MOEJ/GEC JCM Project Planning Study (PS) 2014
Summary of the Final Report

"Installation of Solar PV and Storage Battery with Energy Management System (EMS)"

(Implementing Entity: Pacific Consultants Co., Ltd. /T. T. Network Infrastructure Japan Corporation)

1. Overview of the Proposed JCM Project

Study partners	**Tokyo Electric Power Company** Diesel generation, Distribution **Toshiba** Battery Energy Storage System (BESS), Energy Management System (EMS) **InterAct** Business development **Renewable Energy Maldives** Solar PV, Business development **Energy Consultancy** Coordination, Institutional framework	
Project site	Kaafu Atoll, Maldives	
Category of project	Renewable Energy	
Description of project	The greenhouse gas (GHG) emissions from fossil fuel consumption will be substantially reduced by integrating the two power systems of two nearby inhabited (Huraa) and resort (Kuda Huraa) islands into one and introducing a large capacity of renewable energy. A special purpose company (SPC) will be established for power generation and distribution. Transmission lines will be established between the two islands and the powerhouses will be integrated to the one in Huraa. Solar PV, wind turbine, BESS which absorbs the power fluctuations of renewable energy, and EMS which optimally controls the diesel gensets (DGs) and all other devices installed in the project will be introduced in Huraa, where there is more space. The old DGs will be replaced with high-efficient ones to meet the power demands of the project. The distribution network in Huraa will be upgraded for PV installation and demand increment. Huraa and Kuda Huraa Islands will enjoy stable power supply with low carbon intensity.	
Expected project implementer	Japan	Pacific Consultants Co., Ltd. InterAct Inc.
	Host country	Renewable Energy Maldives Pvt. Ltd.

Initial investment	13,514 (thousand USD)	**Date of groundbreaking**	November 2015
Annual maintenance cost	5,711 (thousand USD)	**Construction period**	12 months
Willingness to investment	All company involved expected to invest in SPC	**Date of project commencement**	October 2016
Financial plan of project	"Support Program Enabling "Leapfrog" Development" or "Financing Programme for JCM Model Projects" is planned to be utilized for solar PV and other eligible components. JICA's "Overseas Investment and Loan" scheme is planned to be utilized in combination with own equity for the remaining costs. The investment and maintenance costs will be recovered by the revenue from the power sales to Huraa residents and the resort on Kuda Huraa.		
GHG emission reductions	588 (tCO2/year) *Average value calculated for the project period (20years)		

2. Study Contents

(1) Project development and implementation

1) Project planning

(a) Facility plan

The GHG emissions from fossil fuel consumption will be substantially reduced by integrating the power systems of nearby Huraa Island and Kuda Huraa Island, which is a resort island operated by the Four Seasons Resorts (FSR), and introducing a large capacity of renewable energy. An SPC will be set up to provide power to the two islands. Transmission lines will connect the two islands and the powerhouses will be integrated to the one in Huraa. Solar PV, wind turbine, BESS which absorbs the power fluctuations of renewable energy, and EMS which optimally controls the diesel gensets (DGs) and all other devices installed in the project will be introduced in Huraa, where there is more space. The old DGs will be replaced with high-efficient ones to meet the power demands of the project. The distribution network in Huraa will be upgraded for PV installation and demand increment. Huraa and Kuda Huraa Islands will enjoy stable power supply with low carbon intensity.

Solar PV systems with a total capacity of 1,239kW will be installed in Huraa. The solar PV modules will be installed mainly on the roofs of public facilities such as the council office, association building, school and powerhouse. Roofs of buildings on public land such as the staff accommodation building of FSR will also be utilized. Some structures will be newly built in the harbor area to install the modules which will also serve as shades. The Panasonic HIT module will be adopted as it requires less space for installation and have a better generation performance at high temperatures compared to its competitor products.

Wind turbines with a total capacity of 40kW will be installed in Huraa. Eight 5kW-Zephyr9000 wind turbines will be installed.

Four 1MW DGs will be installed in the Huraa powerhouse. Together, the powerhouse infrastructure will be upgraded to meet the technical and environmental standards.

A BESS with an output power of 1,000kW and a storage capacity of 1,210kWh will be installed at the Huraa powerhouse compounds to enable stable operation of the solar PV systems. Two containerized battery sets will each be set on a 16m x 22m concrete foundation established in the backyard of the powerhouse. Toshiba lithium-ion battery, SCiB^{TM} will be employed.

