October 30, 2015

Electricity Regulatory Authority announces updated Utility-Scale Solar PPA Pricing

The Electricity Regulatory Authority ("ERA") is pleased to announce an improvement to the power purchase agreement ("PPA") pricing for the island's first utility-scale solar project.

	Updated Pricing	
	25 Year CI$/KWh	25 Year % from PPA
@ 10% Discount Rate		
ENTROPY PPA	0.1590	0%
NYMEX/MID POINT	0.2071	30%
EIA DFO LOW	0.1829	15%
EIA DFO HIGH	0.3761	137%
EIA REFERENCE	0.2366	49%
Average Avoided Cost	0.2507	58%
@ 5% Discount Rate		
ENTROPY PPA	0.1641	0%
NYMEX/MID POINT	0.2302	40%
EIA DFO LOW	0.1947	19%
EIA DFO HIGH	0.4120	151%
EIA REFERENCE	0.2577	57%
Average Avoided Cost	0.2737	67%

Updated pricing added to Figure 6 on p. 23 of ICF International's Report

The ERA congratulates both CUC and Entropy for making this first utility-scale renewable energy project price competitive for electricity consumers of Grand Cayman.

The contract energy price can be found on the following page.

Contract Energy Price

Expressed in US$/kWh

Year	Tariff US$/kWh
1	$ 0.170
2	$ 0.173
3	$ 0.175
4	$ 0.178
5	$ 0.180
6	$ 0.183
7	$ 0.186
8	$ 0.189
9	$ 0.192
10	$ 0.194
11	$ 0.197
12	$ 0.200
13	$ 0.203
14	$ 0.206
15	$ 0.209
16	$ 0.213
17	$ 0.216
18	$ 0.219
19	$ 0.222
20	$ 0.226
21	$ 0.229
22	$ 0.232
23	$ 0.236
24	$ 0.239
25	$ 0.243
Average	**$ 0.204**

Evaluation of Bid Process for Caribbean Utilities Company Request for Expression of Interest and Pricing for Renewable Energy Capacity

FINAL REPORT

July 1, 2015

Submitted to:
Electricity Regulatory Authority of the Cayman Islands

IMPORTANT NOTICE:

This report is based on information obtained from various public and private sources. ICF makes no warranty or assurances as to the accuracy of any such information.

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Executive Summary

On August 24, 2011, Caribbean Utilities Company, Ltd (CUC) issued a letter seeking expressions of interest and preliminary proposals for renewable generation capacity. CUC explicitly noted that 13 megawatts (MW) of capacity would be available to be selected for utility responses to the request for expressions of interest (EOI). CUC indicated it has established a 15 MW renewable energy portfolio capacity for non-firm renewable energy; of this, the 13 MW reflects the largest share; one (1) MW was noted to be reserved for the CUC CORE program that provides a feed in-tariff of CI$0.37/kWh for all AC electric energy generated by consumer's grid tied systems; and the remaining 1 MW was not defined by CUC in the solicitation.

In response to CUC's EOI it received 53 proposals for a total of 380 MW of renewable energy from 31 companies. Of this, CUC shortlisted 20 projects from 9 companies totaling 158 MW. The shortlist included 31.4 MW of wind power from 6 projects at prices ranging from CI$0.13 to CI$0.23 per kWh, and 126.6 MW of solar photovoltaic from 14 projects at prices ranging from CI$0.18 to CI$0.24 per kWh. From this short-list, CUC ultimately submitted a recommendation for a single 5 MW solar facility to the ERA.

ICF evaluated CUC's approach to conducting the call for bids and CUC's evaluation of the final recommended solar bid. Overall, ICF found CUC's RFP process to be somewhat informal; but satisfactory in terms of attracting sufficient bids to ensure a competitive process. Further, we believe the request for expression of interest and pricing was conducted fairly; and there was no known instance of bias towards or against any Bidder or resource type. ICF believes that CUC fairly evaluated the recommended bid in terms of assessing its avoided cost. We do however make several recommendations to improve the transparency of any future bidding process, to allow for more information access to bidders and to limit risk exposure to the CUC and ratepayers in Chapter One.

ICF also evaluated the specific terms proposed PPA between CUC and Entropy. Certain terms currently favor Entropy and if modified may provide risk reduction to CUC and hence become more favorable to the utility and ultimately to customers. Related to the pricing proposed in the CUC/Entropy PPA, ICF provides a benchmark comparison to other transactions as a means of evaluating the reasonableness of the price offer. Further discussion is provided in Chapter Two of this report.

Finally, ICF reviewed CUC's avoided cost analysis. Overall, ICF's findings were consistent with CUC's in identifying that a 20 year PPA would be marginal as compared to the expected avoided costs while a 25 year PPA appears to overall provide a price benefit (i.e. a cost savings) to the system, assuming normal and continuing operation for the facility over time. Chapter Three discusses ICF's review of CUC's avoided cost analysis.

Recommendations and Conclusions

The primary recommendations related to the solicitation process are to utilize larger distribution outlets to provide notification about the solicitation and to provide greater clarity and transparency to potential bidders. Specific recommendations can be found in each of the areas in the following Chapters.

Relative to the Entropy/IEP bid recommended by CUC, ICF finds that the analysis performed by CUC was reasonable and does indicate that the lifetime cost of the PPA proposed would be below avoided costs. This conclusion holds with ICF's update to fuel pricing reflecting current market trends in the oil markets, as well as corrections to a limited number of calculations in CUC's analysis spreadsheet. Specifically, the Entropy price is less than the cost the utility would avoid based on the other feasible alternatives available.

It is possible that if a bid were issued today that a solar bid may come in at a lower price given that the last several years have experienced downward price movements industry wide. However, much of the pricing for a solar resource is tied to location specific issues and many of the same issues apparent in 2011 at the time of the original solicitation continue to exist on Grand Cayman today. New developers of IPP projects face significant hurdles and risks that their price offer would need to capture. As such, it is unclear that a better price for a comparable resource would be achieved. Overall, ICF believes that the Entropy bid is reasonable and in line with the current market range. ICF understands that CUC approached Entropy to provide an updated bid for a 25 year term. It is unclear if in this request, CUC requested a best and final offer which would reflect changes in the market resource costing since Entropy's initial bid. If not, a best and final offer may provide some price reduction benefit. Additional reduction of risk to CUC may be achieved through further negotiation of PPA contract terms, in particular related to non-performance risks.

ICF however would recommend that a smaller size be considered for the initial contract rather than 5MW. This recommendation is intended to provide greater contracting flexibility to CUC and to serve to better hedge risk exposure. This concern is reflective of system conditions and uncertainty; 5MW reflects a significant share, 38%, of the 13 MW utility scale goal determined by CUC. Generally, we would advise more diversity in supply, in this case both because of the limited total renewable carve out and the infancy of such equipment in the area. Further, a 25-year contract term is a significant amount of time to commit to a single contract, particularly for a relatively new technology (as far as commercial application of utility scale solar) which is experiencing dramatic cost and production changes. Additionally, the potential for a weather related decline in output is more significant with the solar resources clustered at one site which will experience the same cloud coverage and climate conditions than should installations be at multiple sites. Certain of these concerns have offsetting factors as well. For example, the interconnection costs and the maintenance costs would be lower at a single site. Likewise the smaller size may result in a higher price bid all else equal.

Chapter One: Review of Bid Process

Chapter One is focused on providing a review of the overall bid process as conducted by Caribbean Utilities Company Ltd. (CUC).

Distribution of the Expression of Interest

The CUC bid evaluation report stated that the announcement was made via direct emails to 30 companies, postings on the company's website, delivery to CARILEC and the Cayman Islands ERA, and posting on CUC's Engineering Services Manager's LinkedIn profile. ICF was unable to verify this through CUC's website archives, nor were we able to locate the official '*Request for Expressions of Interest*" (EOI) as of April 7, 2015 on CUC's website. While the official announcement is still easily accessible in the ERA website, it is not the same in case of CUC's website. As the initial post is no longer available, ICF is not able to assess how easily accessible it was to the public or the use of key search words and criteria which search engines may trigger on. Further, it does not appear that CUC attempted to post announcements in media and trade press regarding the solicitation as is often the case for such solicitations. Nevertheless, the announcement attracted 53 proposals for a total of 380 MW which is a very good response.

