# Renewable Energy/Energy Efficiency Loans

## ESCO Evaluation & Registry

September 2022

EcoMicro IDB LAB ECONOLER Desjardins Développement international

# Abbreviations

| | |
|---|---|
| AML/CTF | Anti-Money Laundering and Counter Terrorism Financing |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| BZD | Belize dollar |
| CDB | Caribbean Development Bank |
| CDF | CARICOM Development Fund |
| CRAF | Credit Risk Abatement Facility |
| DFC | Development Finance Corporation |
| DSCR | Debt service coverage ratio |
| ECM | Energy conservation measure |
| EE | Energy efficiency |
| EPC | Energy performance contract or contracting |
| ESCO | Energy service company |
| GHG | Greenhouse gases |
| IDB | Inter-American Development Bank |
| IPMVP | International Performance Measurement and Verification Protocol |
| LOI | Letter of intent |
| MSME | Micro, small, and medium enterprise |
| M&V | Measurement and verification (of energy savings) |
| O&M | Operations and maintenance |
| PV | Photovoltaic |
| RE | Renewable energy |
| USD | American dollar |

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## Background

Econoler prepared this guide as part of an EcoMicro[1] pilot project aimed at improving the DFC green finance products for the implementation of energy efficiency/renewable energy (EE/RE) investments in micro, small, and medium-sized enterprises (MSMEs). The project aims to define and promote an energy performance contracting (EPC) approach, in partnership with EE/RE providers and energy service companies (ESCOs).

EcoMicro is a USD 17 million technical cooperation facility implemented and partially funded by IDB Lab, the innovation laboratory of the Inter-American Development Bank (IDB) Group. Critical funding has also come from two major outside donors: The Nordic Development Fund and Global Affairs Canada.

Econoler also held discussions with several EE/RE equipment and services providers in Belize to identify companies that were interested in offering the EPC approach to clients. The four ESCOs identified are: Pro Solar, Go Green, Optimizing Engineering Solutions, and FT Williams and Sons. These providers participated in trainings provided by Econoler on conducting energy audits, implementing savings M&V, and carrying out the EPC approach.

[1] EcoMicro Program. Online: www.ecomicro.org/.

## Definitions

- **Baseline consumption**: Representation of the energy usage of a facility or equipment prior to project implementation, assuming that equipment and operating contexts are in line with a normal operation and in good working condition. A normal operation implies, among other things, that all equipment functions properly.
- **Cost price or total cost of project for the customer**: Cost of engineering services including project design, drawings and specifications, construction supervision, the savings M&V process, cost of labor and all objects, furniture, materials, appliances, equipment, tools, machinery, and accessories, costs of energy management activities, all overhead and incidental expenses, any insurance and warranty premiums, as well as all ESCO administrative and management costs.
- **Customers, clients, and facility owners**: Owners of facility where EE/RE measures will be implemented whereby said owners will be the final users and beneficiaries of projects implemented, ideally DFC clients.
- **Energy efficiency (EE):** Energy efficiency means using less energy to perform the same task. Energy efficiency also brings a variety of benefits: reducing GHG emissions, reducing demand for energy imports, and lowering energy costs on a commercial and economy-wide level.
- **EE/RE technology and service providers**: EE/RE technology and service providers (hereinafter EE/RE providers) are companies that supply, install, and maintain such technologies as lighting, air-conditioning units, Photovoltaic Systems and Solar Water heating technologies, etc.
- **Energy savings**: Savings in electricity or fuel costs resulting from reduced energy consumption and demand in a facility over a period of time agreed upon by the parties (usually due to an EE/ RE project intervention).
- **Energy Performance Contract (EPC)**: An energy performance contract is an agreement between an energy service company (ESCO) and a client organization that is used for energy efficiency retrofit projects. Under this agreement, an energy service company assesses a facility's energy systems and equipment, identifies possible energy savings opportunities, recommends and implements energy efficiency improvements, monitors the results, and guarantees the energy savings.
- **Energy Service Company (ESCO)**: An ESCO is a type of company (an EE/RE provider) whose business model is to use EPC as the basis for its remuneration in implementing EE projects. It integrates energy related services including energy audits, project design, project implementation, commissioning, operation and maintenance, M&V, and cost saving guarantees.
- **Facility**: Building(s), network(s), or structure(s) of the client where the EE/RE project will be implemented.

- **Project**: The term project refers to an activity (or group of activities) that encompasses all of the steps required for implementation, commissioning and operation of an EE and/or RE intervention, including an energy audit, financing, design, procurement, implementation, commissioning, and M & V of savings.
- **Measurement and verification (M&V)**: Procedure for determining the savings actually achieved under an EPC agreement as laid down in an M&V plan to be prepared under the contract in accordance with the 2010 or later edition of the IPMVP.
- **Renewable energy (RE):** Renewable energy is energy that is collected from renewable resources that are naturally replenished on a human timescale. It includes sources such as sunlight, wind, rain, tides, waves, and geothermal heat.

# 1 ESCO Accreditation Best Practices

This section describes typical criteria used for the certification or pre-qualification of ESCOs for EPC contracts with public or private entities.