An EMS will be installed to effectively make use of the power generated from the large capacity of PV to be installed. Toshiba's μEMS will be adopted.

Facilities to send power from Huraa to Kuda Huraa will be installed. To ensure highly reliable power supply, two transmission lines will be established. One will serve as the backup to the other. There will be no interruptions in the power supply even if there is a fault in one line.

Distribution facilities will also be upgraded.

(b) Implementation structure

An SPC will be set up to provide power to the two islands with the consent of the Huraa Island Council and FSR before project implementation. The SPC will take over the power business including generation and distribution currently handled by the Huraa Island Council and together with its facilities. The SPC will sell power to and collect payment from the consumers in Huraa. The SPC will also sign a long-term power purchasing agreement with FSR and provide power to FSR through a medium-voltage line.

Renewable Energy Maldives, Pacific Consultants and InterAct will take the lead in establishing the SPC. Toshiba Cooperation, T. T. Network Infrastructure Japan Corporation and Tokyo Electric Power Company will be asked to take part in the SPC to enhance the sense of security of local stakeholders regarding the services provided by the SPC through their established technical expertise.

The main off taker of the power, FSR, is not entirely comfortable with the idea of relying its power supply on the powerhouse in Huraa. FSR fears that the power supply to the resort may be interrupted not only accidently but also intentionally when the relationship between Huraa Island and FSR deteriorates. In order to mitigate these concerns, FSR will be given the option to join the SPC and/or operate the powerhouse.

The Huraa Island Council is expected to lease land, buildings, distribution facilities and other power infrastructure on a long-term basis to the SPC, and give the right to operate the power business in Huraa to the SPC as well.

Nine people will work in the SPC for the daily operation of the power business. The team will work in three shifts around the clock. The competency of the operation team will be enhanced by hiring a highly skilled professional electro-engineer as the powerhouse manager.

(c) Project benefits

a) Generation plan

A generation plan was developed considering the future demand of the two islands (see Table 1). The power generation of solar PV was calculated based on irradiation, installed capacity, degradation, and system loss. For wind turbine, the power production was estimated by referring to the expected average wind speed and the information released from the turbine manufacturer. The power generated by DGs was calculated by subtracting the generation by renewable energy from the sum of total power demand and distribution loss.

b) Capital cost and financing plan

All equipment and machinery except solar PV inverters, which will need to be replaced after ten years, will be used for 20 years. The total initial capital investment cost is 13.514 million dollars. The cost of solar PV inverter replacement required in year 11 is 620 thousand dollars (see Table 2).

The financing plan is shown in Table 3. The Support Program Enabling "Leapfrog" Development or the Financing Programme for JCM Model Projects will be utilized to finance a part of the initial capital investment cost amounting to 7.828 million dollars composed of solar PV, wind turbine, BESS, EMS and communication system. Provided that half of the above-mentioned cost is subsidized, the amount of the subsidy will be 3.914 million dollars. One million dollars will be from own funds and the remaining 8.6 million dollars will be sourced from financing schemes such as the JICA Overseas Investment and Loan.

c) Operating cost

The operating cost is shown in Table 4. The depreciation period was set to 20 years for all equipment except solar PV inverters, which was given ten years. "Maintenance" includes the maintenance cost for solar PV, wind turbine, DG, BESS, distribution system and so on. "Operating fee" is the price which the SPC pays to the Huraa Island Council in return for making use of land, buildings, distribution facilities and other properties owned by the council and for the right to operate the power business. As for "Loan," it was assumed that the interest rate was 4% and repayment would be made in five years after a five-year grace period.

d) Sales revenue

Power pricing will follow the system set by the Maldives Energy Authority (MEA). However, the benefits from the installation of renewable energy will be passed on to the customers. The power price for FSR will be set to 40% less the MEA tariff and 20% less for business and domestic users in Huraa. The total sales revenue and net profit are shown in Table 5.

e) Return on investment

Based on the preconditions and assumptions mentioned so far, the payback period is estimated to be seven years and the IRR over the 20 year project life was calculated to be 15.1 %. Without the subsidy, however, the pay back is nine years and the IRR is 9.7%.

