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ANGUILLA STRENGTH AND ENDURANCE

CDKN Climate & Development Knowledge Network

# Renewable Energy Integration Stakeholder Workshop

***Government of Anguilla***
***Climate & Development Knowledge Network***
***Anguilla Renewable Energy Office***

**24 April 2012**

# *Agenda*

- **Objectives**
- **Work Plan and Deliverables**
- **Power Sector Overview**
- **Potential for Renewable Energy**
- **Barriers**
- **Recommendations for Renewable Energy Integration**

**Coffee Break**

- **Break-out Sessions**

**Lunch**

- **Wrap-Up**

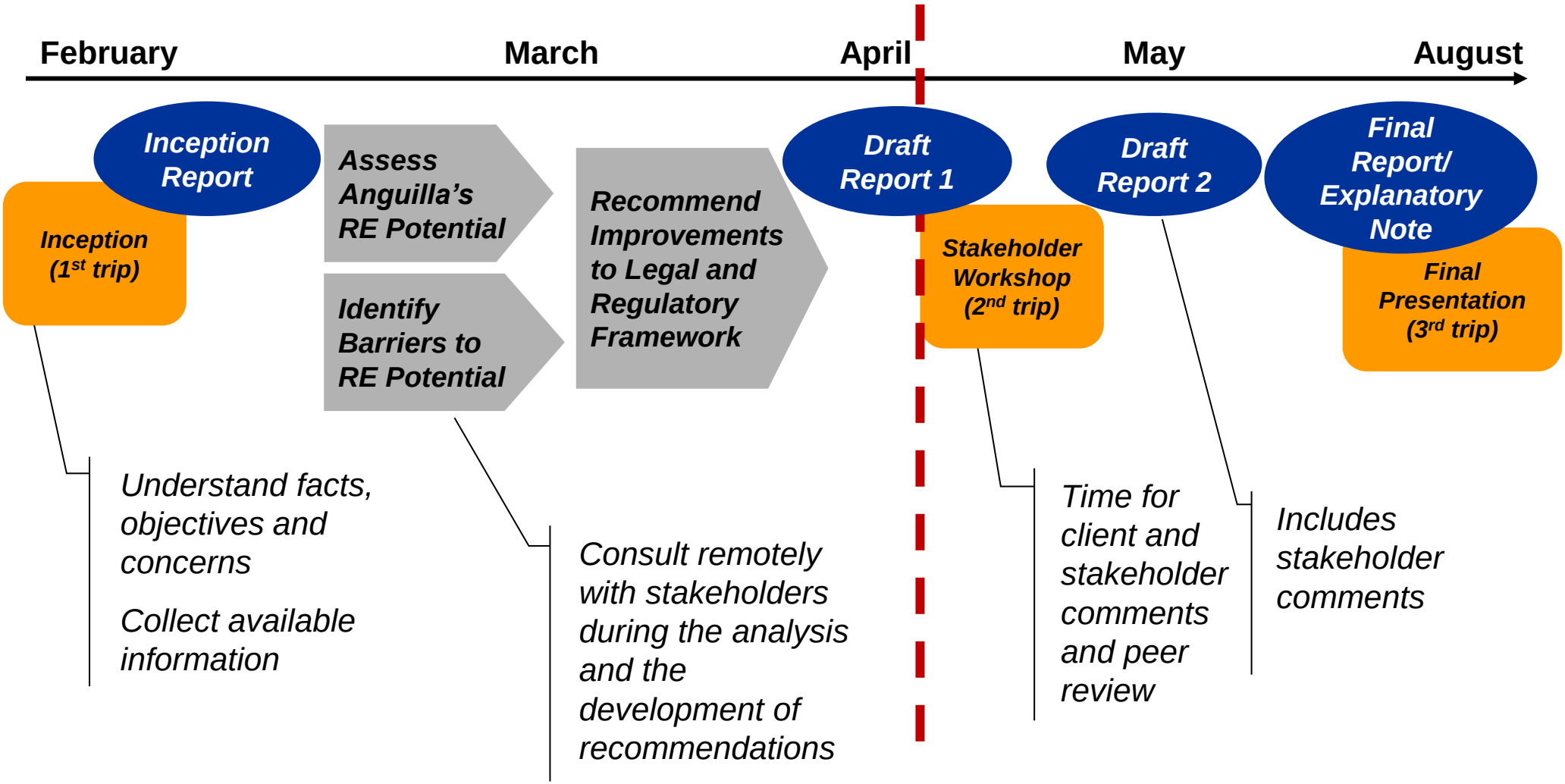
# *Objectives*

- The Government and the Climate & Development Knowledge Network (CDKN) hired Castalia to recommend how to improve Anguilla's legal and regulatory framework to enable integration of renewable energy