Recommendations Regarding the Distribution Process

It is commendable that CUC utilized social media outreach strategy for announcement via CUC Engineering Services Manager's LinkedIn profile. However, in any new EOI ICF further recommends making use of trade press and social media in an outreach campaign to provide greater exposure and attract a broader set of bids, which may yield a more competitive outcome. Alternative media could include print and electronic mediums such as Twitter, Facebook and trade press. For example, a posting on the official Twitter account of CUC and the company's official website would have reached a larger audience than the manager's personal LinkedIn account.

Provision of Information by CUC and Clarity of Bidder Requirements

Within an EOI or RFP solicitation process, it is important to provide clarity to bidders regarding the specific needs and requirements of the bids. This clarity serves, at least in part, as a screening process to ensure that the bids received are qualified to serve the requirements of the need identified. This includes a timeline, evaluation framework, and any specific technical requirements of the bid. Further, a bid request will typically outline the specific requirements which the vendor should provide and will often define the format of those requirements. A bid document would also typically lay out a timeline including deadlines. In part, this is intended to ease the evaluation process by providing a common format for information. It is also helpful to assist the bidder in determining the key factors they will be evaluated on such that they provide a focused bid catered to the needs, rather than a broad-based bid package that may provide too much information to allow a timely and useful review. Obviously, there is a balance between the specific of the information requirements and the desire to allow for innovative bids, however, these two elements can be balanced by separately seeking information on the innovative aspects of the bid.

CUC did specify areas required by bidders to be included in their response. However, it was very open by most standards. This open-ended approach may have the undesired effect of attracting projects which fall outside of the range of desired projects due to the lack of specificity about the needs. Further, CUC did not establish a formal process for Q&A within the EOI document. Though CUC did release questions to parties that had contacted them prior to the bid deadline with questions, this may have ended up excluding bidders who did not contact CUC in advance of submitting their bids as there was no notification of intent to bid prior to submission.

CUC also provided a list of six (6) specific criteria on which bids would be evaluated. The price criteria identified that price would count for 70% of the evaluation score while the remaining 30% of the possible score would be split equally amongst four non-price factors including:

1. The respondent's track record in financing, designing, constructing and operating comparable size renewable energy generation projects within a specified timeframe.
2. An outline of the technology and generating facilities being proposed including capacity, expected, annual net generated energy, proposed site and other technical details specific to the proposed solution.
3. Proposed Commercial Operation Date.
4. Understanding of the local permitting process and how permitting will be achieved.

Although these criteria were defined within the EOI, the specific needs of CUC were not clearly defined, so for example, it was unclear whether the preferred commercial operation date was in the near, mid, or long term. Had more specificity been provided, CUC may have elicited results which better matched the goals of the renewable solicitation.

Recommendations Regarding the pre-bid Communications

1. ICF would recommend future bids formulate an achievable timeline including date of RFP release and distribution, deadline for vendor's submission of written questions, date of response for written answers, deadline for proposal submission, expected date of notification of finalist, finalist interviews, date of selection of vendor and expected date of signing with selected vendor. Having a clear Q&A process helps ensure all vendors have open and easy access to questions. A bidder pre-proposal meeting would also be useful to bidders, allowing for an opportunity for Q&A.
2. ICF recommends providing as much clarity on the bid requirements, including the screening criteria, as possible.
    a. Establish clear expectations and understandings to define procurement needs and goals which are understood by all parties.
    b. Conduct local outreach and engagement prior to procurement commencement to establish a clear line of understanding and transparent procedure.
    c. All the Solicitation Protocol documents, information, announcements, and Questions and Answers that are posted should be easily accessible and also available to download on the CUC website and a link should be provided.

d. Develop a clear, transparent, well communicated process. For example, create a solicitation schedule

Evaluation Process

The initial request for proposal laid down six (6) initial criteria for the solicitation as below:

1. The respondent's track record in financing, designing, constructing and operating comparable size renewable energy generation projects within a specified timeframe.
2. An outline of the technology and generating facilities being proposed including capacity, expected, annual net generated energy, proposed site and other technical details specific to the proposed solution.
3. Proposed Commercial Operation Date
4. Understanding of the local permitting process and how permitting will be achieved.
5. A "not to exceed" pricing proposal covering all aspects of the project shall be included.
6. Facility ownership transfer pricing based on year of transfer.

These criteria translated into 5 specific scoring categories with 70% of the possible points awarded for price and the remaining 30% allocated equally (7.5% each) to bullets 1 through 4 above.

In addition, the submitted proposals were first screened through fatal flaw analysis evaluation, after which scoring categories were adopted to select the winning bid. The fatal flaw analysis evaluation was performed on all of the 53 submitted proposals. This fatal flaw analysis screened out 33 of the bids, leaving 20 projects from 9 companies amounting to 158 MW to be considered for the scoring

As much as the fatal flaw analysis seems to be a good start to narrow down a large list of bidders to a manageable level, it appears as if only the proposals that answered all the criteria of solicitation were considered to move to the next round of CUC's evaluation process. It seems like the fatal flaw analysis is a stringent process and proposals with incomplete information were ruled out completely from any further consideration. *Appendix 3* of *2011 Solicitation for 13MW of Renewable Energy* which provides the list of eliminated projects on fatal flaw analysis, shows that a majority of the projects were eliminated due to high price, some due to unclear capacity and missing information. However it is unclear if any follow up communication, meeting or negotiation was conducted to ensure that no competent proposal was eliminated to move on to the next phase of selection process. For instance, the proposal from one interested party was considered worth a clarification meeting, but from the report, it is not clear if the meeting was conducted or not. The report also indicates that **all** bidders were found to be credible; yet the majority of bidders were eliminated in the fatal flaw screen. Given the credibility of bidders combined with the open bid structure, an opportunity to allow bidders to clarify concerns found in an initial fatal flaw screening may have elicited more compelling bids.

Within the solicitation evaluation process, price is the main determining factor with 70% significance in the selection of the winning bid. Price has always been the key evaluation factor as noted in other similar RFPs. It is good that CUC is consistent with the standard practice as it ensures the greatest ratepayer value. As mentioned previously, in the fatal flaw analysis stage, some of the projects were

ruled out as they did not offer a price in the proposal. Therefore, those projects which were eliminated in this stage were completely cut off from their chances to move on to the next step of scoring criterion. Since price plays a major role in the selection of the project, there should have been a follow-up mechanism to address incomplete responses to the solicitation, and also an opportunity for bidders to revise their price. As the ultimate goal of CUC is to obtain the best bid, and as price is the most influential factor, a meticulous procedure should have been employed to qualify the proposals in terms of the price.

Of the 20 bids which were scored, the least price proposals for this solicitation came from wind power solutions as they were lower in overall cost and generally produced at a higher capacity factor. The average levelized price for the five evaluated primarily wind based bids was CI$ 0.189/kWh. However, in a prior solicitation, CUC was unable to procure wind capacity due to concerns over proximity of the wind turbines to the airport and weather data systems. Approvals to permit the wind capacity could not be obtained given uncertainty regarding the potential interference the turbines would cause to government weather service radar system and to airport radar systems. Wind capacity remains a limited option at this time due to the inability to resolve permitting issues. Rather than eliminate wind from the portfolio at this time, as a cautionary measure, CUC has proposed to reserve 3-5 MW from the 13 MW renewable energy portfolio for wind power subject to future evaluation should permitting issues be resolved and wind remain cost effective. The remaining 15 bids were categorized as primarily solar with an average levelized price of $CI 0.21/kWh.

