

Capacity Building on Development of Bankable Renewable Energy PPAs in Caribbean SIDS

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DAY 3: ALLOCATING RISKS THROUGH PPA CONTRACTS



Recap of Day 2

- > PPA tariff
- > Committed energy and capacity
- > Incentives/penalties
- > Payment lag
- > Indexing

Curtailment		
<i>*During PPA contract period</i>		
Choice of remuneration for curtailment		No compensation ▼
Level of curtailment (% of Net AEP)		3%
Late commissioning		
Delay in commissioning (years)	<input type="checkbox"/> FALSE	1
Late commissioning penalty (USD/year/MW)	<input type="checkbox"/> FALSE	100,000
Inflation rate		
Inflation on OPEX	<input checked="" type="checkbox"/> TRUE	
Over-/underproduction		
include		
Committed AEP (GWh)		159
Penalty for underproduction (USD/MWh)	<input type="checkbox"/> FALSE	130
Tariff for overproduction (USD/MWh)	<input type="checkbox"/> FALSE	93
PPA tariff		
PPA tariff	USD/MWh	93
Payment schedule		
Capacity Credits		
Activate annual variability in capacity factor	<input type="checkbox"/> FALSE	
Comitted capacity factor (% of nominal capacity)		31%
Capacity remuneration (USD/MW/year)	<input type="checkbox"/> FALSE	10,000
Penalty for shortfalls (USD/MW/year)	<input type="checkbox"/> FALSE	10,000

Day 3

Allocating risk through PPA contracts

- > Roles and needs of different stakeholders in PPA design
- > Issues and best practices related to competitive procurement processes and contract negotiations related to PPA contracts
- > Public funding during project construction and/or operations
- > Energy auctions role playing games
 - > How PPA contract design impacts technology choice
 - > Technology neutral auctions
 - > Technology specific auctions

Stakeholders of PPA negotiations

Government

- > Expansions of renewable electricity generation is often driven by public policy
 - > Climate
 - > Independence from fossil fuels
 - > Costs
 - > Public funding of RE projects is also very common
 - > In case of higher LCOE of RE
 - > Subsidized electricity prices in general
 - > Politically regulated energy prices can impact the utility/offtaker's creditworthiness
- > The needs of the government relate to:
 - > Development of renewable energy
 - > Implementation of policy by the regulator and utility

Regulator

- > The executing branch of the government responsible for:
 - > Implementing policy
 - > Ensure fair market conditions and market behaviour – even in a concession/monopoly
 - > Enforcing legislation
 - > Basically defines the playing field for utilities and IPPs/developers
 - > Providing permits
 - > Approving contractual agreements impacting tariffs and energy supply
- > The needs of the regulator are related to information
 - > Clear communication with utilities
 - > Clear role definitions perhaps enforced by law

Utility company

- > Can be split into 3 roles
 - > Generator
 - > Grid operator
 - > Balancing responsible
- > Those above 3 roles are often bundled, but need not be so
- > Going from sole generator to joint generator with an IPP can be a challenge
 - > The Utility retains grid operations and balancing responsibilities while the IPP is more “free”
 - > Loss of control
- > The need on the Utility side is mainly related to:
 - > clarity on timing of grid connection and reliable forecasting of production from the project
 - > Support from Regulator and Government in terms of tariff, contract negotiations, analytical input
 - > Demonstration of creditworthiness will be a challenge if there are political restrictions on tariffs yet no financial backup

Financial Institutions

- > Provide a significant amount of the overall financing of the project
 - > Financial Institutions take risk directly on the SPV (i.e. on the cash flow from the project)
 - > No security outside the project – no recourse
 - > Need for very detailed documentation of the project and all its related risks
 - > Feasibility studies, due diligences and verifications
 - > May bring substantial experience to the table to the benefit of all – and frustration
- > Typical requirements include:
 - > Debt/equity ratio will normally be in the range of 80/20 – 70/30.
 - > Debt service coverage ratio (DSCR) in the 1.3+ range depending on risks
 - > Energy production assumptions based on P90 or sometimes P95.
 - > Extensive due diligence
 - > Use their experience