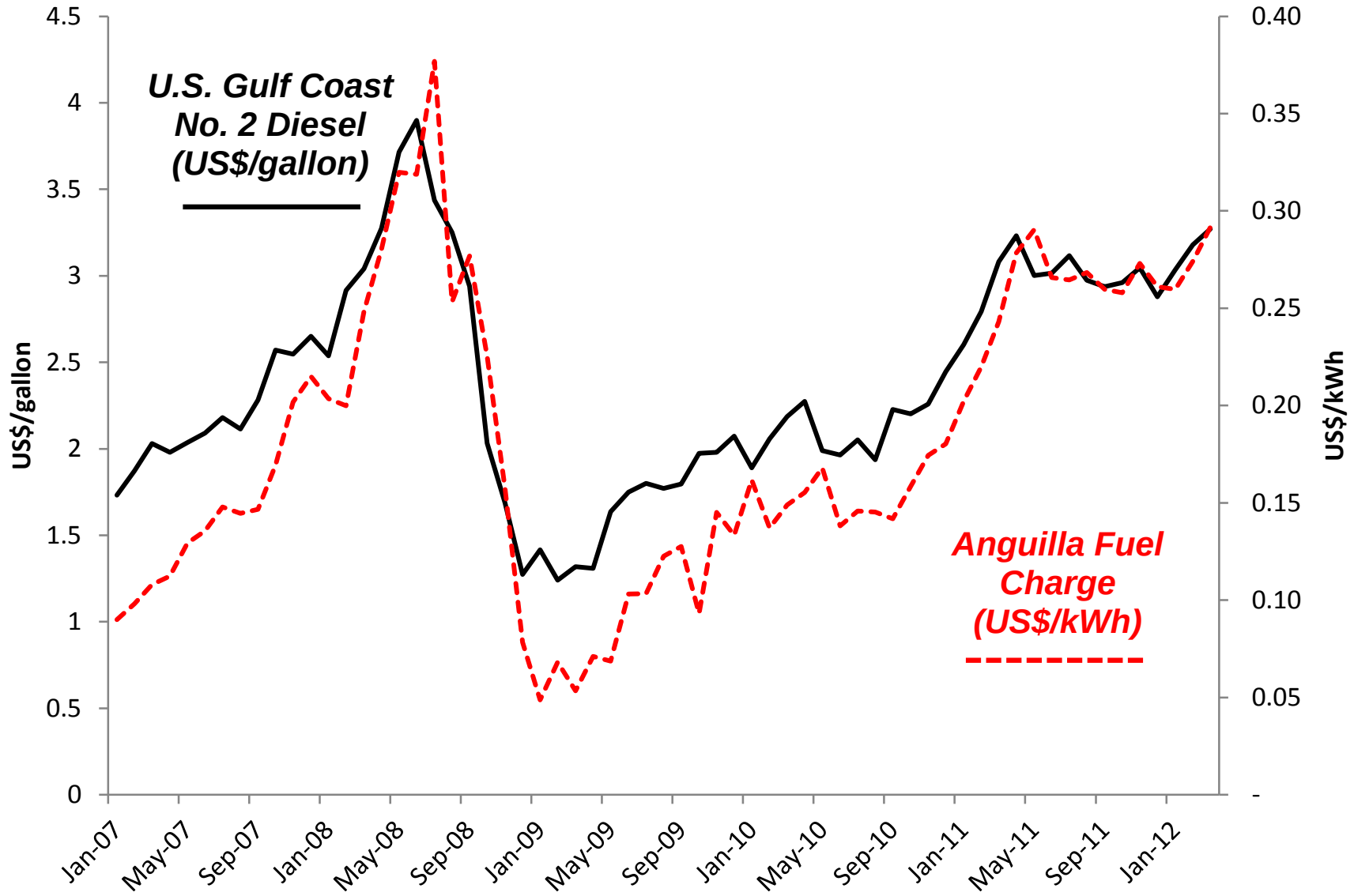
- Why integrate more RE?

1. **To reduce electricity costs**—priority objective for Government and overwhelming majority of stakeholders met
2. **To increase energy security**—this can be done while reducing costs since Anguilla's RE is all win-win
3. **To enhance environmental sustainability**—this too can be done while reducing costs since Anguilla's RE is all win-win
   - Local environment (less pollution)
   - Global environment (less $CO_2$)

# Work Plan and Deliverables



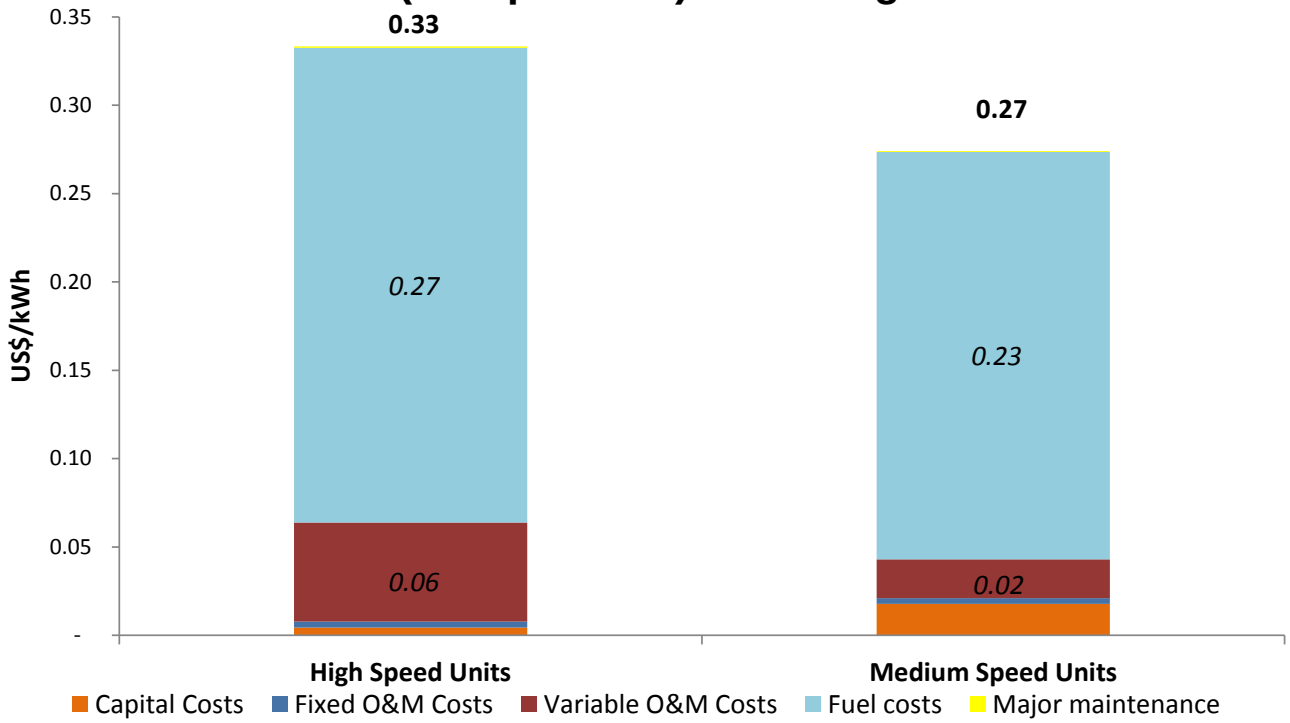
# Power Sector Overview—The Fuel Surcharge Tracks the Market Price of Diesel




