster, political upheaval) should be described.	The TE sufficiently describes the external operating context. The implications on project performance has also been discussed in adequate detail	6

D. Effectiveness **(i) Outputs and Direct Outcomes:** How well does the report present a well-reasoned, complete and evidence-based assessment of the achievement of a) outputs, and b) direct outcomes? How convincing is the discussion of attribution and contribution, as well as the limitations to attributing effects to the intervention.	The delivery of outputs has been assessed in terms of both quantity and quality. Assessment of Direct Outcomes is well covered. Reasons behind the success or shortcomings have been covered to varying degrees of detail.	6
(ii) Likelihood of Impact: How well does the report present an integrated analysis, guided by the causal pathways represented by the TOC, of all evidence relating to likelihood of impact? How well are change processes explained and the roles of key actors, as well as drivers and assumptions, explicitly discussed?	The discussion follows logically from the assessment of Outputs and Direct Outcomes. It is consistent with the TOC narrative and discusses the stakeholders and status of assumptions contributing to causal pathways from medium-term Outcomes to Impact.	5
E. Financial Management This section should contain an integrated analysis of all dimensions evaluated under financial management. And include a completed 'financial management' table. Consider how well the report addresses the following: • completeness of financial information, including the actual project costs (total and per activity) and actual co-financing used • communication between financial and project management staff and • compliance with relevant UN financial management standards and procedures.	The section covers aspects of completeness, compliance and communication, as per guidance. The quality of the assessment has been affected somewhat by the inability of the existing UMOJA system used by UN Environment UNEP for managing GEF projects to monitor component and project management expenditures. (where this section is rated poorly, it is not a reflection on the consultant, but affects the quality of the evaluation report)	4.5
F. Efficiency To what extent, and how well, does the report present a well-reasoned, complete and evidence-based assessment of efficiency under the primary categories of cost-effectiveness and timeliness including: • Implications of delays and no cost extensions	Section is well done and covers the main aspects of efficiency prescribed in the TOR. Findings have been presented adequately and some	5.5

• Time-saving measures put in place to maximise results within the secured budget and agreed project timeframe • Discussion of making use of/building on pre-existing institutions, agreements and partnerships, data sources, synergies and complementarities with other initiatives, programmes and projects etc. • The extent to which the management of the project minimised UN Environment's environmental footprint.	examples were provided to support the assessment.	
G. Monitoring and Reporting How well does the report assess: • Monitoring design and budgeting (including SMART indicators, resources for MTE/R etc.) • Monitoring implementation (including use of monitoring data for adaptive management) • Project reporting (e.g. PIMS and donor report)	Section is covered adequately and offers an assessment of the three main aspects of monitoring and rpeorting prescribed in the TOR.	5
H. Sustainability How well does the evaluation identify and assess the key conditions or factors that are likely to undermine or contribute to the persistence of achieved direct outcomes including: • Socio-political Sustainability • Financial Sustainability • Institutional Sustainability (including issues of partnerships)	Clear and concisely presented. Provides a good idea of the status of each of the dimensions of sustainability from the analyses provided.	6
I. Factors Affecting Performance These factors are <u>not</u> discussed in stand-alone sections but are **integrated in criteria A-H as appropriate**. To what extent, and how well, does the evaluation report cover the following cross-cutting themes: • Preparation and readiness • Quality of project management and supervision[62] • Stakeholder participation and co-operation • Responsiveness to human rights and gender equity • Country ownership and driven-ness • Communication and public awareness	The required sub-criteria are all covered to varying levels of detail throughout the report.	5.5
VI. Conclusions and Recommendations **i. Quality of the conclusions:** The key strategic questions should be clearly and succinctly addressed within the conclusions section? It is expected that the conclusions will highlight the main strengths and weaknesses of the project, and connect them in a compelling story line. Conclusions, as well as lessons and recommendations, should be consistent	The conclusions section is well developed and presents the most critical findings of the evaluation – both strengths and weaknesses are adequately discussed. Responses to the key strategic questions, though not explicit,	6

[62] In some cases 'project management and supervision' will refer to the supervision and guidance provided by UN Environment to implementing partners and national governments while in others, specifically for GEF funded projects, it will refer to the project management performance of the executing agency and the technical backstopping provided by UN Environment.

with the evidence presented in the main body of the report.	are all addressed in the text in as far as describing the project attribution to EE lighting in Chile and the catalytic effect set in motion ex post. Summary of ratings table is complete	
ii) Quality and utility of the lessons: Both positive and negative lessons are expected and duplication with recommendations should be avoided. Based on explicit evaluation findings lessons should be rooted in real project experiences or derived from problems encountered and mistakes made that should be avoided in the future. Lessons must have the potential for wider application and use and should briefly describe the context from which they are derived and those contexts in which they may be useful.	The lessons are relevant and based on findings presented in the report. They have a potential for wider application and use.	6
iii) Quality and utility of the recommendations: To what extent are the recommendations proposals for specific actions to be taken by identified people/position-holders to resolve concrete problems affecting the project or the sustainability of its results. They should be feasible to implement within the timeframe and resources available (including local capacities) and specific in terms of who would do what and when. Recommendations should represent a measurable performance target in order that the Evaluation Office can monitor and assess compliance with the recommendations.	Recommendations are relevant and anchored on evaluation findings. They outline the context, proposed action, and the preferred agency for that action.	6
VII. Report Structure and Presentation Quality		
i) Structure and completeness of the report: To what extent does the report follow the Evaluation Office guidelines? Are all requested Annexes included and complete?	The report follows the prescribed structure, and meets all the requirements in the TOR	6
ii) **Quality of writing and formatting:** Consider whether the report is well written (clear English language and grammar) with language that is adequate in quality and tone for an official document? Do visual aids, such as maps and graphs convey key information? Does the report follow Evaluation Office formatting guidelines?	The report is well written in clear English language that is easy to comprehend. Formatting is well done.	6
OVERALL REPORT QUALITY RATING		**HS**

A number rating 1-6 is used for each criterion: Highly Satisfactory = 6, Satisfactory = 5, Moderately Satisfactory = 4, Moderately Unsatisfactory = 3, Unsatisfactory = 2, Highly Unsatisfactory = 1. The overall quality of the evaluation report is calculated by taking the mean score of all rated quality criteria.