RE developers

- > Normally the driver of developing the project
 - > In some cases a developer may be "hired in" to do the project development
- > Responsible for raising and arranging the financing for the project.
- > The RE developer and the independent power producer need not be the same
- > Most important needs relate to:
 - > Clarity and surety of the regulatory framework including PPA conditions
 - > Permits
 - > Access to adequate transmission capacity to minimize risk to minimize risk of curtailment
 - > A reasonable return on investment, i.e. Equity IRR. Reasonable relative to the risks

Consumers

- > Consumers are the ones that ultimately benefit from the production and supply of electricity
- > In some cases, the consumption of electricity can be related directly to economic activity
 - > Example: production of goods
- > In other cases the benefits are difficult to monetized
 - > Example: the value of lighting for reading a book
- > The tariff which the consumers pay for electricity is not always aligned with the cost of producing and delivering the electricity
- > Electricity is often seen as a base necessity
 - > This leads to very little reaction to the price of electricity
- > In lower percentile income households a higher tariff on electricity can have a significant impact on the household economy
- > This often leads to discussions on which consumer groups should carry the burden of increased production costs
 - > Politically regulated prices on electricity

Networking and discussion forum

- > Split into groups depending on your role
 - > Regulator (Government)
 - > Utility
 - > IPP
 - > Consumer
- > Questions to discuss – take turns
 - > What is your biggest challenge right now?
 - > What considerations have you gone through in that context?
 - > Any specific solutions you are considering?
 - > What is your highest priority as an institution?



Key principles in risk allocation via PPAs

- > Most risk are allocated, not “created or deleted”
- > Allocating risk leads to change in bidder behaviour (including risk premiums)
- > Perceived risk and actual risk can be very different
 - > Knowledge tends to bring the two closer together
 - > So does the ability to manage/control the risk
- > Each of the PPA contract terms mentioned lets us allocate risk to the developer (or not)
- > Before simply allocating risk it is important to consider where that risk is best managed
- > The Excel model provides the opportunity to assess the impact on the PPA tariff of allocating risk to the developer

Typical RE project risks

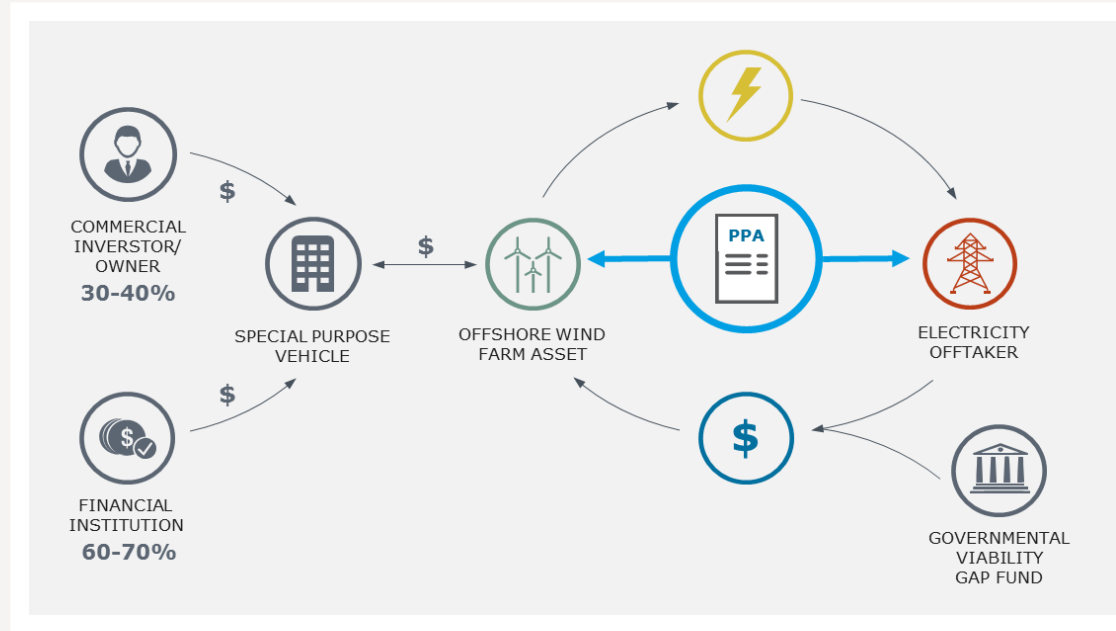
Risk type	Examples	Allocation/mitigation
Technology risks	Choice of technology, detailed design, technical life, design performance, local conditions	Developer Off-taker may have specific wishes for technology and performance
Default on debt risk	Challenges to cash flow, delayed payments, delays in COD, cost overruns	Guarantees provided by IFIs Thorough financial due diligence by local FIs and IFIs Requirements on Debt/equity ratio and DSCR
Operational risk	Malperformance, downtime	Developer/IPP
Off-taker risk	Curtailement, credit worthiness	Government and IFIs may provide guarantees Curtailement may be shared by off-taker and IPP
Currency risk	Inflation, exchange rate, rising tariff levels over PPA contract duration	Government Typically, through indexing of PPA tariffs PPA contracts in USD can become very expensive for local government
Regulatory risks	Permissions, land ownership and access	Use of "One stop shopping" for developers reduces risk and speeds up process Government long term commitment is important
Environmental risk	Pollution, animal habitats, fragile ecosystems	Developer must be held accountable during construction and O&M Clear environmental requirements in contracts Monitoring by local government