***Note**: U.S. Gulf Coast price for No.2 Diesel is a market price. The fuel charge is calculated based on what ANGLEC could charge based on the Electricity (Rates and Charges) Regulations, depending on market prices. Actual figures charged may vary*

# Power Sector Overview—Generation Costs & Tariffs assuming US$4/IG Diesel

## Estimated Generation Costs (US$ per kWh) assuming that Diesel costs US$4.00 per IG

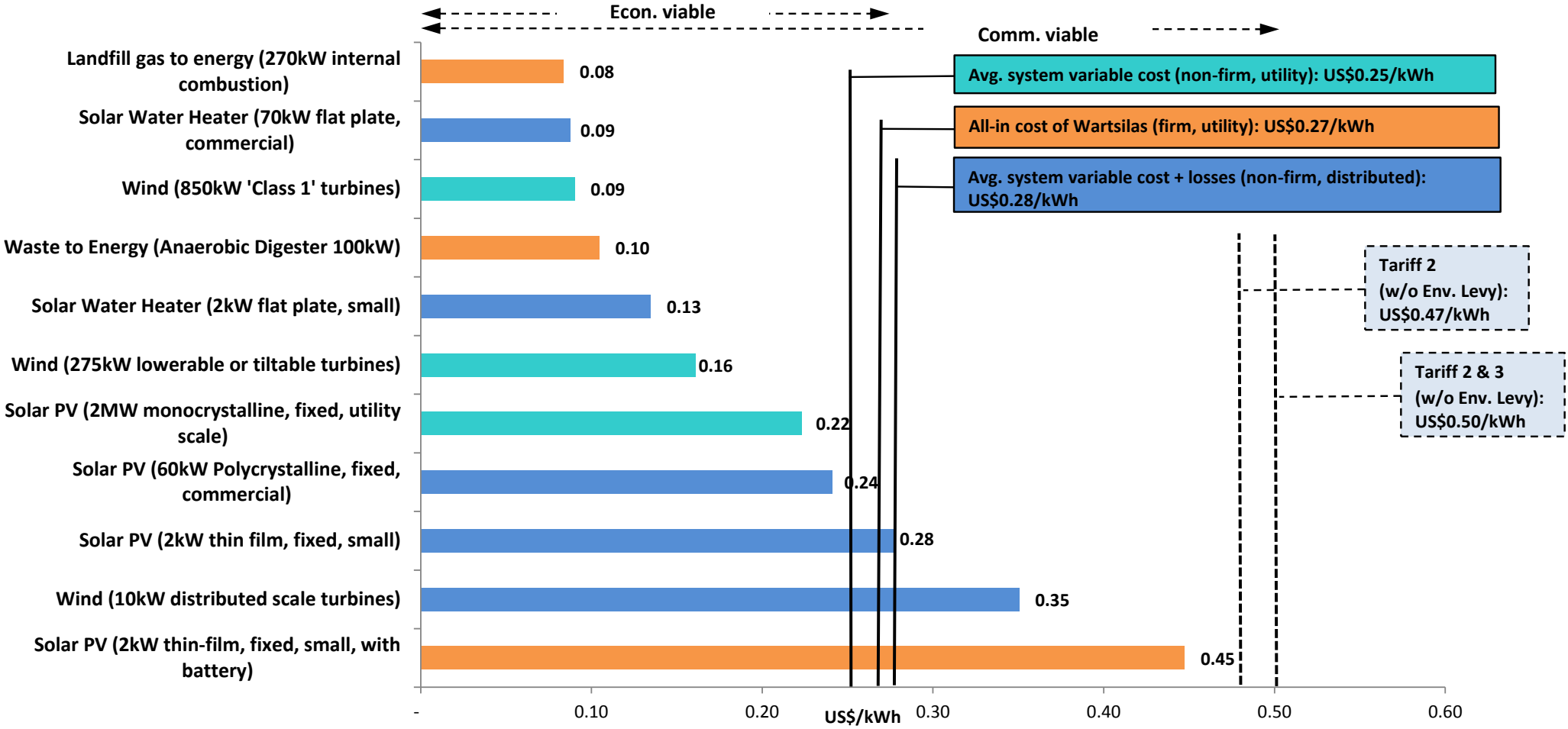



## Estimated Tariffs (US$ per kWh) assuming that Diesel costs US$4 per IG

| | Base Rate (a) | Fuel surcharge (b) | Total (a+b) |
|---|---|---|---|
| 1-40 kWh /month | 0.21 | 0.26 | 0.47 |
| 41-2,500 kWh /month | 0.24 | 0.26 | 0.50 |
| 2,501 - 100,000 kWh /month | 0.23 | 0.26 | 0.50 |
| > 100,000 kWh / month | 0.16 | 0.26 | 0.42 |