Table 1 Generation plan (MWh/year)

Year	1	5	10	15	20
Solar	1,919	1,919	1,843	1,766	1,689
Wind	73	73	73	73	73
Diesel	11,489	13,491	16,112	16,710	17,380
Total	13,482	15,484	18,028	18,549	19,142

Table 2 Capital cost (thousand USD)

Item	Initial investment	Replacement
Solar PV system	3,379	
Solar inverters (Year 11)		620
Wind turbines	660	
Diesel generators	2,531	
Powerhouse upgrade	811	
BESS	2,677	
EMS	1,100	
Communication system	12	
Grid connection	1,320	
Distribution network upgrade	381	
Other	644	
Total	13,514	620

Table 3 Financing plan (thousand USD)

Item	Amount	Loan terms
Subsidy	3,914	
Equity	1,000	
Loan	8,601	Interest rate: 4%
Total	13,514	

Table 4 Operating cost (thousand USD)

Year	1	5	10	15	20
Depreciation	707	707	707	707	707
Diesel fuel	3,276	3,847	4,594	4,765	4,956
Maintenance	180	209	682	274	311
Salary	122	122	122	122	122
Operating fee	80	108	138	153	169
Loan interest	344	344	34	0	0
Total	4,708	5,337	6,277	6,020	6,264

Table 5 Power sales and profit (thousand USD)

Year	1	5	10	15	20
Four Seasons	3,613	4,066	4,714	4,714	4,714
Huraa Business	1,269	1,450	1,639	1,777	1,938
Huraa Domestic	339	461	588	649	717
Total	5,220	5,977	6,940	7,140	7,368
Net profit	435	544	563	952	939

2) Permits and License for the project development and implementation

(a) License for power business

A power business license will be required to implement the project because it involves power generation and distribution. The Maldivian Government requires all power generators and distributors to obtain a license even if the power is only consumed within the property owned by the generator. For this reason, all the resorts need to obtain a license and register, and have their powerhouse certified. Applying for and obtaining a power license is quite common. As there are a lot of cases, there should be no difficulty in acquiring a license as long as the stated procedures are followed in accordance to the relevant regulations.

(b) Environmental impact assessment

An environmental impact assessment (EIA) is required for laying of the submarine cable between Huraa and Kuda Huraa because it is considered as an action which impacts the coastal area. However, the local consultant specializing in EIA has pointed out that there is little probability of the construction plan being ruled out.

An EIA is likely to be required for the wind turbine installation. An EIA is required if the installation involves cutting of more than ten trees.

Around two months is required for the EIA report to be reviewed. The groundbreaking timing should be stated in the EIA report. Normally, the construction is required to start within 12 months after obtaining the EIA clearance. Social aspects are also reviewed. The EIA report will have to explain that there is no trouble in the relationship between Huraa and Kuda Huraa.

3) Advantage of Japanese technology

(a) BESS and EMS

a) BESS

A lithium-ion battery is superior to other battery types in terms of: i) higher capacity per unit size or unit weight (high energy density); and ii) higher rate of available energy relative to the stored power (high energy efficiency). Where land is scarce, in such places like isolated islands or inside a building, the characteristics of the lithium-ion battery shines.

The project will install the SCiB^{TM} manufactured by Toshiba. The SCiB^{TM} is superior in the following respect.

- Ability to charge-discharge rapidly at three times the speed of a conventional lithium-ion battery
- May be charged to 100% and discharged to 0% without reducing the product life
- Longer operating life: more than three times of a conventional lithium-ion battery
- Will operate under low temperature
- No thermal runaway in case of internal short circuiting

b) EMS

The μEMS manufactured by Toshiba will be installed. The main advantages over its competitors are as follows.

- Forecasts the amount of electricity generated by renewable energy
- Develops a BESS operation plan which enables the highest possible use of renewable energy
- Maintains the balance between power supply and demand by controlling DGs and controllable loads
- Minimizes the harmful impact of renewable energy on the power grid by ordering the BESS in seconds to smooth out the rapid power fluctuations

(b) Toshiba Island Solution

Toshiba Island Solution (Off-grid) model consists of DGs, renewable energy, SCiB^{TM} and μEMS. The μEMS develops a power supply schedule in ten to thirty-minute intervals by estimating the power demand and generation by renewable energy. Based on this plan, the μEMS sends control signals to the DGs and SCiB^{TM} to attain optimum fuel consumption, and achieves both economic merit and power quality. By introducing this solution, the diesel fuel consumption can be reduced through the following effects.