### Typical ESCO Qualification Criteria

ESCOs are usually qualified and graded (e.g. points) on their ability to conduct EPC projects using the following criteria:

- Qualification and experience of key staff and project manager
- Energy auditor certification
- EPC certification
- M&V certification
- Project experience (e.g.: 3 projects above USD 100 000, with M&V)

Both the ESCO and their proposed team for a project are usually evaluated under a bidding process.

### ESCO Registry and Accreditations

Different types of accreditations can be used to qualify ESCOs. These usually allow for smaller ESCOs with less qualifications to be featured in the ESCO registry, allowing them to implement smaller projects, pursue training and thus aim at a higher ESCO accreditation. ESCO accreditation schemes thus usually involve different levels of accreditation to reflect this requirement:

- Partial, full
- Level I, II, III

Given the smaller and nascent market for ESCOs in Belize, such a rigid scheme would be hard to implement. It is thus proposed to only list available EE/RE providers in Belize in the initial version of this registry, including ESCOs, with their current qualifications and training.

# 2 EE/RE Providers & ESCOs Qualification Methodology

The ESCO market in Belize is not developed enough to implement a full ESCO accreditation scheme, but EE/RE services and technology providers can be trained and guided in order to implement an EPC approach. The proposed ESCO evaluation scheme aims at identifying gaps in qualifications of EE/RE services and technology providers in proposing and implementing EE/RE/EPC services, as well as help DFC credit officers when orienting clients in selecting one or more EE/RE providers.

**Evaluation Criteria**

The following criteria are to be used by DFC (credit Staff) to assess the qualifications and experience of EE/RE services and technology providers and their key staff:

- Company profile
  - Market sector
  - Services/Specialization
  - Number of employees
  - Annual revenue (BZD, approximate if available)
  - Contact information
- Company experience
  - Past EE/RE project experience including size (e.g.: kW saved (EE) or kW installed (RE)) and cost (BZD) of project
  - Number and extent of projects (including EPCs) implemented.
  - Type of energy savings guarantee offered
- Key staff qualifications and experience
  - Profession
  - Years of experience
  - Area of Expertise
  - Completed EE/RE/EPC training/certifications (e.g.: DFC training)
  - EPC Experience
- Additional relevant information (e.g RE/EE consulting experience)

**Use of the ESCO registry**

The registry is to be used by DFC credit officers when providing support to clients in obtaining service proposals or quotes from relevant EE/RE/EPC providers. The registry should be updated regularly (and no less than twice per annum) since the EE/RE market is expanding and ESCO qualifications and experience may improve. The ESCO registry can also serve as a project registry whereby relevant projects and their characteristics can be listed here for reference purposes.

# 3 ESCO Registry

There are limited EE/RE providers working in Belize offering different services including energy audits, energy efficiency, as well as renewable energy solutions. The following table lists some of the companies with their specialization to guide ESCO clients and staff of the DFC. Clients may also express willingness in reducing their energy costs. Credit officers may provide the information below to clients and guide them according to their needs but should not recommend a specific company (to reduce reputational risks arising from any adverse client experiences). It is a good practice to recommend that clients to seek more than one offer prior to deciding on a service provider.

| EE/RE Provider | Specialization | Services | | | |
|---|---|---|---|---|---|
| | | RE Supply | EE Projects | ESCO Candidate | ESCO Provider |
| **Integrated Solutions Providers** | | | | | |
| Go Green Ltd. | Solar PV Panels, wind power, rainwater catchment, energy efficiency audits | Yes | Yes | Yes | |
| SEOS Sustainable Solutions Ltd. | Lighting, controls, outdoor lighting, water heating, water conservation | Yes | Yes (lighting) | | |
| Pro Solar Engineering Ltd. | Solar PV panels installation, wind power, rainwater catchment, mini-hydro dam | Yes | Yes | Yes | |
| FT Williams & Associates | Building services, energy efficiency, HVAC installation, construction | Yes | Yes | Yes | |
| Optimize Engineering Solutions Limited | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | Yes | Yes | Yes | |
| **Solar Water Heater Providers** | | | | | |
| GreenSun Ltd. | Solar water heating, home biogas systems, septic tank treatment system | Yes | No | | |
| **Solar PV Providers** | | | | | |
| Green Light Renewable Energy (GLRE) | Solar PV panels systems development and financing | Yes | No | Yes | |
| Solar Energy Solutions Belize (SESB) | Solar PV panels systems installation, wind power systems | Yes | No | | |
| Sun's Electric | Solar PV panels systems installation | Yes | Yes | | |
| Southern Solar Solutions | Solar PV panels systems installation | Yes | No | | |
| Solar Caribbean | Solar PV panels systems installation | Yes | No | | |

Detailed analyses of each EE/RE providers can be found in Appendix I. Interested SMEs can visit DFC's website for further information on EE/RE providers.[2]

[2] DFC. Green Energy Service Companies. Online: www.dfcbelize.org/green-energy-service-providers/