The bid evaluation report clearly outlines how CUC determined the winning bid. The criteria listed in the fatal flaw analysis to eliminate outliers are good in terms of helping CUC to determine the bidder's competence on the basis of their experience and technology. There appears to be room for significant subjectivity in the point determination as the overall criterion is vaguely defined within the document. Common practice with RFP and solicitation review which may involve multiple evaluators is often to provide guidelines for awarding points to limit the potential for swing scoring based on evaluator, as well as to reduce the subjectivity of the evaluation. It is unclear if this process occurred at CUC. Further, such scoring criteria can be provided to bidders to help focus bids specifically to the needs, though this is not always the practice. One example where this may have helped is in the site information. The bidders may not have provided details on the proposed site, as in the request for expressions of interest, underlying aspects associated with the site such as site control, land rights, feasibility studies, and Environmental Impact Assessment at the site were not required to be included in the bid submission Rather, the request for expression of interest and proposal stated that such detail aspects of the site will be discussed only after the final selection of the project. ICF recommends that the site due diligence evidence should be required in such requests for proposals.

For the price evaluation, CUC provided detailed spreadsheets including formulas showing the price scoring methodology. In its analysis, CUC derived both the expected annual cost associated with the energy purchase based on the bid price and the avoided energy price for a comparable purchase volume annually. The net present value of the difference of these values, i.e. the avoided cost, was normalized on a capacity (MW) basis and the price ranks were assigned based on the relative differences of the bid value from the bid providing the highest avoided cost per MW. ICF finds the approach taken by CUC a

reasonable determination of the value of the proposal to CUC and its customers. The initial expression of interest indicated a valuation based on price per KWh rather than avoided cost per MW, however it is common for the evaluator to reserve flexibility in the process and avoided costs are a common metric in the industry.[1] RFP "price" evaluations often are based on avoided costs, or change in total resource payment costs from a reference level. However, as renewables are generally considered as energy based resource rather than capacity resources, ICF did reassess the final rankings based on the value per MWh and found the rank order of bidders of solar resources would be unchanged. Hence, CUC's identification and ranking of bidders was fair.

Recommendations Regarding the Evaluation Process

Although CUC clearly defined the scoring that would be applied to proposals, their initial letter did not reference the application of a fatal flaw screening nor did it provide specificity on the bid requirements (such as the maximum price criteria). Had they been specified, both may have contributed to better defined proposals. The majority of the bids eliminated due to fatal flaws would have received low scores on pricing and hence had they passed to the scoring stage, would have been eliminated due to their overall score. ICF would recommend greater transparency and clarity in future solicitation documents. ICF recommends that the scoring methodology for each category be described in greater detail within the initial request for proposals. Specifically, the RFP should provide a description of the key elements to which will be considered under each area.

Recommendations and Conclusions

Overall, ICF found that CUC conducted a fair process in its 2011 Expression of Interest for Renewables. However, there was limited transparency to bidders in several areas which could be improved upon in future solicitations. ICF has provided several recommendations to improve

1. The distribution of the RFP,
2. The communications process with bidders, and,
3. The evaluation process.

The main focus of these recommendations is to increase the transparency of the overall process and provide additional clarity to interested parties to the solicitation.

[1] The CUC 2011 Request for Expressions of Interest states "CUC will evaluate proposals on both technical and financial merits with 70% scoring going to the quoted price per kWh and / or quoted facility transfer cost vs. expected net generation output."

Chapter Two: Review of Entropy Bid

Based on the evaluation of bidders in its 2011 request for expressions of interest, CUC identified two bidders for continued discussions. The two identified bidders were New Generation Power for 8MW of renewable capacity and Lanco Solar for 5 MW of solar capacity.[2] CUC signed a term sheet and interconnecting study agreement with New Generation Power which was terminated on May 24, 2014 due to non-compliance with the schedule set forth in the term sheet and interconnection study agreement. An initial agreement was also signed with Lanco Solar, however, during the process of developing the interconnection study, Lanco Solar notified CUC that it was closing down its Caribbean Operations and served notice to terminate its Agreement with CUC. Upon termination of the Lanco agreement, CUC selected the next highest ranked bidder International Electric Power LLC to negotiate with and signed a term sheet with International Electric Power LLC on October 22, 2013 and an Interconnection Study Agreement on January 23, 2014. The agreement was later assigned to Entropy Cayman Solar Limited (Entropy). In late 2014, CUC requested that Entropy provide a 20- and 25- year bid for consideration. The remainder of this document is focused on the Entropy bid including an assessment of the PPA terms, the reasonableness of the Entropy 2014 price proposal, and CUC's evaluation of the bid.

Review of PPA Elements

This section provides an evaluation of the various elements in the Power Purchase Agreement (PPA) between Caribbean Utilities Company, Ltd. (CUC) and Entropy Cayman Solar Limited (Entropy), including the commercial terms, rewards and penalties, timing, and more. In order to carry out its evaluation, ICF reviewed several publicly available sources, including several commercial PPAs executed within the past several years. This analysis will focus on the differences between the CUC/Entropy PPA and the other similar PPAs reviewed by ICF.

In general, the PPA between CUC and Entropy does adhere to standard terms and contains a high degree of both granularity and thoroughness. While there is not an industry standard for the number of articles or schedules in any given PPA, the CUC/Entropy PPA is similar in content and length to other contracts. In particular, many of the technical and operating procedures listed in the PPA can be considered standard, including the sections on the operating procedures (Article 12), the section on maintenance and repair (Article 13), and the section on health, safety, and environmental compliance (Article 17). Similarly, many of the sections on the financial nature of the relationship between CUC and Entropy are standard and complete, including the sections on events of default and remedies (Article 4), the section on credit and collateral requirements (Article 8), and the section on insurance (Article 14).

However, there are some portions of the proposed PPA that could be reconsidered, added, or refined to make the agreement more standard, or in some cases simply fairer for either the buying or selling party. The following are components identified by ICF for further scrutiny or alteration:

[2] Letter dated March 2, 2015 from Letitia Lawrence, CUC to Charles Farrington, ERA "RE: Request for ERA Review and Approval of the proposed 5 MW Utility Scale Solar 25-Year & 20-Year PPA & IA Agreements between CUC & Entropy Cayman Solar Ltd.".

- **PPA Term:** CUC considered both 20 and 25 year PPAs for review. While both 20 year and 25 year solar PPAs are utilized in the United States, 20 year agreements are about four times more common than 25 year agreements. The 25 year term reflects a better value on a pure price basis, but also places more risk on the purchaser tied to changes in the market including falling cost of solar which may allow for considerably less cost for similar plants in the future. These timing risks are often compensated for by staggering contracts and allowing for spot purchases such that the end date for contracts will allow for replacement facilities to come on line. In the case of CUC, spot purchases are not a viable option as there is not a wholesale power mechanism available. Staggered contracts however could be used to limit the timing of risk exposure. In this case, CUC is considering locking in on a 5MW contract, fully 1/3 of the renewables requirement. This reflects a significant portion of the renewable generation capacity goal for the system. As it is such a large portion, the risk exposure to customers is higher than a smaller scale contract would have. More specifically, a smaller contract would give greater ability to diversify and stagger contract resources, lowering reliability risk, contracting risk, and providing better price diversification. This matter is more reflective of the goals of CUC in creating a balanced wind portfolio and is not considered a fault in the contract proposal itself. That is, the risk we identify here is a portfolio exposure versus a contractual exposure.
- **Invoices and Billing:** There are several differences concerning the timing between the CUC/Entropy PPA and standard PPA procedures that concern invoices and billing.
    - **Invoice Timing:** Section 6.1 of the CUC/Entropy PPA allows up to three business days for the seller to invoice the payment obligations for the previous month's deliveries to the buyer. However, standard PPAs allow ten days (both business and non-business days) for invoicing. If the 10^{th} day of the following month is not a business day, invoicing may occur on the first business day following the 10^{th} day. The terms of the current PPA are beneficial for the buyer.
    - **Payment Timing:** Section 6.2 of the CUC/Entropy PPA allows sixty days for payment following invoicing, while standard PPAs generally allow for twenty to thirty days. The current terms benefit the buyer.
    - **Billing Disputes:** Section 6.3 of Article 6 states that invoice disputes can be raised within three months of the date of invoice. Generally, PPAs allow significantly more time for either party to raise invoice disputes, with periods of both twelve and twenty four months utilized.
- **Confidentiality:** Standard PPAs generally dedicate an article to outlining the explicit nature of the confidentiality agreement between the two PPA parties. The confidentiality agreement generally includes:
    - A definition of what constitutes confidential information.
    - The affiliates and representatives with whom confidential information may be shared (also known as associated parties).
    - A list of exceptions to the confidentiality agreement, which generally includes any other parties involved in project financing, construction, operations, relevant government entities, and other affiliates.
    - Remedies that apply in the case of a breach to the confidentiality agreement.
    - Any exclusion to the prior list of confidential information.