***Note:*** *Generation costs and tariffs shown are not historical values, but estimated values for purpose of analysis, based on an assumption that Diesel costs US$4 per Imperial Gallon*

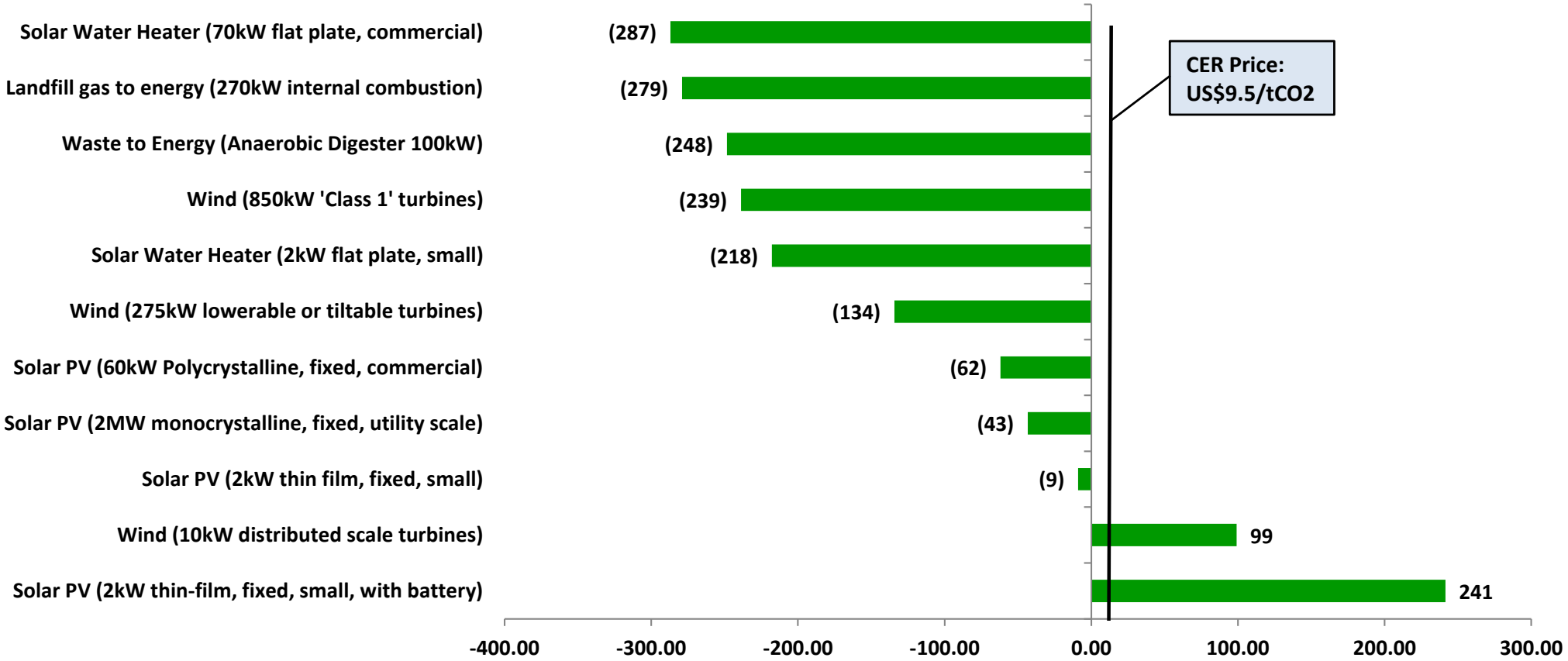
# Potential for Renewable Energy—Good Options, Currently Unrealized




**Explanation**: This cost curve analyzes the cost to generate 1 kilowatt hour of electricity, comparing renewable options (horizontal bars) and conventional fossil fuel options (vertical lines) based on a fuel price assumption. Tariffs (dotted vertical lines) compare the cost of generating electricity with small renewables with that of buying it from the grid, based on the same fuel price assumption

**Note**: Indicative Long Run Marginal Costs (LRMCs) of renewable energy technologies (US$/kWh) based on a 11% discount rate for utility scale technologies, and 9% for distributed scale technologies. Landfill gas to energy and waste to energy estimates are subject to there being enough waste. **Generation costs and tariffs shown are not historical values**, but estimates based on an assumption of Diesel prices at US$4.00 per Imperial Gallon. Average system variable cost benchmark for distributed generation is grossed up for system losses (12%)

# Potential for Renewable Energy—Good Options to Save $CO_2$ and Money




**Explanation**: This Marginal Carbon Abatement Cost Curve shows what cost do the various renewable energy technologies require to avoid 1 ton of $CO_2$. Technologies that are economically viable (most of them, as shown in the graph in the previous page) do that with a negative cost—that is, they avoid emitting $CO_2$ while also saving money. Just two technologies require spending extra money to avoid emitting $CO_2$—but instead of doing those two technologies, if one wanted to avoid emitting $CO_2$ he or she could buy an emission reduction on the market (at a price of about US$9.5 per ton of $CO_2$ )