# APPENDIX I ESCO Registry Details

## Specialization, Sectors, Services

| EE/RE Provider | Specialization | Sectors | | | | Services | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Residential | Commercial | Manufacturing/ Industrial | Agriculture | Consulting | RE Supply | Energy Audits | EE Projects | EPC |
| **Integrated Solutions Providers** | | | | | | | | | | |
| Go Green Ltd. | Solar PV Panels, wind power, rainwater catchment, energy efficiency audits | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| SEOS Sustainable Solutions Ltd. | Lighting, controls, outdoor lighting, water heating, water conservation | | Yes | | | Yes | Yes | No | Yes (lighting) | |
| Pro Solar Engineering Ltd. | Solar PV panels installation, wind power, rainwater catchment, mini-hydro dam | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | |
| FT Williams & Associates | Building services, energy efficiency, HVAC installation, construction | | Yes | | | Yes | Yes | Yes | Yes | |
| Optimize Engineering Solutions Limited | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | | | | | | | | | |
| **Solar Water Heater Providers** | | | | | | | | | | |
| GreenSun Ltd. | Solar water heating, home biogas systems, septic tank treatment system | Yes | Yes | Yes | | Yes | Yes | No | No | |
| **Solar PV Providers** | | | | | | | | | | |
| Green Light Renewable Energy (GLRE) | Solar PV panels systems development and financing | Yes | Yes | Yes | | Yes | Yes | No | No | Financing (No capital from client) |
| Solar Energy Solutions Belize (SESB) | Solar PV panels systems installation, wind power systems | | Yes | Yes | | Yes | Yes | Yes (Solar) | No | |
| Sun's Electric | Solar PV panels systems installation | Yes | Yes | | Yes | Yes | Yes | Yes (Solar) | Yes | |
| Southern Solar Solutions | Solar PV panels systems installation | Yes | Yes | | Yes | No | Yes | No | No | |
| Solar Caribbean | Solar PV panels systems installation | | Yes | | | No | Yes | No | No | |

## Training

| EE/RE Provider | Specialization | DFC Training Received | | | | Formal Training | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Intro. to EPC | Energy Audits | M&V | EPC | Energy Audits | M&V / EPC | Solar PV | Sustainable Design |
| **Integrated Solutions Providers** | | | | | | | | | |
| Go Green Ltd. | Solar PV Panels, wind power, rainwater catchment, energy efficiency audits | Yes | Yes | Yes | Yes | EE Auditor (California) | | Renewables Academy (RENAC) | Permaculture |
| SEOS Sustainable Solutions Ltd. | Lighting, controls, outdoor lighting, water heating, water conservation | - | - | - | - | | | | |
| Pro Solar Engineering Ltd. | Solar PV panels installation, wind power, rainwater catchment, mini-hydro dam | Yes | Yes | Yes | Yes | | | | |
| FT Williams & Associates | Building services, energy efficiency, HVAC installation, construction | Yes | Yes | Yes | Yes | | | | LEED AP |
| Optimize Engineering Solutions Limited | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | Yes | Yes | Yes | Yes | | | | |
| **Solar Water Heater Providers** | | | | | | | | | |
| GreenSun Ltd. | Solar water heating, home biogas systems, septic tank treatment system | Yes | Yes | - | - | | | | |
| **Solar PV Providers** | | | | | | | | | |
| Green Light Renewable Energy (GLRE) | Solar PV panels systems development and financing | | | | | | | | |
| Solar Energy Solutions Belize (SESB) | Solar PV panels systems installation, wind power systems | Yes | Yes | - | - | | | | |
| Sun's Electric | Solar PV panels systems installation | Yes | - | - | - | | | NABCEP installer | |
| Southern Solar Solutions | Solar PV panels systems installation | - | - | - | - | | | | |
| Solar Caribbean | Solar PV panels systems installation | - | - | - | - | | | | |

## Company Evaluation

| EE/RE Provider | Specialization | Founded | Number of Employees | Annual Revenues Range (BZD) | Company Experience | EPC Experience |
|---|---|---|---|---|---|---|
| **Integrated Solutions Providers** | | | | | | |
| Go Green Ltd. | Energy efficiency audits, permaculture, rainwater catchment, solar PV panels, wind power | 2007 | 2 | 200,000 - 500,000 (2020) | Energy audits, consulting, design, implementation, procurement, construction | Energy audits only |
| SEOS Sustainable Solutions Ltd. | Lighting, controls, outdoor lighting, water heating, water conservation | | 4 | 500,000 - 1,000,000 (2020) | | |
| Pro Solar Engineering Ltd. | Solar PV panels installation, wind power, rainwater catchment, mini-hydro dam | 2012 | 20 | > 1,000,000 (2020) | | |
| FT Williams & Associates | Building services, energy efficiency, HVAC installation, construction | | 127 (3 in RE/EE) | | | |
| Optimize Engineering Solutions Limited | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | | | | | |
| **Solar Water Heater Providers** | | | | | | |
| GreenSun Ltd. | Solar water heating, home biogas systems, septic tank treatment system | | 2 | <200,000 (2020) | | |
| **Solar PV Providers** | | | | | | |
| Green Light Renewable Energy (GLRE) | Solar PV panels systems development and financing | 2018 (Belize) | 2 (6 in Pro-energy) | | Works with an EPC (eng., procurement, commissioning) company Pro-energy based in Honduras | Financing Offered (No capital from client). PUC confirmed that GLRE model is legal. |
| Solar Energy Solutions Belize (SESB) | Solar PV panels systems installation, wind power systems | 2011 | 14 | > 1,000,000 (2020) | Solar PV, design, installation, commissioning, troubleshooting & monitoring | |
| Sun's Electric | Solar PV panels systems installation | 2018 | 2 | < 200,000 (2020) | Solar electric systems and electrical services | |
| Southern Solar Solutions | Solar PV panels systems installation | | 5 | < 200,000 (2020) | | |
| Solar Caribbean | Solar PV panels systems installation | | | | | |