- **Minimum Guaranteed Generation and Replacement Power**
    - Section 2.44 of the CUC/Entropy PPA defines the "Minimum Guaranteed Energy" under the agreement. However, the contract does not mention any conditions in which the actual energy production of the facility should be adjusted to reflect significant events that affected the output of the facility. Possible adjustments include periods of Force Majeure events, buyer default, and significant deviations from historical weather patterns. Consistent under-performance would create a seller default, which would be beneficial to the buyer.
    - The CUC/Entropy PPA defines the "Seller's Energy Penalty Rate", which is the penalty rate that applies for violating the Minimum Guaranteed Energy (amongst other uses), as equal to half of the fuel charge per kWh during the violation period. However, standard PPAs generally define replacement power in more explicit terms that fully encapsulate the cost of replacement power for the buyer. For example, in a 2011 PPA between Cottonwood Solar (the seller) and the Marin Energy Authority (the buyer), replacement power is defined as the difference between the average hourly rate paid by the buyer to use replacement power (including generation, fuel, and delivery components) compared to the rate they would have paid for the solar energy. This value is multiplied by the level of under-performance to create a payment in lieu of performance. This calculation explicitly captures the full cost to the buyer of generating or procuring the marginal power below the minimum, which the current energy penalty rate does not accomplish. The current penalty rate also relies on the fuel charge, which could fluctuate widely based on historical precedent, while ignoring the buyer's other costs that tend to escalate over time. Depending on the difference between the PPA price and the avoided costs, the current penalty rate could end up benefitting either the buyer or the seller.
    - The CUC/Entropy PPA caps the Seller's Energy Penalty Rate at 10 days per year (sections 5.3.a.ii, 5.3.b.ii, and 5.3.c.ii), however, the penalty rate is not typically capped in a PPA. Current language significantly limits the effectiveness of the Minimum Guarantee, creating additional benefit for the seller. Recommend updating this provision and including a sample calculation in Schedule 6 for clarity..
- **Metering Equipment:** The CUC/Entropy PPA contains several small differences from standard PPAs.
    - The accuracy standard of 0.2% for the metering equipment in the CUC/Entropy PPA is more stringent than the standard generally used in other PPAs, which is generally in the range of 1%-2%.
    - Standard PPAs explicitly note that metering equipment should be sealed. In addition, they mention the situations in which the seal may be broken and the protocol for contacting the other party when the seal has been broken.
    - Requiring two sets of meters (one for the buyer and one for the seller) is good practice, but the PPA should be more explicit about the metering equipment the buyer needs to purchase, that they need to purchase and install it at their own cost, and what they need to do to maintain their meter (inspecting and testing).
- **Recitals:** The recitals section references a prior "Term Sheet" between International Electric Power and the buyer, but having two separate documents is creating unnecessary complications

that can be avoided. One solution would be to pull any necessary terms and conditions from the term sheet and include them in the PPA. Corresponding references to the term sheet would then be removed. Conversely, the Term Sheet could be included as a schedule in the PPA document.

- **Base Generation:** Section 2.6 defines the "Base Generation" of the facility. However, the actual output of the facility should be more detailed and transparent. An additional schedule would be appropriate, and should contain the expected annual output for full period of the PPA and a monthly forecast for the first full year of production. This directly impacts the ability to monitor and enforce the Minimum Guarantee Energy provision.
- **Renewable Energy Credits**: According to section 5.5, all environmental attributes and renewable energy credits (RECs) are owned by the SELLER. This arrangement is typically contracted based on the mutual understanding of the parties and may be owned by either the SELLER or BUYER depending on the agreement. However, all claims to renewable power belong to the owner of the RECs. Therefore, with the current draft PPA, the BUYER would not be able to claim the environmental benefits from the proposed solar project nor count the system output toward clean energy goals – which is not entirely consistent with the stated purpose of the EOI. Recommend revisiting this assignment of REC ownership to ensure that the CUC does not need the RECs for reporting or environmental purposes.
- **Insurance Coverage:** requirements for insurance coverage in Schedule 5 are consistent with typical PPA contracts however there is no requirement for annual certificates of insurance or notices of coverage changes being provided to the Buyer. Recommend adding notification provisions to Schedule 5 to avoid potential issues with improper coverage over the 25 year contract term.
- **End of Contract Site Remediation:** According to Section 3.1, the SELLER is responsible for removing all equipment from the site upon expiry of the agreement. This provision is standard for PPA contracts and provides for appropriate remediation of the project site. However, the specific responsibilities and definition of the "equipment" is not fully documented and leaves ambiguity in the expectation for the SELLER at the end of the contract term. However this may be covered in the Site lease with the property owner (which was not reviewed by ICF.)
    - Recommend that the "equipment" reference is changed to the defined term "Generating Facility" and use a more specific description of the SELLER responsibility such as: "SELLER shall, at its expense and in a manner that minimizes the disruption of Site to the extent commercially practicable, (i) remove the Generating Facility and related equipment from the site, (ii) shall repair, in a commercially reasonable manner, any damage to the site caused by the system and such removal, and (iii) remove all trash and debris introduced to the site by owner, leaving the site in substantially the same condition existing prior to the commencement of system construction (reasonable wear and tear excepted)."
    - Further, if there is a concern that funds may not be available for the eventual removal of the system at year 25, then a "Removal and Disposal Fund" could be established in the contract using language similar to: "In order to ensure that funds are available for the removal of the Generating Facilities and remediation of the Site upon the expiration or termination of this Agreement, Seller agrees to establish an interest bearing escrow account at a federally insured banking institution to hold funds dedicated for such

purpose (the "Removal Fund"). The terms for the escrow account shall be reasonably acceptable to the Buyer and the Seller." With additional provisions as appropriate.

- **Indemnity:** Section 16.3 on indemnity appears to contain the same material previously covered in Section 7.2 (and corresponding Sections 7.3 and 7.4). These sections should be reviewed and potentially consolidated for clarity.
- **Schedule 10:** Section 16.14 of the PPA says that Schedule 10 contains a financial model, "depicting estimated annual cash flow", however, Schedule 10 does not actually contain a financial model but rather a clause that the seller will release the model to the buyer after receiving prior written consent. It is not immediately clear why the financial model is not attached. ICF recommends that the language should be firmed up and financial model incorporated prior to final negotiations to avoid any gray areas in this part of the agreement.
- **Assignment:** The language surrounding assignment of the contract in Section 16.4 enables the seller to assign the contract whenever they desire. While this may be agreeable to the buyer, there should at least contain terms for the seller to notify the buyer in advance.

Recommendations Regarding PPA Terms

Several of the PPA terms could be modified to CUC's benefit. Items of specific concern which affect the potential cost to CUC and its customers include the Minimum Guaranteed Generation and Replacement Power provision including the definition of Base Generation to the extent that it impacts this provision, the site remediation provisions, and the insurance coverage requirements. ICF has also provided additional recommendations to help clarify and standardize the PPA including review of the indemnity language, including financial model directly in the PPA, providing explicit definitions for metering requirements and equipment, and concatenating any external references directly into the PPA agreement. Additionally, ICF recommends that CUC seek to have assignment of the environmental benefits associated with the project; although there is not a renewable energy credit market in place, the assignment of these benefits would allow CUC to claim the carbon benefit and other associated rights should market structures and requirements changed over the term of the PPA.