**Note**: CER = Certified Emission Reduction. Price for Carbon from Carbonex on April 15, 2012

# *Barriers—Is Anything Needed Missing for Viable Renewables to Happen?*

- **Commercial viability of a renewable energy project**
  - Utility scale—a project generates at a competitive cost
  - Distributed scale—a project generates at a cost that saves on one's bill
- **Three basic rights any developer of a renewable project needs:**
  - Right to use the primary renewable energy resource (sun, wind, waste…)
  - Right to access and develop the site where to set up and run the project
  - Right to sell the electricity generated
- **A good regulatory framework to do renewables in the right way**
  - Body of rules that ensure good quality of service at reasonable price
  - Someone with the power and ability to effectively administer those rules
- **Other things**: skills, information, awareness, financing, good equipment competitively priced

# *Right to Use the Renewable Energy Resource—No Barriers, No Measure*

- **Right to use solar energy**
  - Anyone who can capture it can use it
  - Anyone can use it to generate electricity
- **Right to use wind energy**
  - Anyone who can capture it can use it
  - Anyone can use it to generate electricity
- **Right to use waste**
  - Anyone who owns it can use it
  - Only a public supplier can use it to generate electricity, but waste is so little in Anguilla that if anything makes sense, it will be a very small plant that uses any waste available

**No barriers—no measures needed**

# *Right to Access and Develop the Site—A Barrier for Solar Water Heaters*

- **Access and develop a site for utility scale RE:**
  - All rights in place
  - Difficulties in enforcing them
  - New procedures in draft legislation may improve the current situation:
    - streamlining the process
    - guiding the authorities' broad discretion

**No barriers—no measures needed**

- **Access and develop a site for distributed scale RE:**
  - All rights in place
  - Distributed scale projects do not qualify as 'developments'
  - Problem for solar water heaters—new buildings can go up in a way that makes it impossible or very costly to install one

**Now:**

**Mandate Caribbean-appropriate solar water heaters for new buildings**

# *Right to Sell Electricity—For Utility Scale Renewables, Good Situation*

- **Three options possible under the current framework for utility scale**

  1. ANGLEC can sell electricity generated by renewables it does itself
  2. Independent Power Producers (IPPs) can operate under ANGLEC's licence without a new licence by assignment of rights
  3. ANGLEC can hire a specialized contractor to design, build, operate, and maintain ('DBOM')

**Now:**

**Ensure ANGLEC does renewables in the best way under one of these options**

- **Only option not possible: IPP with own licence**
  - Unnecessary
  - Costly and time consuming
  - Difficult to administer

**Later:**

**Consider autonomous licensing regime for IPPs… but don't do it**

# *Ensure ANGLEC Does Renewables Well—with Corporate Rules (By-Laws)*

- **ANGLEC's by-laws regulate how the company is run**
  - Includes how business and affairs of the company should be managed
  - But does not include specific rules—can add specific rules for renewables
- **Companies Act (s.63) provides the power and procedure to amend by-laws to include specific rules**

**Now: add in by-laws 4.1:**

"In managing the business and affairs of the company, the directors, and any person to whom their powers are delegated under paragraph 4.10 or otherwise, shall comply with the Corporate Rules for Renewable Energy set out in the Schedule."

**Now: add Schedule 'Corporate Rules for Renewable Energy'**

Preamble

Principles (good quality of service at least cost, energy security, environmental sustainability, transparency & competitiveness in procurement)

Rules for Utility Scale Renewables

Rules for Distributed Scale Renewables

# *ANGLEC's Corporate Rules for Renewable Energy—Utility Scale*

- **Do demand forecast**
- **Do least cost generation plan with full consideration of RE**
- **Participate in consultation with the public**
- **Approve least cost generation plan**
- **Identify best option to design, build, operate, maintain, finance**
  1. Fully developed by ANGLEC
  2. Procure DBOM contractor
  3. Contract IPP
- **When doing DBOM and IPP: run competitive, transparent procurement process**
  - Clear eligibility criteria, and evaluation process & rules
  - Prequalification (Expressions of Interest) → Request for Proposals
- **Implement / award**

**Now:**

Request EOIs for large Solar PV

**Now:**

Add O&M in RFP for large PV

- **Customers cannot connect to the grid and sell excess electricity they generate with renewable energy**

**Now: amend Electricity Act Part 2, section 2(2) by adding that one does not need a licence for use of an electrical plant that…**

(a) is powered only by wind and which is used by any person for the purpose only of supplying electricity to his own premises, **or selling excess electricity to a public supplier on terms agreed with the public supplier**;

(b) is used only for the photovoltaic generation of electricity by any person for the purpose only of supplying electricity to his own premises, **or selling excess electricity to a public supplier on terms agreed with the public supplier.**

**Now: adopt ANGLEC Corporate Rules on Distributed Renewable Energy**

1. Identify technically/economically viable cap for eligible systems

2. Create grid and distributed generation code

3. Create Standard Offer Contract (SOC) with fair and predictable terms

4. Try to secure under public supplier's licence any change to tariffs and conditions of supply needed to promote distributed renewables as much as possible