What risks are the developers familiar/comfortable with – and not?

- > Variable generation and commitments
 - > They know their technology
 - > Depends on the time resolution
- > Construction time
 - > At least partially in their control
- > Curtailment
 - > Partially within limits it is a base condition
 - > But developer has little influence on grid strengthening, dispatching choices etc..
- > Inflation
 - > Outside their control
- > Payment lag
 - > Highly critical for financing
 - > Speaks to the creditworthiness of the off-taker
- > Real time balancing responsibility
 - > Most RE is not suited for dispatchable generation

Public co-funding & grants

Likely need for gap funding



Pay-as-you-go

- > Pay out the difference between PPA tariff and Base tariff on a per MWh basis
 - > Sometimes called Generation Based Incentive (GBI)
- > Spreads out the government/public expenditure over many years
- > Easy to manage and rationalize
 - > “A small premium to get RE”

Investment incentive

- > Pay out a subsidy on CAPEX to achieve a PPA tariff equal to the Base tariff
 - > Sometimes called an Investment Tax Credit (ITC)
- > Requires substantial public funding up front
- > Issues of ownership of assets

Why not GBI?

- > GBI is the more expensive solution
- > NPV of GBI is higher than NPV of the Investment Incentive
- > Money up front is worth more than money later

Grants

- > Grants are common for pilot projects
- > They can replace or supplement private equity
- > Can be used as an investment incentive
 - > What size grant would we need?
- > Alternative to equity
 - > We have a grant to cover the 30% equity
 - > What will the PPA price be?

Exercises Day 3

Public funding

Government incentives

- > Removing Value added taxes (VAT), duties and production tax credits (PTC). Can work as government incentives. (*rows 119 and 120*)
 - > PTC is a fixed value per MWh net AEP
- > If the PPA tariff is still higher than the Base tariff, government funding may be needed (GBI or investment subsidies)

Tax incentives		
VAT	<input type="checkbox"/> FALSE	VAT excluded
Duties	<input type="checkbox"/> FALSE	Duties excluded
PTC (USD/MWh)	<input type="checkbox"/> FALSE	<input type="text" value="5"/>

GBI vs Investment subsidy

- > Goal seek the PPA tariff
 - > Use the "Calculate Investment Subsidy" button in row 130
- > Include only investment subsidy
 - > Row 128
- > Indicate a Base tariff lower than the PPA tariff
 - > Row 127
- > Calculate the investment subsidy
- > Select and deselect first the GBI and then the investment subsidy to compare the NPV of the two options.