- Capacity addition of solar PV
- Stabilizing the DG output by absorbing the short-cycle fluctuation of renewable energy
- Optimizing DG operation
- Reducing the number of DGs to be operated
- Avoiding PV power suppression

According to the simulation, this solution will enable the project to install solar PV with a capacity reaching around 58% of the total peak load and to reduce the fuel consumption by more than 15% of the BaU scenario.

4) MRV structure

The quantity of electricity generated by diesel generation and electricity supplied at the demand side need to be monitored in the project. Both variables are monitored in normal power business operation. Therefore, no special training is necessary. The SPC will educate the powerhouse staff at the start of the project on the MRV concept, importance of proper data collection, reporting process and monitoring cycle.

A power meter will be installed to measure the electricity generated by the DGs in the powerhouse as there is no functioning meter at present. In order to monitor the quantity of electricity supplied at the demand side, conventional power meters will continue to be used for measurement. A power meter will be placed at the point connecting the power line from Huraa to the distribution system of Kuda Huraa.

Monitoring will be implemented by the powerhouse manager, powerhouse staff and accounting staff. The powerhouse manager is the person in charge of administering the entire monitoring activity and is responsible for reporting, quality control of data and data keeping. The powerhouse staff will be responsible for reading the power production meter at the powerhouse and reading the power meters installed at the demand side. The accounting staff will be responsible for summing the power supplied to the consumers and reporting the result.

5) Environmental integrity and Sustainable development in host country

It is very unlikely for the project have a negative impact on the environment. When the installed project components come to the end of their life, they need to be properly disposed. For batteries, which sometimes become an environmental nuisance, the project will adopt a lithium-ion battery which does not contain any harmful substances.

The project will install solar PV and wind turbine which utilize locally available natural resources in an area that relies almost entirely on imported fossil fuel for energy. These energy sources are cheaper, emit no GHG and pollutants, and cause no or limited noise. The project is innovative in two aspects. Firstly, the project will install a substantially large capacity of solar PV in a small-scale grid and cuts down the power cost and GHG emissions.

Secondly, the project will become a showcase for cooperation between an inhabited island and a resort island in power supply. Traditionally, each island has owned and managed infrastructure on its own only for its own purpose and cooperation between the two category of islands has been quite limited. The project will enable the installation of renewable energy on a larger scale, streamlining of power facilities, power cost reduction and effective utilization of land. The project can serve as a business model for private sector-led power business in the outer islands. By combining a resort island which usually lacks space to install large scale solar PV but has the capacity to pay and an inhabited island which tends to have the opposite characteristics, an economical and high quality private sector-led power business can be realized. This is not just beneficial for the islands in question but also good news for the government as it will become another viable solution to upgrade and decarbonize the power infrastructure in the outer islands. The project will contribute to achieving carbon neutral which is one of the main development goals set by the Maldivian Government.

6) Toward project realization (planned schedule and possible obstacles to be overcome)

The viability of the project has been confirmed. Gaining consent of the Huraa Island Council and FSR is integral to realizing the project. In the meeting held in December 2014, the study team explained the preliminary business plan and the timeline for implementation. In response, FSR suggested that they needed more time to consider. FSR added that they are very busy up to March and if they were forced to respond quickly they had no choice but to give a negative reply. As of mid-February 2015 no progress has been made.

Further discussions with FSR will have to wait for a while. In the meantime, efforts will be made to have a meeting with the resort owner, Hotel Properties Limited (HPL), a company based in Singapore.

The Huraa Island Council has remained interested in the project. Once getting the consent of FSR, detailed discussions will be held with the council to agree on the arrangements on the project including those on benefit sharing.

(2) JCM methodology development

1) Eligibility criteria

Criterion 1: The project involves power generation and distribution, and is the sole power provider in the given area.

Criterion 2: The project involves an installation of a solar PV system in a small-scale grid in which there is no other power source than diesel generators.

Criterion 3: The project involves an installation of a system composed of a storage battery and an EMS.

Criterion 4: The PV modules have obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).

Criterion 5: The PV modules have an efficiency 19.0% or higher and the temperature coefficient of Pmax of the PV modules is equivalent to or better than -0.29%/˚C.