## Selected EE/RE Projects

| EE/RE Provider | Year | Location | Building Type | EE/RE | Technologies | Size (kWp) | Cost | Solar PV Cost/kWp | Savings (%, kWh, BZD) | Funding Source | Simple Payback Period (yrs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Integrated Solutions Providers** | | | | | | | | | | | |
| Go Green Ltd. | < 2020 | Caye Caulker | Water treatment building | RE | Solar PV (Grid connected) | 38 kWp | 350,000 BZD | 9,210 BZD/kWp | N/A | EU | 8.0 |
| | < 2020 | Barbados | Solar farm | RE | Solar PV (Grid connected) | 58 kWp | 600,000 BZD | 10,344 BZD/kWp | N/A | EU | 8.0 |
| | < 2020 | Dominica | Water treatment building | RE | Solar PV | 68 kWp | 660,000 BZD | 9,705 BZD/kWp | N/A | Italian Government | 9.0 |
| | | | | Storage | Saltwater battery storage | - | N/A | - | - | Italian Government | N/A |
| SEOS Sustainable Solutions Ltd. | < 2020 | San Pedro | Hospitality | EE | LED Lighting | - | 150,000 BZD | - | N/A | Partner in Europe | N/A |
| | < 2020 | Countrywide | Public buildings | Water | Waterless Urinals | - | 80,000 BZD | - | N/A | N/A | N/A |
| Pro Solar Engineering Ltd. | < 2020 | Belmopan City | Commercial | RE | Solar PV (Grid-tied) (with backup) | 12 kWp | 87,000 BZD | 7,250 BZD/kWp | N/A | Self funded | 5 years |
| | < 2020 | Dangriga | Commercial Tourism Resort | RE | Solar PV (Off-grid) (with backup) | N/A | 93,000 BZD | N/A | 100% | DFC | 5-7 years |
| | < 2020 | Toledo, Corozal | Villages | RE | Solar PV with Backup | 4 × 5 kWp | 798,000 BZD | N/A | 100% | BSIF Funding | N/A |
| | | | | Water | Potable water pumping system | - | | - | N/A | BSIF Funding | N/A |
| FT Williams & Associates | | | | | | | | | | | |
| Optimize Engineering Solutions Limited | | | | | | | | | | | |
| **Solar Water Heater Providers** | | | | | | | | | | | |
| GreenSun Ltd. | < 2020 | Belize City | Laundry facility at hotel | RE | Solar thermal | N/A | 20,000 BZD | - | 65% | DFC | 2.0 |
| | < 2020 | San Pedro | Resort | RE | Solar pool heating | N/A | 13,000 BZD | - | 100% | Self funded | 2.0 |
| | < 2020 | Hopkins | Villa | RE | Solar thermal | N/A | 29,000 BZD | - | 100% | Self funded | 3.0 |
| **Solar PV Providers** | | | | | | | | | | | |
| Green Light Renewable | | | | | | | | | | | |

| EE/RE Provider | Year | Location | Building Type | EE/RE | Technologies | Size (kWp) | Cost | Solar PV Cost/kWp | Savings (%, kWh, BZD) | Funding Source | Simple Payback Period (yrs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Energy (GLRE) | | | | | | | | | | | |
| Solar Energy Solutions Belize (SESB) | < 2020 | SPL Grid | Warehouse | RE | Solar PV (Grid-tied) | 23.1 kWp | 68,000 BZD | 2,957 BZD/kWp | N/A | Self funded | 2.8 |
| | < 2020 | Island | N/A | RE | Solar PV (Off-grid) | 6.8 kWp | 105,000 BZD | 15,441 BZD/kWp | 100% | DFC | 5.0 |
| | < 2020 | Cayo | N/A | RE | Solar PV (Grid-tied) | 37 kWp | 120,000 BZD | 3,243 BZD/kWp | N/A | Self funded | 5.0 |
| Sun's Electric | < 2020 | Valley of Peace | Farm | RE | Solar PV (Off-grid) | 10 kW | 80,000 BZD | 8,000 BZD/kWp | N/A | Self funded | N/A |
| | < 2020 | Santa Elena | Commercial | RE | Solar PV (Grid-tied) (with backup) | 18 kW | 121,000 BZD | 6,722 BZD/kWp | N/A | Self funded | 7.0 |
| | < 2020 | Cristo Rey | Residential | RE | Solar PV (Off-grid) | N/A | 5,000 BZD | N/A | 100% | Self funded | N/A |
| Southern Solar Solutions | < 2020 | N/A | Residential (Remote) | RE | Solar PV (Off-grid) | N/A | 70,000 BZD | N/A | 100% | Self funded | N/A |
| | < 2020 | N/A | Agriculture | RE, water | Solar PV direct sun pumping | N/A | 10,000 BZD | N/A | 100% | Self funded | N/A |
| | < 2020 | N/A | Greenhouse | EE, RE | Solar Ventilation Fans, PV direct | N/A | 8,000 BZD | N/A | 100% | Self funded | N/A |
| Solar Caribbean | | | | | | | | | | | |