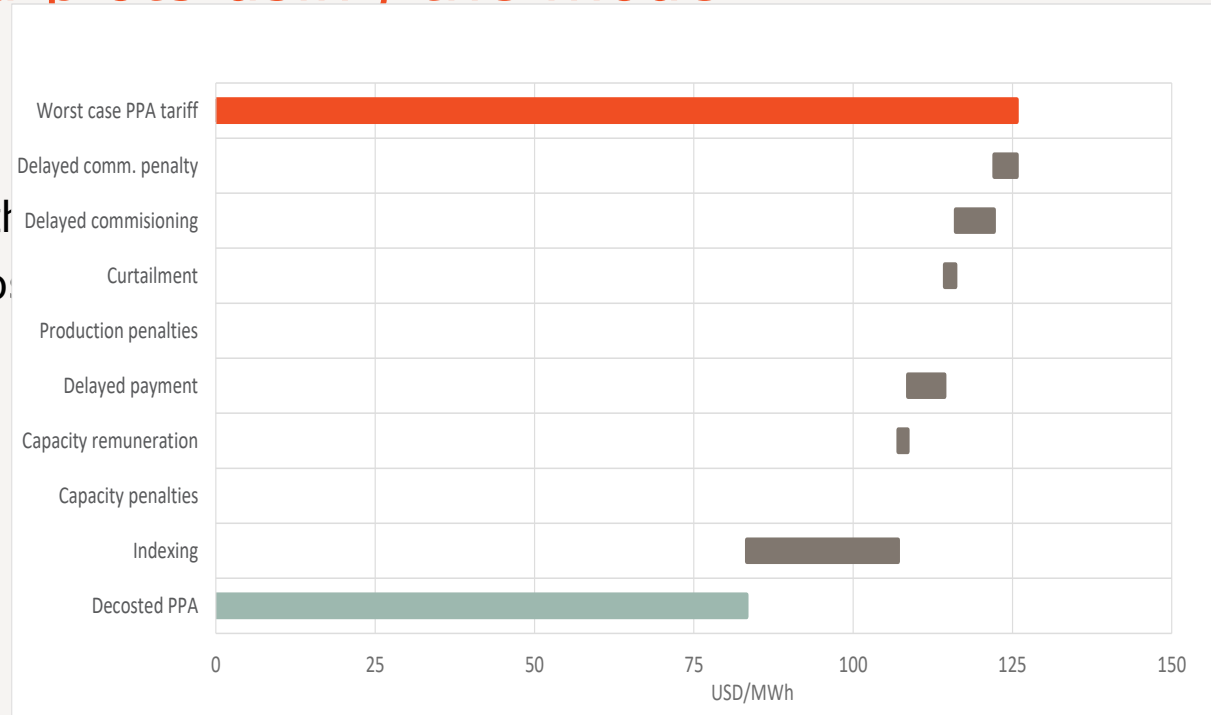
Viability gap funding		
Base tariff	USD/MWh	<input type="text" value="100"/>
GBI (USD/MWh)	<input checked="" type="checkbox"/> TRUE	
Investment subsidy	<input checked="" type="checkbox"/> TRUE	<input type="text" value="29%"/>

NPV GBI	686,501,787
NPV Investment subsidy	633,702,571

Creating advanced plots using the model

Creating advanced plots using the model

- > Decosting the PPA tariff
 - > removing risks from the contract
 - > Visualisation of the cost of contract terms



Establish the base

- › Make sure all basic data on the project are in place
 - › Technology (*row 9*)
 - › Uncertainty (*row 9*)
 - › Construction start and duration (*row 14 and 15*)
 - › Technical life (*row 16*)
 - › CAPEX and OPEX (*CAPEX & OPEX*)
 - › Energy production (*Technical data*)
 - › Curtailment level (*from row 85*)
 - › Funding: Loans and equity (*from row 133*)

Activate worst case/most expensive PPA contract

- > Find reasonable values for penalties and remuneration
 - > Underproduction costs base tariff?
 - > (row 98)
 - > Overproduction only paid base tariff?
 - > (row 99)
 - > Compensation for curtailment?
 - > (rows 87 and 90)
 - > Level of committed energy?
 - > (row 97)
 - > Capacity remuneration?
 - > (row 105)
 - > Penalty for delayed commissioning 5% of CAPEX/MW?
 - > (row 112)