Criterion 6: The storage battery will retain at least 80% of its rated capacity after 12,000 cycles of 0-100% charge and discharge at the rate of 3C.

Criterion 7: The EMS can forecast the outputs of the solar PV system, develop an operation plan of the storage battery, and control the operation of the diesel generators and storage battery.

Criterion 8: If the project involves an installation of diesel generators, the efficiency of such generators are same or better than all diesel generators in operation before installation.

Criterion 9: All of the consumers supplied electricity by the project are either supplied solely by the project or have a facility to measure the electricity supplied by the project.

Criterion 1 to 3 are the basic criteria that define the basic precondition of the project.

Criterion 4 and 5 are for the solar PV modules to be introduced. Performance and characteristics on generation efficiency and temperature coefficient are set.

Criterion 6 is for BESS. The BESS should be capable of rapid charge-discharge of large volume of power and have a long operating life under heavy use. This criterion is developed based on the assumption that the SCiB™ will be used in the project and by referring to the description of the product by the manufacturer.

Criterion 7 is for EMS. The EMS should be able to control the operation of the DGs and BESS for making maximum use of the solar PV in the project. This criterion is developed assuming that the Toshiba μEMS will be adopted in the project.

Criterion 8 is for DG. The main purpose of the project is to reduce GHG emissions by installing solar PV. However, if the project installs DGs that are less efficient than existing generators, it will not serve the purpose of the project. For this reason, the generators to be installed in the project must be same or better than existing generators in terms of efficiency.

Criterion 9 is set to ensure proper monitoring of the power supplied at the demand side. The project involves not only generation but also distribution to the customers. The electricity supplied by the project shall be measured at the demand side. The measured values must not include electricity supplied by other sources. In reality, only the Huraa Island Council or FSR provides power today. Therefore, power is not supplied from more than one source and this situation will most likely remain unchanged into the future. This criterion is set for the sake of defining the project content accurately.

2) Calculation of GHG emissions (including reference and project emissions)

(a) BaU emission

In the Maldives, diesel generation is the norm for generating electricity. Solar PV system is still not common because of the high initial investment cost. This is particularly true in a small-scale grid because additional investment in grid stabilization system may be required. Based on this situation, the BaU scenario assumes that all electricity is generated by diesel generators in the absence of project.

(b) Reference emission

The reference emissions are the CO_2 emissions from the combustion of diesel fuel with all electricity in the project provided by DGs with the highest efficiency in the world. The reference emissions are calculated by multiplying the quantity of electricity supplied by the project measured at the demand side by the emission factor of DGs. The quantity of electricity supplied at the demand side is measured by power meters. A default values is set for the emission factor of DGs.

$$RE_p = ES_{project,p} \times EF_{diesel}$$

RE_p	: Reference emissions during period p [tCO_2/p]
$ES_{project,p}$	: Quantity of electricity supplied by the project during period p (measured at the demand side) [MWh/p]
EF_{diesel}	: CO2 emission factor of diesel generators [tCO_2/ MWh]

(c) Project emission

The project emissions are the CO_2 emissions from the combustion of diesel fuel by DGs operated in the project. The project emissions are calculated by multiplying the quantity of electricity generated by the DGs in the project by the emission factor of DGs. The quantity of electricity generated by the DGs is measured by a power meter located in the control panel. A default values is set for the emission factor of DGs.

$$PE_p = DG_{project,p} \times EF_{diesel}$$

PE_p	: Project emissions during period p [tCO_2/p]
$DG_{project,p}$	: Quantity of electricity generated by the diesel generators of the project during period p [MWh/p]
EF_{diesel}	: CO_2 emission factor of diesel generators [tCO_2/ MWh]

3) Data and parameters fixed *ex ante*

The emission factor of DGs is set to 0.533 tCO2/MWh. This value was adopted in the draft JCM methodology “Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System” for a project in Palau. It corresponds to the power generation efficiency of 49% by diesel engines.

When the above-mentioned methodology was developed, the Additional Information was prepared to explain that: i) there is little possibility of rapid efficiency improvement in diesel generation; and ii) the highest efficiency attainable for DGs given the current technology was below 49%. In accordance with these findings and the principle of conservativeness, the default value of for the emission factor of DGs was set using the 49% generation efficiency.