N/A: Not available

## Solar PV Projects

| EE/RE Provider | Number of Projects | Total Size Installed (kWp) | Maximum Size Installed (kWp) | Average Size Installed (kWp) | Typical Solar PV Cost (Cost/kWp) | Savings/Product Guarantee |
|---|---|---|---|---|---|---|
| **Integrated Solutions Providers** | | | | | | |
| Go Green Ltd. | | | | | | |
| SEOS Sustainable Solutions Ltd. | | | | | | |
| Pro Solar Engineering Ltd. | | | | | | |
| FT Williams & Associates | | | | | | |
| Optimize Engineering Solutions Limited | | | | | | |
| **Solar Water Heater Providers** | | | | | | |
| GreenSun Ltd. | | | | | | |
| **Solar PV Providers** | | | | | | |
| Green Light Renewable Energy (GLRE) | | > 300 MW | | | | |
| Solar Energy Solutions Belize (SESB) | | 100+ Reference Systems | 4000+ Solar Panels Installed 1.6mW of Solar Installed | | | |
| Sun's Electric | | | | | | |
| Southern Solar Solutions | | | | | | |
| Solar Caribbean | | | | | | |

## Key Staff Evaluation

| EE/RE Provider | Employee Name | Gender | Profession | Professional Experience (yrs) | General Experience | Employee Certifications | EPC Experience |
|---|---|---|---|---|---|---|---|
| **Integrated Solutions Providers** | | | | | | | |
| Go Green Ltd. | Tobias Sengfelder | M | ? | 17 years (2005) | Energy efficiency audits, permaculture, rainwater catchment, solar PV panels, wind power | Commercial Energy Auditor, Solar PV, Permaculture | Energy Audits Only |
| SEOS Sustainable Solutions Ltd. | Saïd Muntslag | M | | | | | |
| | Egon von Foidl | M | | | | | |
| Pro Solar Engineering Ltd. | Marco Valle | M | Electrical Engineer | | IT professional | | |
| | Eric J. Vivas | M | | | | | |
| | Carla Lopez | F | | | | | |
| FT Williams & Associates | Mark Gabb | M | | | | | |
| | Billy Mira | M | Electrical Engineer | 5 years (2017) | Electrical designs and photovoltaic designs | Solar PV design & sizing | |
| Optimize Engineering Solutions Limited | Robert Tillett | M | Mechanical and Electrical Engineering | > 20 years (1994) | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | | |
| **Solar Water Heater Providers** | | | | | | | |
| GreenSun Ltd. | Tom Sagee | M | | | | | |
| **Solar PV Providers** | | | | | | | |
| Solar Energy Solutions Belize (SESB) | Silvan Kuffer | M | System Engineering | > 20 years | Solar PV, design, installation, commissioning, troubleshooting & monitoring | SMA certified in Solar PV Design | |
| | Nadja Preisig | F | Business Administration | > 20 years | Business administration, international sourcing | | |
| | Lukas Kuffer | M | Computer Engineering | 19 years (2003) | Solar PV, design, installation, commissioning, troubleshooting & monitoring | SMA certified in Industrial Energy Systems | |
| | Denver Trapp | M | Solar Technician | 9 years (2013) | System installation, commissioning, monitoring, maintenance & troubleshooting | | |
| | Mervin Matute | M | Certified Electrician | 5 years (2017) | Electrical design, system installation, commissioning, monitoring & maintenance | Certified Solar Technician Cayo CET | |

| EE/RE Provider | Employee Name | Gender | Profession | Professional Experience (yrs) | General Experience | Employee Certifications | EPC Experience |
|---|---|---|---|---|---|---|---|
| Sun's Electric | Jon Siegenthaler, owner | M | BA. Design | 20 years (2002) | Solar PV design, installation, electrical works | NABCEP Certificate | |
| | Tatiana Siegenthaler | F | | | | | |
| Southern Solar Solutions | Mark J Miller | M | | | | | |
| Solar Caribbean | Frederic Andreau | M | Industrial, chemical, engineer | 21 years (2001) | Solar PV design, installation, commissioning, maintenance, off-grid, electric vehicles charging stations | | |
| | Denis Cloup | M | Engineer | > 20 years | Technical and sales responsibilities | | |
| | Carlton N. Young | M | Civil Engineer | > 20 years | Energy and building sector, engineering, project management, energy policies | | |
| Green Light Renewable Energy (GLRE) | Andres Santiago (VP) | M | | | | | |
| | Eduardo Santiago | M | Electrical Engineering, MBA | | | | |