# *ANGLEC's Corporate Rules for Renewable Energy—Distributed Scale*

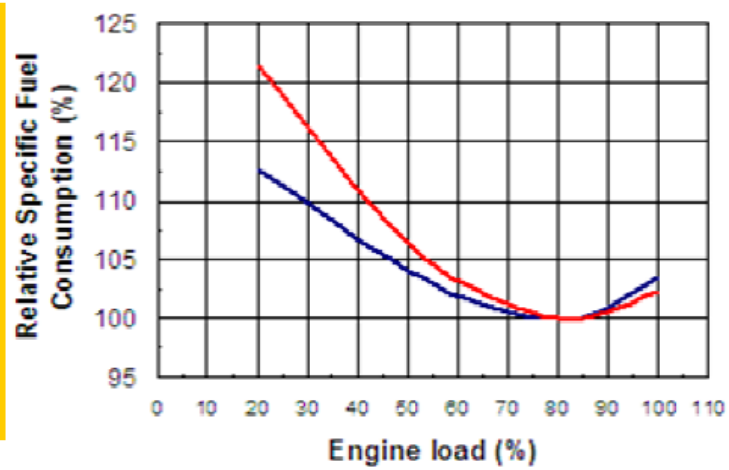
➢ **A standardized 'package' of items that must go together:**

1. **Cap on individual and total eligibility**—needed for quality, stability, reliability of service

2. **Grid code / interconnection agreement**—know in advance what to do to comply

3. **Standard Offer Contract (SOC)**
   - **Rate**: actual avoided cost under realistic dispatch conditions—fair value for country
   - **Term**: system lifetime—no uncertainty!

4. **Tariff change**—to pay separately for:
   - Supply of energy
   - Backup and standby
   - Connection to distribution grid




**Now:**

Issue pilot SOC with limited cap

**Now:**

Offer pilot disaggregated tariff under 4(1) of ANGLEC licence / Electricity Supply Regulations

# *Having a Good Regulatory Framework in Place—Must Correct Distortions*

- **Anguilla's regulatory framework is rudimentary and outdated**
  - Limited rules on how to plan, implement, operate, and recover investments
  - Limited regulatory activity and tradition
  - Designed for an era when renewables were not even an option—only Diesel
- **Much of this is a problem of power sector reform, beyond just renewables**
- **But this creates barriers to renewables too**
  - Investments in diesel generation are safe thanks to fuel surcharge, but those in renewables are risky—uncertain recovery
  - Rate reviews are rare—and unclear as to how to do them, and what outcome may be
  - Tariffs bundle all services together (energy, capacity, connection)
  - No regulatory capability anyway

**Later:**

**Ensure good investments in renewables can be recovered via tariffs**—on a par with Diesel!

**Later: disaggregate tariff structure for everybody**

**Later: assign regulatory responsibilities**

# *Correcting Electricity Regulatory Distortions—Later (but not too late)*

**Later: amend ANGLEC licence and Electricity Supply Regulations with rate setting principle for cost recovery**

Define 'Approved Renewable Energy Costs' as those incurred in accordance with the best practice Corporate Rules

State that 'Approved Renewable Energy Costs' shall be considered reasonable →can be recovered through tariffs

*"The Minister or the Arbitrator shall consider that Approved Renewable Energy Costs are reasonably incurred"*

**Later: issue revised SOC**

With higher cap, based on pilot experience

**Later: commission Cost of Service Study**

How much it costs to provide different services to different customers

**Later: amend Electricity (Rates and Charges) Regulations with a disaggregated tariff structure**

1. Supply of energy

2. Backup and standby

3. Connection to distribution grid

→ *Fuel should all be in **one fuel surcharge** component, to be published monthly*

→ *Can add a **Renewable Energy Recovery Clause** for all Approved RE Costs*

**Later: determine who will administer all these rules—PUC, ECERA, Commissioner?**

# *Recommendations for Overcoming Other Barriers*

| | Utility scale RE | Distributed scale RE |
|---|---|---|
| **Limited institutional capabilities** | Secure funding for further activities | Secure funding for further activities<br>ANGLEC to develop skills to inspect systems for SOC |
| **Limited skills for renewables** | Include O&M components when procuring (DBOM), even brief | Check wireman's licence<br>Check plumber's licence |
| **Limited information and awareness** | Assess quantity and quality of wind and waste | Consider adopting external certifications for installers |
| **Limited financing** | No barrier—no measure | Use this report to secure low-cost financing for solar PV and solar water heaters (from UK Government, ANGLEC if can recover cost)<br>Set up consumer finance initiative |
| **Limited availability of competitively priced equipment** | No barrier—no measure | |

- **Group 1: Assessing the Potential and Viability of Renewable Energy Projects**

- **Group 2: Land Use, the Environment, and Development of Renewable Energy Projects**

- **Group 3: Selling Electricity Generated by Renewable Energy Technologies**

# Wrap Up: Renewable Energy Potential & Viability (slide 1 of 2)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| How much are the upfront costs of a renewable energy system for a house, and how much will rate reductions be? | Mr. Leroy Hill | Costs depend on size. A small solar water heater could cost about US$3,000 or less (~US$1,600 per kW thermal installed); a small solar PV system about US$8,000 or less (~US$4,000 per kW installed). Upfront cost is high, but allows savings as you go |
| Peak oil is coming, so we should look to replace oil entirely using renewables | Ms. Elaine Christopher | Anguilla's key renewable sources (sun and wind) unfortunately are non-firm, so oil is still needed to provide firm power (that is, power that can be available anytime) |
| If you have a renewable system, how can you store the electricity it generates? | Ms. Daphne Armantrading | Batteries. However, they are very expensive. It is cheaper to connect to the grid for backup & standby, using the grid like a big battery |
| You should look at methane gas too, and consider importing it to replace diesel | Mr. Dallen Connor | The study considered landfill gas to energy and anaerobic digesters, but it is unclear that there may be enough waste volume for them. Importing gas requires a larger market and the right infrastructure |
| Did you look at ways to get energy using waste? | Ms. Gina Brooks | Yes—landfill gas to energy, and anaerobic digesters, would both use waste. If either proves feasible, it will be a very small plant |