The methodology for the project sets the default value for the emission factor of DGs based on the concept stated above.

(3) Development of JCM Project Design Document (PDD)

1) Environmental impact assessment

The EIA regulations in the Maldives is the “Environmental Impact Assessment Regulation 2012.” According to this regulation, the project will definitely need an EIA for laying submarine cables between Huraa and Kuda Huraa as it will make some changes in the coastal area. The installation of wind turbines is also likely to require an EIA as cutting of more than ten trees calls for an EIA. These facts have already been confirmed through an interview with the Environmental Protection Agency. An EIA is not required for solar PV installation.

As already explained, it normally takes around two months to have an EIA report reviewed. The construction period should be stated in the report and normally, the actual groundbreaking should happen within 12 months after obtaining the EIA clearance. In the EIA, the social aspects also needs to be dealt. The project will have to explain that there are no issues between the Huraa residents and FSR.

2) Local stakeholder consultation

The main stakeholders of the project are the Huraa Island Council and residents, FSR, HPL, Ministry of Environment and Energy (MEE) and STELCO. The opinions of the stakeholders and the progress of consultation are explained below.

- Huraa Island Council and residents

The Huraa Island Council has been consistent in its support to realize the project since the first meeting with the study team. The most important agenda for the council is to keep the power prices which the residents will pay equivalent to or lower than the current level. The council currently subsidizes the electricity costs of the residents. The council wishes the project to take on this role.

The council held a meeting for the study team to explain about the project to the residents. In this meeting, the participants decided that the council shall not cooperate with any other entity on a power project before the conclusion of the study. The study team obtained an exclusive right to propose a power project to the council.

- FSR

The concept of the project arose during the discussion with the financial controller of FSR and others in October 2013. FSR was keen on the idea and subsequently, the study commenced. After some changes in the management personnel at the resort, however, FSR is now reluctant to participate in the project. FSR is uncomfortable with the idea of moving all generation facilities to Huraa and relying solely on that island.

- MEE

MEE has been supporting the project consistently from the planning stage. MEE believes that the realization of the project will have a significant impact on the power sector. It believes that such success will accelerate the implementation of power projects utilizing a substantial amount of renewable energy by combining resort and inhabited islands

- STELCO

STELCO is the state-owned power company responsible for providing power to the area in which Huraa is situated. If the Huraa Island Council stop providing power, STELCO is likely to become responsible for providing power. STELCO has not expressed its interest in the management of the project. However, it is interested in the technologies utilized in the project.

3) Monitoring plan

In the project, the electricity generated by DGs and all electricity supplied by the project shall be measured. The electricity supplied by the project shall be measured not at the supply side but at the demand side using the power meters installed at the consumer sites.

Monitoring will be conducted by the SPC. Monitoring will be implemented by the powerhouse manager, powerhouse staff and accounting staff. The powerhouse manager is the person in charge of administering the entire monitoring activity and is responsible for reporting, quality control of data and data keeping. The powerhouse staff will be responsible for reading the power production meter at the powerhouse and reading the power meters installed at the demand side. The accounting staff will be responsible for summing the power supplied to the consumers and reporting.

The electricity generated by the DGs will be measured on a daily basis using the power meter to be installed in the control panel at the powerhouse. The electricity supplied by the project will be measured by the power meters installed at the demand side. The powerhouse staff will read the meters every month. The power meters meeting the standards set in the Maldives and have obtained certification from STELCO will be used in the project.

4) Calibration of measuring instrument

a) Accuracy of power meters

The “Metering Scheme Regulation” enforced by MEA stipulates the accuracy requirements of power meters. A separate standard is set for medium and low voltage. For low voltage, there is a separate standard for single phase and three phase. These are based on the IEC standards.

b) Certification rules

The Metering Scheme Regulation also stipulates the rules for certifying power meters. Only the entities registered with MEA is allowed to do the testing and certification. Currently, only STELCO is registered. All power consumers are required to purchase the power meters certificated by STELCO. If anyone wishes to use a meter without a certificate, it will have to be tested by STELCO. Meters passing the test are issued a certificate. The owner of the meter has to keep the certificate until it becomes void which is no longer than 20 years after certification. A sticker indicating the certification will be affixed to the meter. The meter will need to be recertified if the owner wishes to continue use after the certification is void.

The project will use the power meters meeting the standards stated above