Reasonableness of Pricing in the Entropy Agreement

This section provides an assessment of the reasonableness of the pricing in the agreement by examining current utility-scale solar PV costs in the Caribbean region as well as cost and performance trends since Caribbean Utilities Company's 2011 request-for-proposal and solicitation of renewable energy.

The best way to compare the reasonableness of the pricing is by examining the pricing of comparable projects. However, utility-scale solar in the Caribbean is in its infancy as an industry, and it is challenging to find completed projects in countries with characteristics and electrical systems similar to the Cayman Islands as well as finding pricing data. Nevertheless, there is limited information available. According to the National Renewable Energy Laboratory (NREL), the 2014 estimated levelized cost of utility-scale

solar in Grenada was between CI$0.18/kWh and CI$0.37/kWh.[3] The rate of CI$0.21/kWh in Entropy/International Electric Power's (IEP) 2011 proposal falls on the low side of this range.

However, other sources suggest that the installed cost of utility-scale solar PV in the Caribbean have fallen to levels that would suggest a far lower levelized cost of energy. GTM Research's recent whitepaper, "Solar PV in the Caribbean: Opportunities and Challenges" summarizes recent regional survey data on utility-scale solar PV. Their survey results indicate that current costs are in the range of CI$1.67 to CI$2.08/watt, with a mode price of CI$1.67/watt and a median price of CI$2.38/watt (the median is higher due to much higher reported costs in Puerto Rico compared to the rest of the region. ICF used these figures to perform a levelized cost of energy (LCOE) analysis for solar PV. The U.S. Energy Information Administration (EIA) says that the levelized cost of energy, "represents the per kilowatt-hour cost (in real dollars) of building and operating a generating plant over an assumed financial life and duty cycle".[4] Since solar PV plants do not have any fuel or variable operations and maintenance costs, the main components of the LCOE are as follows:

- The capital charge rate or the carrying cost of capital for a given project.
- The installed capital cost. The value used by ICF is equal to the mode price of current utility-scale solar PV pricing in the Caribbean region.
- The capacity factor of the project. The value used by ICF is equal to the projected capacity factor for the 5 MW solar facility.
- The fixed operations and maintenance cost of the project. The value used by ICF is from the EIA's 2014 Annual Energy Outlook.

Figure1: Simple LCOE Calculations for 2016 Utility-Scale Solar PV ($Nominal CI$)

Cost Component	Unit	Current Mode from Caribbean Solar Study	Current Median from Caribbean Solar Study
Capital Charge Rate	%	14.0%	14.0%
Capital Cost (assuming $2.5/watt)	CI$/kW AC	2,083	2,375
Capacity Factor	%	25%	25%
Annualized Capital Cost	CI$kWh	0.131	0.15
Fixed O&M	CI$/kW-yr	21.67	21.67
Fixed O&M	CI$/kWh	0.01	0.01
LCOE	CI$kWh	0.14	0.16

Overall, this implies a cost of roughly CI$0.14/kWh for currently available equipment on average orCI$0.16/kWh using the median price reported for Caribbean power systems. Although there remains

[3] http://www.nrel.gov/docs/fy15osti/62699.pdf. The US$ in the report were converted to CI$ using an exchange rate of 1.2 US$/CI$; this is based on the CUC solar PPA analysis (spreadsheet '5 MW PPA Price Comparison021115-25 yr.xls' and is consistent with current exchange rates.

[4] http://www.eia.gov/forecasts/aeo/electricity_generation.cfm

significant cost variability across the equipment cost estimates, this average price suggests that a solicitation if put forward today could result in a lower price.

A significant challenge in finding comparable benchmarks to Grand Cayman is due to the site specific nature of solar resources. Localities often provide differing compensatory mechanisms or subsidies for solar which would prevent comparison of the final price of the PPA, while transport, delivery, and duty costs for equipment can significantly vary resulting in comparisons of LCOE being inaccurate. As such, identifying comparable projects in the Caribbean is difficult. Despite this, there is strong evidence based on international trends to suggest that solar PV market fundamentals have changed significantly since 2011. This is illustrated in recent research regarding the costs of hardware by Greentech Media Research (GTM Research) indicating the average price of utility inverters fell from CI$0.13/Watt (W) to CI$0.09/W in just one year (from the fourth quarter of 2013 (Q4 2013) to the fourth quarter of 2014 (Q4 2014). Fixed-tilt mounting systems fell from CI$0.13/W to CI$0.12/W over that same timeframe. Module costs, which are the largest component of hardware costs, have fallen even more dramatically; according to the International Renewable Energy Agency (IRENA), solar PV module costs fell by an average of 11% to 23% per year from 2012 to 2014, depending on the demand market and the manufacturing market.[5] Overall, the global average LCOE for utility-scale solar PV systems fell from CI$0.25/kWh ($2014) in 2011 to just under CI$0.17/kWh in 2014.[6]

Module efficiencies have also continued to improve over the last several years. The industry average module efficiency for commercially-produced monocrystalline silicon and polycrystalline silicon (also known as multi-crystalline silicon) panels, which represented 90% of commercial installations in 2014,[7] increased significantly from just 2011 to 2013. Increased module efficiency means that a comparable solar PV system can capture a higher percentage of the energy available to it, and in turn, that greater efficiency will translate into a higher capacity factor and a lower corresponding LCOE.

The industry averages suggest that should a solicitation be put forth today, proposed PPA prices may be lower than those resulting from a 2011 solicitation. However, there is no such guarantee that a lower price would be available, particularly for a first of its kind project in Grand Cayman. It is important to note that the proposed PPA price falls well within the range of quoted prices contained within the study and as such, it is not considered an out of market cost. Further, many performance parameters and risks are highly site specific with a solar project and as such, though industry costs have declined, the site specific risks are not affected by this such that only the component costs of the total bid price may be impacted.

Perhaps the best comparison however is to comparable price quotes received through the competitive bid process itself. Of the 20 bids evaluated by CUC for pricing, 14 were exclusively solar, 2 were a combination of solar and wind, and 4 were exclusively wind. The 14 solar bids provide a strong comparison of available pricing. Overall, the Entropy 2011 bid of CI$ 0.21/kWh for a 22-year term PPA was found to be consistent with the simple average levelized price of the 14 solar bids. The terms of the bids evaluated varied with the lowest price bidder at a 30-year term. The Entropy bid was the fifth

[5] http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf
[6] http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf
[7] http://www.irena.org/DocumentDownloads/Publications/IRENA_RE_Power_Costs_2014_report.pdf

ranked bid (third ranked bidder) based on price in the initial evaluation. Under their updated 2014 proposal for a 25-year term, the levelized price of the Entropy bid at CI$ 0.18/kWh falls below the simple average price of the initial bid and would result in the bid being ranked as the fourth ranked bid (second ranked bidder). Entropy also provided an updated price bid for a 20-year term at CI$0.22/kWh. Slightly above the average of the original solar bid prices. Note, the capacity factor is assumed constant at 25% for this LCOE calculation based on the specifications provided by Entropy. This capacity factor appears low for the solar profile for the area based on profiles for comparable latitudes, however, as such, it reflects a conservative level for purposes of the cost analysis. Further, the reasonableness of this capacity factor is reflected in comparison to the average of all solar bids in the solicitation process which as at 19%.

Recommendations Regarding PPA Pricing

While ICF finds the Entropy price proposal reasonable, we believe it would be fair to seek a best price offer from Entropy specifically acknowledging recent declines in solar equipment pricing. ICF has not reviewed the overall negotiations process between CUC and Entropy nor are we familiar with the context under which CUC sought a revised bid from Entropy in 2014. It is possible this revision already incorporates the potential movement in bid price due to equipment cost. If so, CUC should provide acknowledgement that such discussions have already taken place and would be reflected in the 2014 bid price.

Recommendations and Conclusions

Several terms in the PPA are more biased to the advantage of the seller than standard in PPA language. ICF recommends pursuing further negotiations around these terms and conditions as discussed in detail above. Further, we suggest specific acknowledgement that the current bid is reflective of equipment costs available in the current market be sought.