# Wrap Up: Renewable Energy Potential & Viability (slide 2 of 2)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| Why did the presentation not include tidal and wave technologies? | Mr. Damian Harrigan, | Tidal and wave energy are still at a pre-commercial stage—for this, we considered them, but screened them out of the analysis for now. However, the recommended framework allows bringing them in (like any technology) as soon as they become viable |
| Can ANGLEC explore using both distributed and utility scale renewables, adjusting the mix gradually to include innovative options? | Mr. Som Chandra | Yes. The recommended framework would allow planning the right mix and implementing it based on what gradually becomes technically and economically viable, as well as possible for the system |
| Least cost planning is not a black/white matter, and requires attention to many things | Mr. David Gumbs | Yes. For example, it should be done considering a prudent diversification of the generation portfolio, and consider various oil price assumptions |
| ANGLEC's electricity costs are similar to those in other countries in the region, not the highest in the region or the world | Mr. David Gumbs | Yes. Costs and prices of generation are generally high in the Caribbean mostly due to small size of plants and imported diesel. ANGLEC's values are within the regional range |

# Wrap Up: Land Use, the Environment, and Development (slide 1 of 3)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| The right to request an Environmental Impact Assessment for development applications has been challenged as illegal. Is it? | N/A | It is a reasonable exercise of the power to request information under the Land Development (Control) Regulations |
| Did you mandate a local preference for skilled labor to work on renewables? | Mr. Connor | No. It would be an unnecessary market limitation for something that already makes sense. Also, ANGLEC noted that it already practices this policy |
| You can't put all renewable energy in one site because not all resources are best available there, and there is a tradeoff over what to use the land for (RE, hotels, golf-course, other) | Mr. Kennedy Hodge | Correct. Where renewable projects are located depends on the availability of the resource there; there will be competing uses for the land |
| Recommending that Anguilla recognize a certification for professionals in the field of renewables—wouldn't that be a conflict of interest or an undue discrimination? | Mr. Kasseem Forde | Certified professionals wouldn't be a closed group just based on one certification—but an open group updated on rolling basis, and compliant with any good certification |
| To inspect the interconnection for distributed renewables, there is already a Government inspector. Do you recommend that it be ANGLEC instead? | Mr. Kasseem Forde | Whoever is the competent authority should keep on doing it—just making sure that he or she can deal with distributed renewables too. Usually, government and utility cooperate to make it work well |

# Wrap Up: Land Use, the Environment, and Development (slide 2 of 3)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| Are the recommendations just a fast track to renewable energy development? If so, should we try to do renewable energy fast, or do it well? For example, the recommendations leave all ANGLEC's powers in place and limit competition. Is that a good thing? | Mr. Ron Connor | The recommendations suggest how to do renewable energy well in the short term doing minimal changes; and how to keep on doing them well in the medium and long-term too. Parties other than ANGLEC can play a role under the current framework (IPPs or DBOM contractors), or with small changes (households and businesses that should be eligible for the SOC) |
| The presentation referred a lot to poles. Isn't the idea to replace poles with underground conduits? Shouldn't the new rules take into consideration this future change? | Mr. Noel Egan | Yes. The rules would consider any cost for the grid, not necessarily just poles. Also, the rules to acquire statutory rights to land for poles are the same as for conduits |
| The solar and wind plants will also be subject to external laws like the Civil Aviation Authority | Mr. Noel Egan | No. This is a question of local planning approval |
| Are you mandating that when a new building is developed and wants water heating, it be solar? | Mr. Chris Mason | Yes. This means that buildings that do not want water heating would not be forced to put one in |

# *Wrap Up: Land Use, the Environment, and Development (slide 3 of 3)*

| Question or comment | Stakeholder | Reply |
|---|---|---|
| Little or no reference is made to sustainable energy by the Government. We could reduce the load on the grid by making other changes to the building code, like requiring sustainable energy materials to be used in buildings | Mr. Noel Egan | Yes. The building code could mandate energy efficiency (equipment, material, and design) just like it should mandate solar water heaters |
| Could we incorporate a requirement in building codes to make renewables hurricane proof? | Ms. Susan Hodge | Some requirements could help (proper installation), and homeowners' insurance could help manage the risk. However, one cannot really ensure that anything can be fully hurricane proof |
| How much land would be required to meet peak demand with solar? | N/A | Generally, about 4-5 acres of land are required per Megawatt installed |