## Contacts

| EE/RE Provider | Specialization | Phone | Location | Contact | Gender | Website/ Contact |
|---|---|---|---|---|---|---|
| **Integrated Solutions Providers** | | | | | | |
| Go Green Ltd. | Solar PV Panels, wind power, rainwater catchment, energy audits | +501.622.0980 | San Ignacio, Cayo District | Tobias Sengfelder | M | www.gogreenandsolar.com gogreenbelize@gmail.com |
| SEOS Sustainable Solutions Ltd. | Lighting, controls, outdoor lighting, water heating, water conservation | Office: +501.614.4660 | Belize City, Belize District | Saïd Muntslag and Egon von Foidl | M | www.seos-international.com info@seos-international.com |
| Pro Solar Engineering Ltd. | Solar PV panels installation, wind power, rainwater catchment, mini-hydro dam | Office: +501.822.2216 or 677-0017 | San Ignacio Town, Cayo District | Marco Valle | M | www.prosolarltd.com info.prosolar@gmail.com |
| FT Williams & Associates | Building services, energy efficiency, HVAC installation, construction | Office: +501.223-6066 | Belize City, Belize District | Mark Gabb | M | www.ftwilliams.bz ftwilliams@btl.net |
| Optimize Engineering Solutions Limited | Water infrastructure projects, hydropower, wastewater treatment, utility scale solar systems, wind power | +501.615-3613 | Belize District | Robert Tillett | M | optimize-engineering-solutions-limited.business.site |
| **Solar Water Heater Providers** | | | | | | |
| GreenSun Ltd. | Solar water heating, home biogas systems, septic tank treatment system | Office: +501.671.4533 \| (+501) 627.4533 | San Ignacio, Cayo District | Tom Sagee | M | www.swhbelize.com chromagenbz@gmail.com |
| **Solar PV Providers** | | | | | | |
| Green Light Renewable Energy (GLRE) | Solar PV panels systems development and financing | | | | | |
| Solar Energy Solutions Belize (SESB) | Solar PV panels systems installation, wind power systems | Office: +501.666.1000 | Teakettle Village, Cayo District | Silvan Kuffer, Nadja Preisig and Lukas Kuffer | M/F | www.sesb.com mail@sesb.com |
| Sun's Electric | Solar PV panels systems installation | Office: +501.671.1399 | Cristo Rey Village, Cayo District | Jon or Tatiana Siegenthaler | M/F | www.sunselectric.com jon@sunselectric.com |
| Southern Solar Solutions | Solar PV panels systems installation | Office: +501.664.2054 | Punta Gorda Town, Toledo District | - | - | solarbelize@gmail.com www.facebook.com/SolarBz |
| Solar Caribbean | Solar PV panels systems installation | Office: +501.223.2072 | Belize City, Belize District | Carlton Young | M | carlton.n.young@gmail.com |

# APPENDIX II Information on Individual ESCOs

See folders accompanying this document (company profiles, key staff CVs, interviews, surveys, etc.)

# APPENDIX III Energy Performance Contracting

An EPC is an agreement between a facility owner and ESCO, which outlines responsibilities for the facility owner and ESCO in implementing an EPC project. The guaranteed savings contract has been identified as the most suitable for the privately owned ESCOs working in the Belize market. More details can be found in the DFC EE/RE Loan Operation Guide.

## Objectives of the EPC Approach

The EPC approach is aimed at providing the following benefits to ESCOs, clients, and DFC:

| | |
|---|---|
| ESCO | **Better long-term relationship between the client and ESCO**<br>**Marketing to future clients by demonstration of past energy savings** |
| Client | **Provides more confidence for the client to invest in EE/RE projects**<br>**Savings guarantee ensures lower energy costs and enables client to repay the loan without reliance on operational cash flows** |
| DFC | **Increased uptake of EE/RE technology by demonstrating energy savings**<br>**Savings guarantee lowers risk of client defaulting on loan repayment**<br>**Facilitate attainment of climate resiliency strategic objectives** |

## EPC Concept

EPC is a risk mitigation mechanism for organizing RE and EE financing. EPC involves an ESCO that provides integrated turnkey energy services including:

- Project development and energy audits;
- Energy conservation measure (ECM) identification;
- EPC and legal aspects (limited services depending on complexity of project);
- Engineering design;
- Facilitating/ Arranging financing;
- Equipment procurement and installation;
- Construction and on-site supervision;
- Overall project management;
- Commissioning;
- Customer capacity building on new equipment operation and maintenance;
- Operations and maintenance (O&M) (if needed or required);
- Savings M&V;
- Performance guarantee.

ESCO remuneration depends on the achievement of guaranteed savings. The ESCO stays involved in the M&V process for energy savings during the repayment period (or part thereof).