From a portfolio perspective, ICF further identified exposure to CUC and its customers associated with the PPA. Specifically, the capacity commitment under the PPA and the term commitment under the PPA are both large. The 5 MW reflects a significant share of the total renewable goal and may limit the ability to diversify resource selection and seek alternate contracting opportunities. Further, competitive pricing alternatives may become more available as issues with siting wind facilities are resolved and solar cost trends continue downward. As such, locking into a long term arrangement for a significant share of the renewable commitment limits the ability of CUC to hedge its risks and provide greater diversity in its portfolio. As such, we strongly recommend pursuing the most favorable terms and conditions under the PPA agreement as possible.

Chapter Three: Review of CUC Price Evaluation

In evaluating the Entropy price bid, CUC utilized a levelized cost of energy (LCOE) analysis to compare the solar costs to costs of generation from traditional oil-fired facilities. LCOE provides a measure of the overall economic comparison of different generating technologies. Various inputs such as capital costs, fuel costs, and O&M costs are necessary for calculating LCOE. For renewable technologies LCOE is largely based on estimated capital cost of generating capacity, as they have no fuel costs and variable costs are relatively small. Therefore, comparing non-firm generation such as renewable energy and firm generation such as diesel powered generation based on LCOE alone is limited in its application. Because of this CUC further considered avoided costs in its review of pricing. Specifically, CUC considered the levelized avoided cost of electricity (LACE) metric for comparison. Consideration of LACE is a relatively common practice in the industry. EIA in their 2014 Annual Energy Outlook also recommends using the methodology of comparing LCOE to LACE. ICF consents to the methodology adopted by CUC for the analysis.

LACE provides an assessment of economic competitiveness that can be gained through consideration of avoided cost, a measure of what it would cost the grid to generate electricity that is otherwise displaced by a new generation project, as well as its levelized cost. LACE value can be compared with LCOE value to provide an indication of whether or not the project's value exceeds its cost.

For the levelized cost analysis, CUC was required to make several assumptions related to fuel price, fuel consumption, generation, and discount rate.

Key Assumptions

Commodity Pricing

For fuel price assumptions, CUC relied on information available from the US Energy Information Administration (EIA) and the New York Mercantile Exchange (NYMEX) at the time of their analysis. Fuel prices considered encompass three cases:

1. EIA's 2014 Annual Energy Outlook Report Low Distillate Fuel Oil (DFO) Price forecast;
2. EIA's 2014 Annual Energy Outlook Report High Distillate Fuel Oil (DFO) Price forecast; and
3. NYMEX Futures/ mid-point of EIA's Low and High DFO forecasts.

As EIA's 2014 Annual Outlook Report was the most recent report available when CUC conducted their analysis, ICF commends CUC for using the latest publicly available report. However, it is not clear why CUC utilized the mid-point of EIA's high and low DFO price forecasts as representative of the expected growth rate rather than relying directly on EIA's published Reference Case as an expected outlook. EIA does not consider its Reference Case as an expected case, but rather as a reasonable outlook given current conditions. EIA sensitivity cases are reflective of sensitivities to the Reference Case. As CUC did not provide a rationale for this averaging, ICF cannot provide an opinion on the reasonableness of their assumption.

Figure 2: Historical U.S Gulf Coast Spot Prices vs. NYMEX Heating Oil Futures

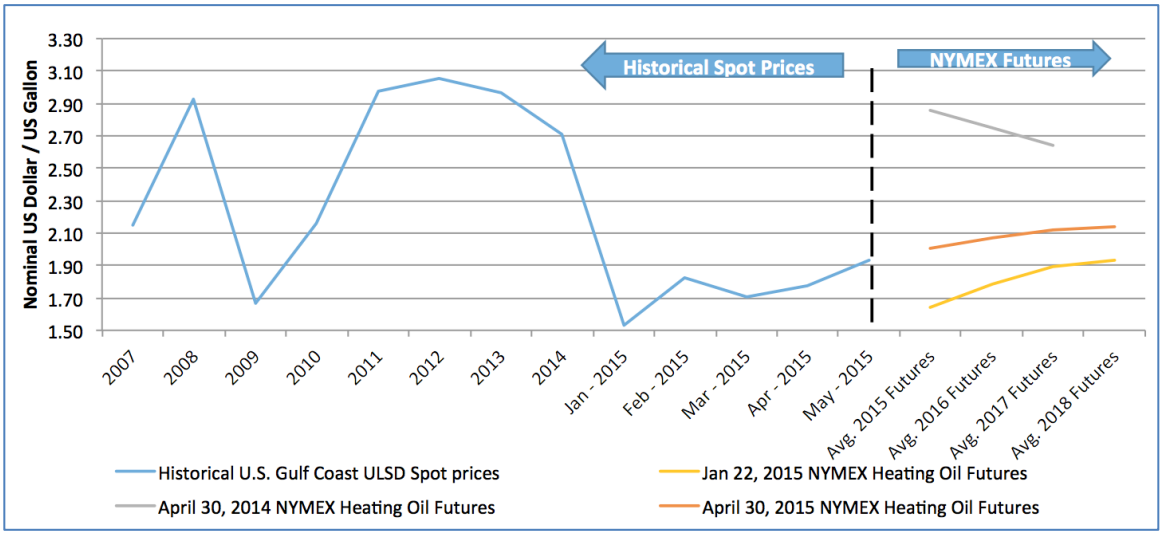
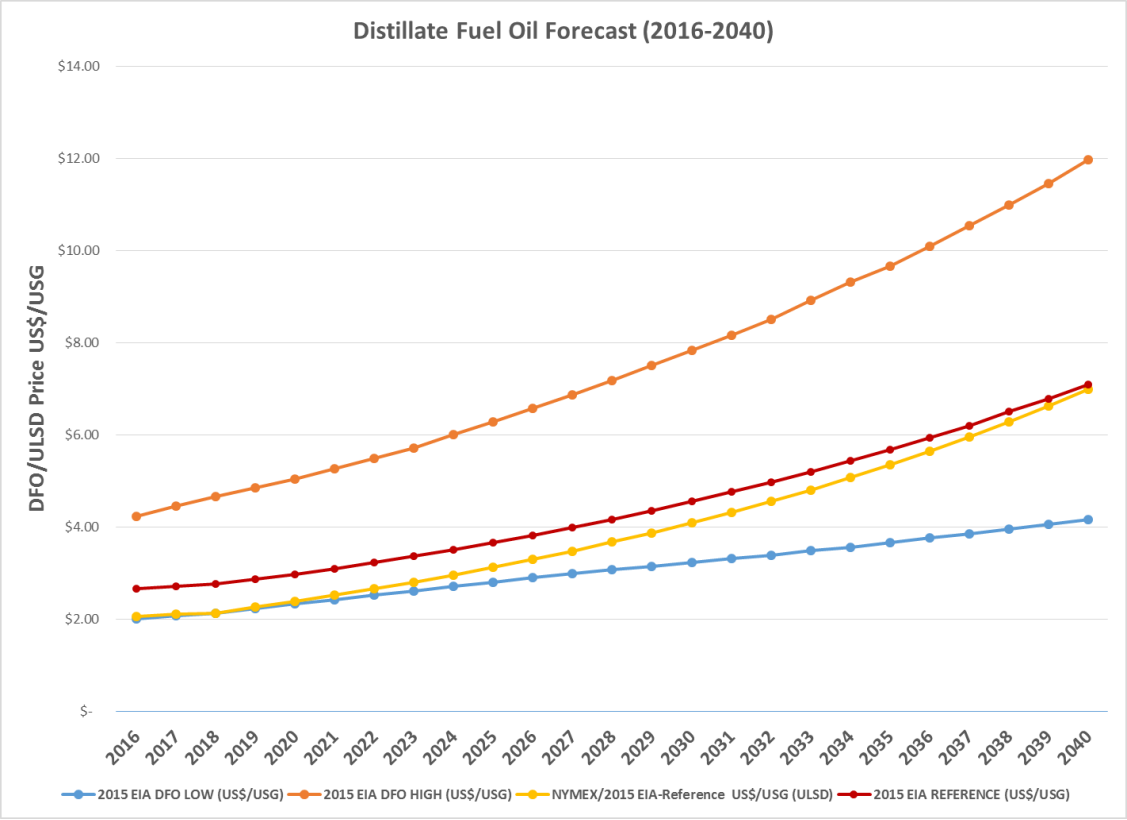