# Wrap Up: Selling Electricity from Renewables (slide 1 of 2)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| What kind of meters should be used? | Mr. Ranjith Kumara | Bidirectional meters that measure and bill two flows separately: that bought from ANGLEC (retail rate), and that sold to ANGLEC (SOC rate at avoided cost). Also, ANGLEC is introducing an advanced metering system (AMS) over next 3-5 years |
| What are the guarantees that ANGLEC will purchase the excess electricity? | Ms. Susan Hodge | An enforceable Standard Offer Contract between ANGLEC and the customers, issued following ANGLEC's Corporate Rules |
| Is a 15% penetration for renewables high based on your experience? Did you recommend a specific penetration percentage? What if just one big entity takes it up? | Ms. Trudy Nixon | It is relatively high (but note: it combines utility and distributed scale). This study didn't look into which cap should be implemented—it is not a technical study. A big entity would not be at distributed scale, but would enter separately at utility scale; it would not 'eat up' any part of the cap |
| A 15% cap is not enough in the long term, and would set up ANGLEC for failure. Tuvalu Island gets funding to go 100% renewables | Mr. Sutcliffe Hodge | It can be an adjustable target based on technical and economic factors. The total cap is a dynamic concept—can upgrade the grid, and once that is done, can increase the cap to what is technically/economically feasible |

# *Wrap Up: Selling Electricity from Renewables (slide 2 of 2)*

| Question or comment | Stakeholder | Reply |
|---|---|---|
| Can customers benefit from the cheaper costs of utility scale renewables? | Mr. Peter Quinn | Yes. Just like the pass-through of fuel, cost savings would also have to be passed through to customers |
| If a customer generates some of his or her own electricity with renewables, will he or she still have to pay the other tariffs for energy, capacity, and connection? | Mr. Connor | Yes. In general, customers would pay for services they use, and not pay for services they do not use |

# *Wrap Up: Other Comments (slide 1 of 3)*

| Question or comment | Stakeholder | Reply |
|---|---|---|
| What financing instruments are available to promote sustainable energy? | Mr. David Gumbs | Tools include low-cost loans; risk sharing/loan guarantee facilities for banks; and grants for feasibility studies |
| The framework should ensure that ANGLEC remains sustainable to provide electricity to the poor, since the poor cannot access credit or funds to install renewables | Mr. Calvin Richardson | Access to finance for the upfront investment is difficult indeed. The framework recommended actually would see ANGLEC benefit all customers, not just the poor—because it is convenient to the country as a whole to have a financially viable power utility, and for no other reason. That said, a lifeline tariff for the poor is also possible to ensure special attention to affordability |
| Why isn't the UK promoting renewables in Anguilla and claiming the carbon credits against its own targets? France is doing it with Martinique | Mr. Chris Mason | One reason is that Martinique is French metropolitan territory, not an overseas territory. Another reason may be that until now there was no assessment—hopefully this study can help fill that gap (in particular the $CO_2$ abatement curve), and help secure some funding thanks to a solid analysis |
| Anguilla needs awareness about certified suppliers and the cost of products | Mr. Leyroy Hill | Government and AREO could try to secure funds for awareness campaigns and printed/online information |

# Wrap Up: Other Comments (slide 2 of 3)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| There is a problem with ANGLEC's monopoly, in that it limits competition | Mr. Noel Egan | In renewable generation, there would not be a monopoly—IPPs, DBOM contractors, and households and businesses eligible for the SOC could all contribute with renewables. Transmission and distribution are natural monopolies (a second grid makes no sense) |
| ANGLEC has 15 MW of peak demand. With such a small system, a generation monopoly makes sense given the economies of scale. A bigger diesel unit can generate more efficiently than smaller RE systems | Mr. Sylvan Brooks | Large diesel units are far more efficient than small ones. There will be also economies of scale for renewables. As said, however, renewable generation would not be a monopoly (IPPs, DBOM contactors, and eligible SOC customers could participate) |
| In 2-3 years the cost of solar PV and batteries may drop significantly. Renewable energy generation should not be ANGLEC-centric, but market driven | Mr. Kennedy Hodge | Customers can already do solar PV (and solar water heating) and save money. ANGLEC will always enjoy economies of scale to do renewables compared to customers, but will also be interested in buying from third parties (large and small) at a convenient cost |
| Although monopolies should be avoided in principle and distributed renewables should be enough in the future, Anguilla would still need ANGLEC to supply poor and businesses | Mr. Kennedy Hodge | There is likely to be a financially viable role for many actors in Anguilla's power sector—ANGLEC, IPPs, contractors, and large and small generating customers. It is a win-win scenario |

# Wrap Up: Other Comments (slide 3 of 3)

| Question or comment | Stakeholder | Reply |
|---|---|---|
| ANGLEC should find a way to reduce electricity costs, using renewables, since it can do it best and at the least cost | Mr. David Carty | Yes. The recommended Corporate Rules aim to ensure precisely that—and in addition, customer-owned generation can play a role, as long as it gets avoided cost (no more, but no less either) |
| Government should take a sensible approach to reduce costs for the country as a whole and not just individuals | Mr. David Carty | Yes. That is the priority of the Government, and that is why economic viability (that is, reducing electricity costs to all customers) is the key criterion |
| Sustainability should be a general approach beyond just electricity. Anguilla as a country should brand itself as sustainable, focusing in particular on climate change mitigation and adaptation | Mr. David Carty | Yes—this assignment focuses on electricity, but sustainability matters more broadly. The carbon abatement curve for electricity shows that key options to avoid $CO_2$ in Anguilla can also save the country money—it is one concrete step in that direction |
| Anguilla went from gas and kerosene lamps to electricity that became affordable to all Anguillans. Renewables need to be done, but electricity should remain affordable to people | Mr. Desmond Gumbs | Yes—regarding renewables, ensuring affordability and doing more renewables are complementary goals since there are a number of renewable options available that will reduce generation electricity costs, making it more affordable in Anguilla |

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