Create decosting PPA

Scenario title	PPA tariff
Worst case PPA tariff	100
Delayed comm. penalty	96
Delayed commissioning	91
Curtailment	89
Production penalties	89
Delayed payment	83
Capacity remuneration	82
Capacity penalties	82
Indexing	64
Decosted PPA	64

RE auctions

Bidding under different PPA designs

Technology neutral auction

- > 1 group per table
- > One technology each
- > 2 MW capacity
- > Bid submission on paper
 - > Group name
 - > Technology
 - > Bid in USD/MWh
- > Use the special version model sent to you today
- > You only need to change PPA setup and technology during this exercise
 - > Hint: and maybe IRR of equity?

Tender 1

- > 2 MW capacity
 - > PPA length 25 years
 - > Inflation on OPEX
 - > 3% indexing of PPA tariff per year for 25 years
 - > 6 month delay in payment
 - > 3% curtailment compensated at 30 USD/MWh
 - > Penalty for underproduction 0 USD/MWh
 - > Tariff on overproduction 0 USD/MWh
 - > Capacity remuneration 0 USD/MW/year
 - > Penalty for capacity shortfall 0 USD/MW/year
 - > No delay in commissioning
- > Bids based on deviations from PPA terms will be disqualified
 - > Lowest PPA tariff wins
 - > Bids with DSCR under 1.3 are rejected
 - > Hint: Use the custom scaling of DSRA

Tender 2 – PPA terms

- > 2 MW capacity
 - > PPA length 25 years
 - > Inflation on OPEX
 - > 3% indexing of PPA tariff per year for 25 years
 - > 6 month delay in payment
 - > 3% curtailment compensated at 30 USD/MWh
 - > Penalty for underproduction 90 USD/MWh
 - > Tariff on overproduction 90 USD/MWh
 - > Capacity remuneration 0 USD/MW/year
 - > Penalty for capacity shortfall 0 USD/MW/year
 - > No delay in commissioning
- > Bids based on deviations from PPA terms will be disqualified
 - > Lowest PPA tariff wins
 - > Bids with DSCR under 1.3 are rejected
 - > Hint: Use the custom scaling of DSRA



Tender 3 - All solar

- > Same groups
- > 2 MW capacity
- > Bid submission on paper
 - > Group name
 - > Bid in USD/MWh
- > Use the special version model sent to you today
- > You only need to change PPA setup during this exercise
 - > Hint: and maybe IRR of equity?
- > Bid should be based on Annual time series.

I want 60 USD/MWh

Tender 4

- > 2 MW capacity
 - > PPA length 25 years
 - > Inflation on OPEX
 - > 3% indexing of PPA tariff per year for 25 years
 - > 6 month delay in payment
 - > 3% curtailment compensated at 60 USD/MWh
 - > Penalty for underproduction 140 USD/MWh
 - > Tariff on overproduction 140 USD/MWh
 - > Use yearly data and penalties for shortfall TRUE
 - > Capacity remuneration 10000 USD/MW/year
 - > Penalty for capacity shortfall 20000 USD/MW/year
 - > No delay in commissioning
- > Bids may suggest alternative PPA contracts
 - > Closest to 60 USD/MWh wins
 - > Bid based on Annual time series of energy generation
 - > Bids with DSCR under 1.3 are rejected
 - > Hint: Use the custom scaling of DSRA

Shock !

Prices are going up and some one has to pay!

Inflation is running rampant

- > The PPA tariff has doubled
- > Some one has to pay
 - > Government (subsidies)
 - > Consumers (base)
 - > Investors (IRR / IRRe)
- > The regulator is the mediator
 - > Doesn't want power plants to go bankrupt
 - > Doesn't want subsidies that are too high
 - > Doesn't want consumers to pay too much
- > In your groups with your existing role (or swap if you like)
- > Prepare your "negotiation strategy" – 10 minutes
 - > What are your ideal outcomes? (subsidies, tariffs, returns, other)
 - > Any red lines?
 - > How will you negotiate
- > Negotiate in groups
- > Each person presents position (10 mins total)
- > Negotiate! (15 minutes)
 - > Regulator is the mediator and records all agreements