Figure 2 illustrates the US Gulf Coast Ultra Low Sulfur No. 2 Diesel (ULSD) spot prices significantly dropped to around Nominal USD1.50/US gallon towards the end of 2014. Since March 2015 onwards, the market has slowly started to recover. As of May 4, 2015, the diesel price reached around USD 1.90/US gallon which is still lower than 2014 yearly average. Although prices are recovering, they continue to be well below historical pricing levels and indications from OPEC are that prices will remain low for the near-term. However, as this is a 25 year contract, the long-term trend will be significant in the comparison for LCOE/LACE analysis. It is useful to consider history in understanding the potential for significant movements in pricing and the speed at which price movements can occur. Significant price volatility does exist in the oil markets and year on year price swings can be dramatic. However, the sustainability of low prices over multiple years is questionable. CUC's use of a range of forecast projections is a useful method for considering the potential price swings and implications thereof to the annualized avoided cost.

Figure 3 illustrates the current (EIA AEO 2015) projections for fuel oil as well as the blended NYMEX/mid-point projection.

Figure 3: Fuel price forecasts over the 25-year PPA period (Step II: Updated EIA AEO 2015, NYMEX Futures, and Historical Spot)



Compared to the 2014 forecasts from EIA, there have not been significant changes in the 2015 values in the long-term. As seen in the Figure, the use of the mid-point versus the reference case slightly deflates the projected fuel prices in the NYMEX-Midpoint scenario as opposed to using the EIA Reference Case growth. The differences are concentrated in the near-term, which tend to have a more significant impact on a levelization calculation, particularly under low discount rates. ICF is using EIA's 2015 reference case growth rate from 2016 - 2035 to grow beyond 2018 NYMEX Futures instead of using EIA Midpoint. EIA 2015 DFO Reference Case growth rate for 2016 to 2035 was around 5.98%, whereas EIA Midpoint of High and Low DFO case was around 5.51%. Given this, the CUC assumption is conservative (resulting in a lower avoided cost) for purposes of this analysis.

In its analysis, CUC used average of the monthly contracts of NYMEX Heating Oil Futures traded as of January 22, 2015 to benchmark to Entropy/IEP's PPA costs for the first three years (2016-2018) of the analysis. At present the NYMEX Heating Oil Futures traded as of April 30, 2015 are trading at higher prices compared the futures contracts values that CUC used for the analysis. Since the spot market has started to rise slowly, people are expecting and trading future contracts at higher prices today than in January 2015. Overall, this movement would have the effect of increasing the LCOE from the levels calculated by CUC.

Fuel Cost Adders

CUC assumes a Fuel Delivery and Duty charge of CI$ 0.79/Imperial Gallon (IG). Of this, CI$ 0.50/IG is based on the Cayman Government's fuel duty rate of CI$ 0.50/IG. CUC's report does not explain the additional CI$ 0.29/IG applied in its analysis to determine delivered fuel prices. Other adders to the fuel commodity price for local delivery, wharf age fees, taxes, etc. may all be applicable. Though CUC does not explicitly state its assumptions, ICF believes these incremental costs were applied. For benchmarking purpose, ICF performed its own analysis to find the range of fuel delivery charges with import duty from similar diesel projects. ICF estimates diesel fuel delivery charges with import duty would likely range from CI$ 0.77/IG to CI$ 0.83/IG. Though CUC did not elaborate on its assumption, it appears to be reasonable based on ICF's experience. However on May 15, 2015, Premier Alden McLaughlin announced that the Cayman government will cut the duty on diesel imported by Caribbean Utilities Company by CI$ 0.25/IG effective January 2016[8]. Assuming latest fuel duty rate of $0.25/IG and keeping CUC's CI$ 0.29/IG fuel delivery charges, ICF uses CI$ 0.54/IG as the diesel fuel delivery charges with import duty for the analysis. As a result, the LACE value for the various oil benchmark case dropped by an average of 6% to 7%.

Fuel Heat Content

CUC assumes a lower heating value (LHV) fuel content 138,110 BTU/US Gallon versus 128,494 BTU/Gallon as reported by Massachusetts Institute of Technology (MIT) Energy Club [9]. Variations in heating content do exist and may vary based on the sourcing or blending of fuels. CUC does not provide a specific reference for the heat content. However, ICF consulted with ERA regarding the Fuel Heat Content assumption, and the fuel quality test for diesel (High Venture, and High Prosperity) conducted by ERA suggests that CUC may be using historical average (Gross Calorific Value) heat content based on its past purchases. Therefore, ICF is comfortable using CUC's assumed LHV fuel content of 138,110 BTU/US Gallon for the analysis.

Discount Rate

CUC also utilized two separate discount rates of 10% and 5%. CUC stated the 10% discount rate is based on CUC's current weighted average cost of capital for Capital Improvement Plan (CIP) projects. CUC considers the 5% discount rate as consistent with a customer discount rate. Specifically, CUC indicated that the US Department of Energy (DOE) suggests a range of 3% to 5% discount factor for comparing energy projects in 2015, however, no specific reference to DOE is provided such that the source and reasonableness of what the discount rate to customers serviced by CUC would be. More explanation on this discount rate would be useful to further understanding the rationale for considering this rate. As CUC did not provide the specifics for the assumption, ICF cannot provide specific comments on the selected discount rates.

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[8] Toward a Better Tomorrow 2015/2016 Policy Statement Delivered Friday 15, May 2015. http://www.gov.ky/pls/portal/docs/PAGE/OTPHOME/PUBLICATIONS/2015-16-POLICY-STATEMENT/TOWARD%20A%20BETTER%20TOMMORROW%202015-16%20POLICY%20STATEMENT%2015-5-15.PDF

[9] MIT Energy Club Units & Conversion Fact Sheet report http://mitenergyclub.org/system/files/unitsandconversions.pdf

Inflation

The fuel delivery charge of CI$0.79/IG is grown at an annual inflation rate. For the US CPI-U Inflation forecast, CUC adopted forecast assumption published on The Puget Sound Economic Forecaster newsletter prepared by Conway Pedersen Economics, Inc. ICF relied on updated US CPI-U inflation projection based on The Puget Sound Economic Forecaster newsletter as well. ICF believes this source provides adequate documentation of its methodology which has been adopted in public forums such as its use by the City Budget Office of Seattle government. Based on the latest information CUC had at the time of their analysis for the US-CPI expected inflation, the assumed inflation was 2.25% on average. However, the latest forecast for US CPI-U for 2015 has significantly dropped from 2% to 0.4%. As a result, based on March 2, 2015 US-CPI forecast data and using the same methodology as CUC applied, the latest inflation assumption would drop to 1.98% annually from 2.25%. This adjustment has the effect of reducing the annualized avoided costs estimated by CUC. The CPI assumptions are shown in Figure 4 below.

Figure 4: US CPI-U Inflation Projections

Year	US CPI-U Inflation as of 6-9-2014[10]	US CPI-U Inflation as of 3-2-2015[11]
2015	2%	0.4%
2016	2.20%	2.20%
2017	2.30%	2.30%
2018	2.40%	2.40%
2019	2.30%	2.30%
2020	2.30%	2.30%
Average	**2.25%**	**1.98%**

Source: The Puget Sound Economic Forecaster Newsletter, prepared by Conway Pedersen Economics, Inc.

Methodology

As discussed earlier, ICF concurs with CUC's consideration of both LACE and LCOE in its review. ICF evaluated CUC's spreadsheet for application of this methodology. Overall, the CUC analysis was reasonably well performed and reflected a sound analysis. However, ICF did identify several minor formula errors in the calculation.