### Guaranteed Savings

Under the guaranteed savings scheme:

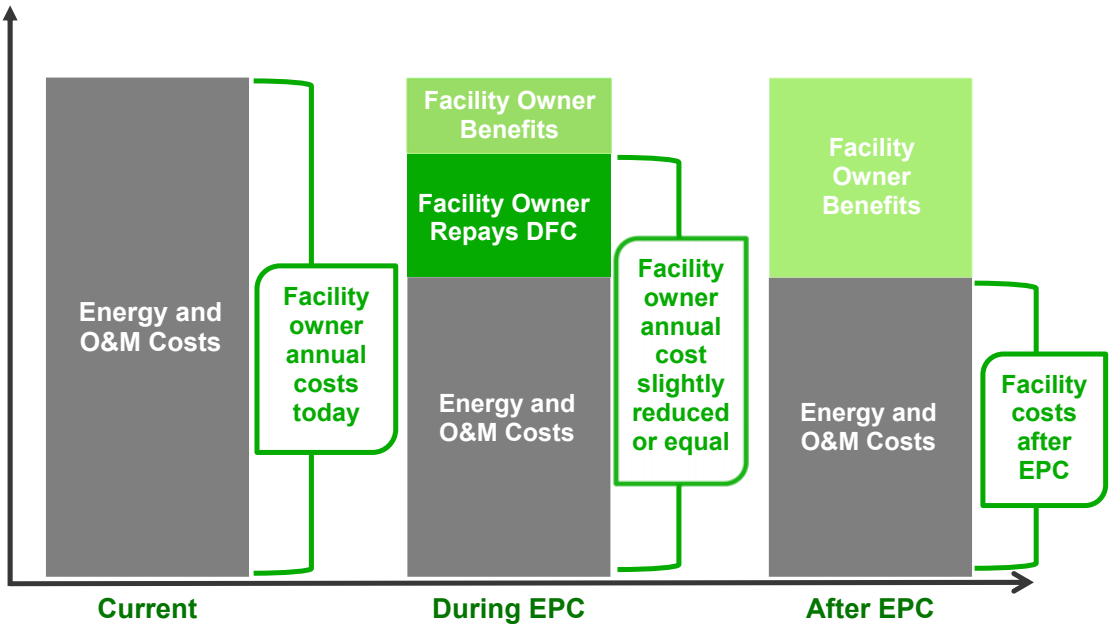
- The client provides the upfront investment (through their own capital or financed through DFC) for EE/RE projects,
- The ESCO is required to guarantee that the estimated energy savings (or part thereof) will be achieved[3].

Guaranteed savings scheme details:

- **Cost:** Fixed price. May include a share of savings above the guaranteed amount.
- **Funding**: The facility owner provides the funding (with DFC providing the loan).
- **Guarantee:** If realized savings are below the guaranteed amount, the ESCO will compensate the customer for the shortfall amount or rectify the system to generate the agreed upon savings.
- **Duration:** Fixed term contract.
- **Cash flow:** Immediate positive cash flow for the customer.
- **Equipment ownership:** Typically, with the customer.
- **Contract Period:** Often fixed and coordinated with the debt service.

### Facility Owner Benefits Throughout the EPC

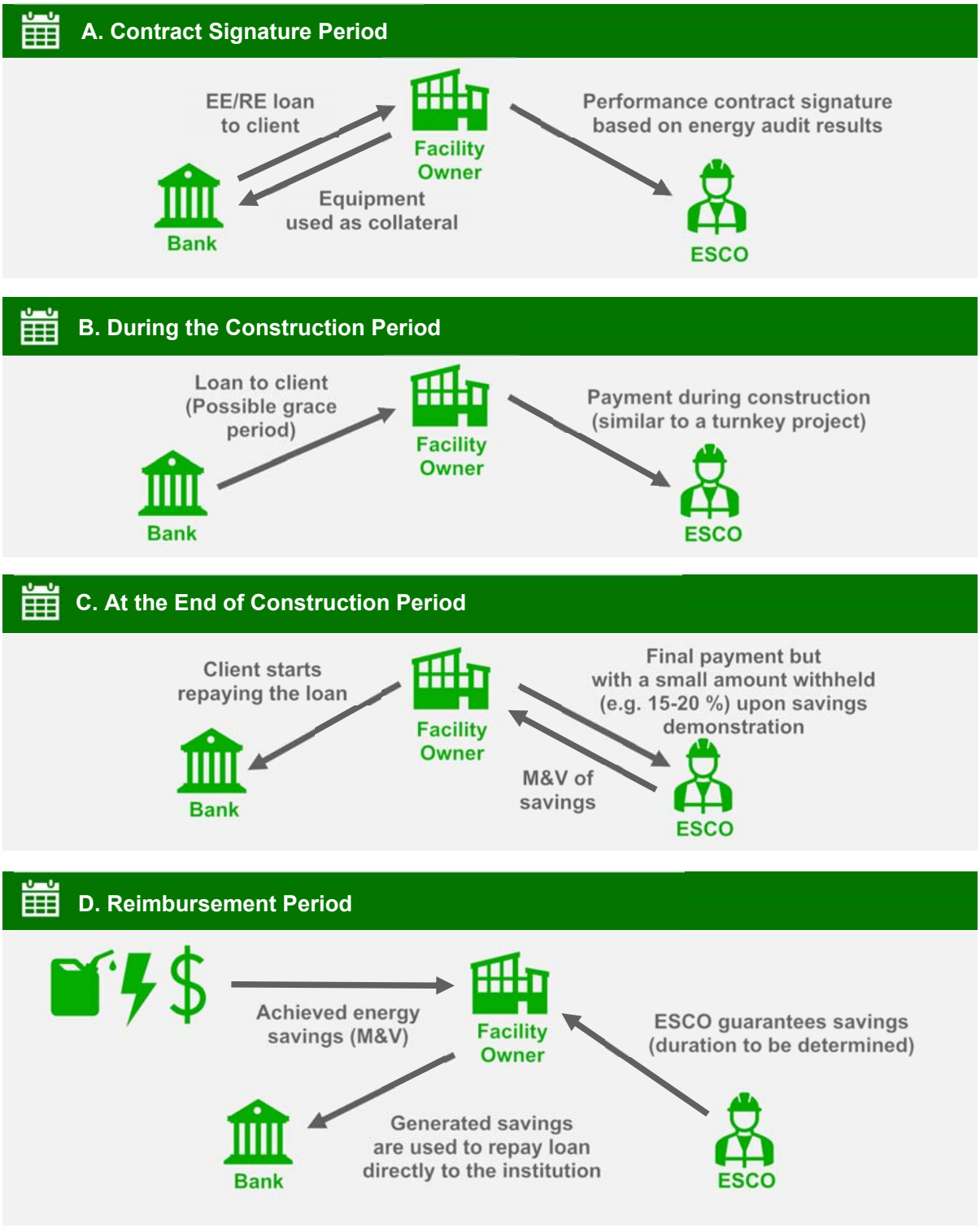
The following figure illustrates the benefits for the facility owner throughout and after the EPC:




[3] A percentage of the total expected savings may be guaranteed (e.g 80%).

## EPC Scheme at Different Moments of EE/RE Project Development

The following figures illustrate the EPC scheme at different stages of the EE/RE project development cycle using a guaranteed savings scheme.



## Solar PV Projects Particularities

For grid-connected solar photovoltaic (PV) projects, ESCOs can only guarantee electricity output (kWh) and not electricity savings, as the solar PV output might exceed the electricity power required by the facility at any given time[4]. Without electricity storage solutions (e.g. batteries), the size of solar PV panels should be adjusted to the daytime baseline electricity consumption of the facility, also acknowledging that electricity produced on weekends and during holidays might not be used by the facility owner.

## Important EPC Points and Minimum Requirements

An EPC should include at a minimum the following:

| | |
|---|---|
| **Subcontractors** | ▪ ESCO selected subcontractors for which it is responsible<br>▪ Selected subcontractors are approved by client |
| **Substantial Completion** | ▪ Criteria must be set and agreed to by both parties<br>▪ If ESCO is subject to material failure leading to non-issuance of certificate of substantial completion for up to 6 months – grounds for default |
| **EPC Adjustment** | ▪ Client modifications are subject to joint evaluation with ESCO<br>▪ Client actions leading to: (1) Increased costs during and/or after completion; (2) decreased savings |
| **Customer Responsibilities** | ▪ Responsibility of client to ESCO on direct loss of savings due to late reporting of malfunctions, improper operation and maintenance of the system, and the like |
| **Ownership** | ▪ All equipment owned by client<br>▪ All related drawings and specifications owned by ESCO |
| **Payment** | ▪ Construction period - work fees<br>▪ Penalty clauses can be revised |
| **Default by ESCO** | ▪ Reported material failure by ESCO<br>▪ Thirty-day allowance for correction as standard may be revised |
| **Default by Customer** | ▪ Client actions leading to inability to sustain project financing<br>▪ Non-payment by client of dues |
| **Negotiation** | ▪ All payments/fees/penalties established in % are negotiable<br>▪ All contractual periods stated in days or months are negotiable<br>▪ Payment schedule and share of cost tied to the savings guarantee. Typical values: 10% upfront, 70-75% throughout implementation, 15-20% upon demonstration of cost savings<br>▪ Other responsibilities (e.g.: O&M) may be negotiated |

[4] Belize electricity regulations does not currently allow for a feed-in tariff to be used in the Country (whereby decentralized electricity producers can sell their excess electricity back to the grid).

## EPC Responsibilities

The ESCO, client, and DFC have the following responsibilities in carrying out the EPC approach:

**ESCO**

- EPC proposed by the ESCO
- ESCO negotiates the EPC with the client

**Client**

- Client negotiates the EPC with the ESCO (M&V approach, % of cost tied to guarantee, etc.)
- Client signs the EPC after loan approval
- Selected subcontractors are approved by client

- DFC approves the loan before EPC signature

# APPENDIX IV Additional References

## International ESCO Training

| Name | Web Source |
|---|---|
| **Energy Audits** | |
| Certified Energy Auditor (CEA) | aeecenter.org/certifications/certifications/certified-energy-auditor |
| **Measurement & Verification** | |
| Certified Measurement & Verification Professional (CMVP) Program | https://evo-world.org/en/ |
| **Energy Performance Contracting** | |
| Performance Contracting and Funding Professional | https://www.aeecenter.org/certifications/certifications/performance-contracting-and-funding-professional |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