ICF identified the following mistakes on CUC's provided 5MW 25 year PPA price comparison spreadsheet:

[10] The Puget Sound Economic Forecaster Newsletter. Prepared by Conway Pedersen Economics, Inc. Consumer Price Index Forecasts, http://www.seattle.gov/financedepartment/cpi/documents/US_CPI_Forecast_--_Annual06-19-14.pdf.

[11] The Puget Sound Economic Forecaster Newsletter. Prepared by Conway Pedersen Economics, Inc. Consumer Price Index Forecasts, http://www.seattle.gov/financedepartment/cpi/documents/US_CPI_Forecast_--_Annual.pdf. Accessed on March 2015.

1. The formula for both 2014 EIA DFO low and high value conversion from real to nominal dollars for year 2016 was erroneous. Since the inflation number was already in percentage, the further division of the value by 100 was incorrect. As a result, values for year 2016 reported were lower than the correct value.
2. Values for year 2016 and 2017 NYMEX Futures in NYMEX/EIA-MID POINT US$/USG (ULSD) row also had minor error in cell referencing. For year 2016 value, it was referencing to December 2016 NYMEX heating oil future contract price alone instead of average of monthly contracts for year 2016. As per year 2017 value, it the average of the monthly contracts for year 2017, however it skipped/missed September 2017 NYMEX heating oil futures contract price of US$ 1.9047/USG in the average calculation for year 2017.

In all but the NYMEX/mid-point case, the impact of the formula errors was negligible. In the NYMEX/mid-point case, the resulting LACE was reduced by 6% assuming a 5% discount rate. When assuming the 10% discount rate, the LACE was reduced by 5% in the NYMEX mid-point case while it increased by ½% in the EIA high and low price scenarios.

Updated Price Review Results

ICF revised or updated assumptions and formula errors in CUC's analysis as discussed above. Overall, the effect of doing so resulted in a similar conclusion to that of CUC in considering the 25 year PPA. In the near-term, the contract pricing is above expected avoided costs based on current NYMEX levels, however, over time, as the oil price escalates, the contract bid price is well below the annual expected avoided costs.

Figure 5: Entropy's (COE) versus CUC's (ACE) over the 25-year PPA period

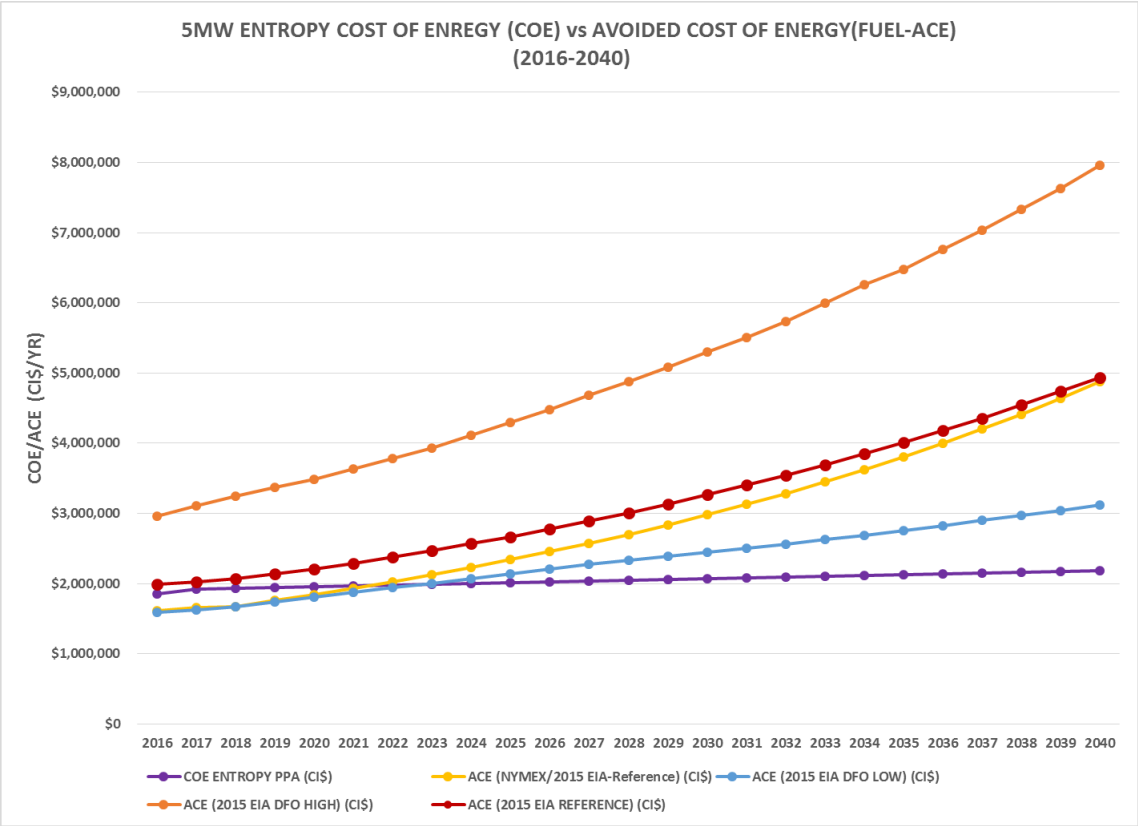

Figure 5 illustrates Entropy's Cost of Energy (COE) versus CUC's Avoided Costs of Electricity (ACE) over the 25-year PPA period utilizing five price forecasts. The COE Entropy PPA price is above the annual ACE under the 2015 EIA DFO Low scenario through 2023; likewise, it remains above the NYMEX/2015 Mid-Point scenario until 2022. Assuming flat nominal pricing thereafter, the solar pricing proposed in the COE Entropy PPA is below the annual ACE within the 2015 EIA DFO High scenario for all years. Finally, as compared to the EIA Reference scenario, the pricing is near parity or slightly lower in the first few years before the EIA Reference case increases into the long-term.

Figure 6: Comparison of PPA LCOE and Levelized Avoided Cost of Diesel Generation

	20 Year CI$/kWh	20 Year % delta from PPA	25 Year CI$/kWh	25 Year % delta from PPA
@ 10% Discount Rate				
ENTROPY PPA	0.2147	0%	0.1786	0%
NYMEX/MID POINT	0.1947	-9%	0.2071	16%
EIA DFO LOW	0.1774	-17%	0.1829	2%
EIA DFO HIGH	0.3577	67%	0.3761	111%
EIA REFERENCE	0.2254	5%	0.2366	32%
Average Avoided Cost	0.2388	11%	0.2507	40%
@ 5% Discount Rate				
ENTROPY PPA	0.2174	0%	0.1809	0%
NYMEX/MID POINT	0.2085	-4%	0.2302	27%
EIA DFO LOW	0.1853	-15%	0.1947	8%
EIA DFO HIGH	0.3799	75%	0.4120	128%
EIA REFERENCE	0.2382	10%	0.2577	43%
Average Avoided Cost	0.2530	16%	0.2737	51%

Based on the 20 year PPA price quote, the PPA pricing at an assumed 10% discount rate is expected to be within a small percentage (11% above) of the average of all scenarios considered and below the NYMEX/Mid-point forecast by 9%. The average range increases to a 16% difference assuming a 5% discount rate while it is only 4% lower relative to the NYMEX/Mid-Point expected conditions. When extending the PPA pricing to a 25 year term, the PPA pricing drops by nearly 17% overall relative to the 20 year pricing. This significant pricing difference results in a meaningful advantage to the PPA versus the anticipated avoided cost based on projected diesel costs. The price advantage clearly exists in all Cases. The result of this analysis in regards to the advantage of the 25 year PPA, including adjusted assumptions is generally consistent with CUC's findings.

Recommendations and Conclusions

ICF concludes that the evaluation performed by CUC is reasonable and CUC has provided adequate documentation of their methodology through the spreadsheets reviewed. ICF identified minor formulaic errors for correction. However, these errors have no significant impact and do not affect the overall conclusion that the Entropy bid is significantly below the current system avoided costs associated with diesel generation.