Renewable PPA Tool Set

Agenda

09:00 am – Guest arrival & Registration

09:30 am – Welcome

09:45 am – BRC-A presentation

10:00 am – UNSW PPA case study

10:20 am – Tool presentation

10:40 am – Tool demonstration

11:00 am – Morning tea

11:30 am – Hands on with the tool
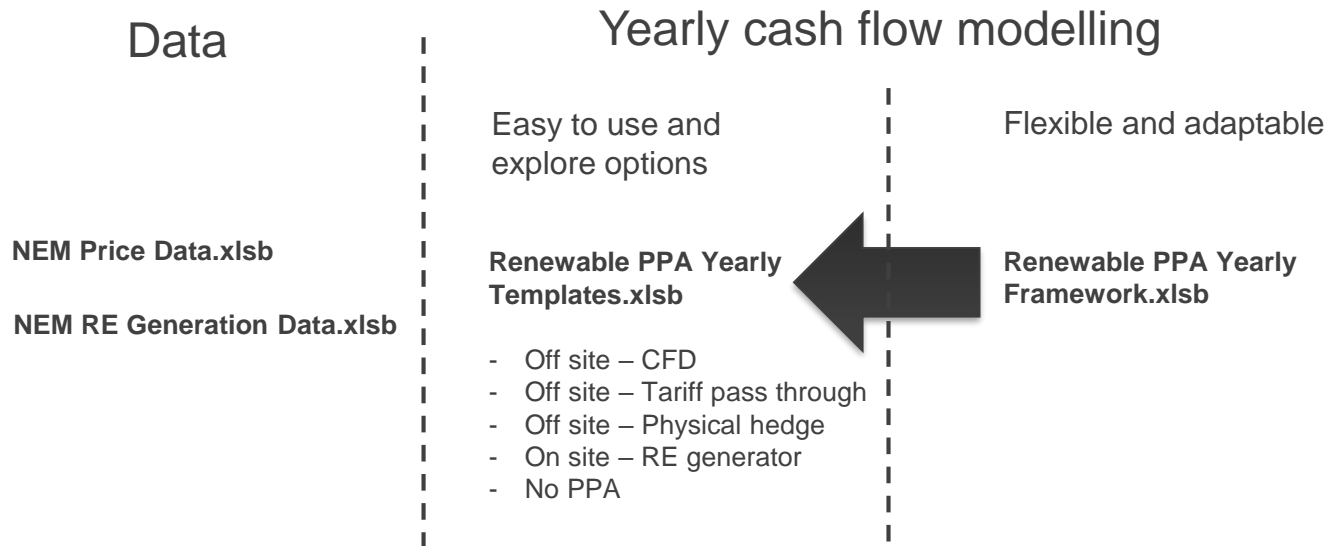
12:30 pm – Lunch to be served

01:00 pm – Event to conclude

Centre for Energy and
Environmental Markets

PPA modelling: motivation and challenges

- The contractual rather than physical nature of PPAs allows for a potentially broad range of implementations (flexible but complex)

  – This seems to be reflected in the deals being made

- Despite the broad range of potential contract structures the specifics are what determine the financial outcomes (ad hoc risk analysis)

- Deals can be one offs for the energy user, so there may be a lack of in-house expertise (barrier).

Centre for Energy and Environmental Markets

Our approach

Data

Yearly cash flow modelling

Easy to use and explore options

Flexible and adaptable

NEM Price Data.xlsb

NEM RE Generation Data.xlsb

Renewable PPA Yearly Templates.xlsb

- Off site – CFD
- Off site – Tariff pass through
- Off site – Physical hedge
- On site – RE generator
- No PPA

Renewable PPA Yearly Framework.xlsb

All MS Excel based, no hidden tabs, no locked cells, no calculations done in VBA

Centre for Energy and Environmental Markets

Data workbooks: NEM Price Data

Data Selection						
Region	NSW1	VIC1	NSW1			
Historical Base Year	2018					
Scaling Factor	1	1	1	1	1	1

Price ($/MWh)						
Datetime	NSW1	VIC1	NSW1	0	0	0
1/01/2018 0:30	91.86	92.46	91.86			
1/01/2018 1:00	88.83	87.62	88.83			
1/01/2018 1:30	73.62	73.08	73.62			
1/01/2018 2:00	71.49	70.18	71.49			
1/01/2018 2:30	69.27	67.43	69.27			
1/01/2018 3:00	68.44	66.31	68.44			
1/01/2018 3:30	69.67	67.72	69.67			
1/01/2018 4:00	67.58	65.5	67.58			
1/01/2018 4:30	67.09	64.5	67.09			
1/01/2018 5:00	67.53	65.41	67.53			
1/01/2018 5:30	65.8	63.66	65.8			
1/01/2018 6:00	61.53	59.9	61.53			
1/01/2018 6:30	66.62	64.67	66.62			

Centre for Energy and Environmental Markets

Data workbooks: NEM RE Generation Data

Scale output:	FALSE	Scale Capacity to:	100.0 MW

SETTLEMENTDAT ▾	Station Name ⊤	AVERAGE MW ▾	REGISTEREDCAPACITY (MW) ▾
1/01/2018 0:30:00	Broken Hill Solar Plant	0	53
1/01/2018 1:00:00	Broken Hill Solar Plant	0	53
1/01/2018 1:30:00	Broken Hill Solar Plant	0	53
1/01/2018 2:00:00	Broken Hill Solar Plant	0	53
1/01/2018 2:30:00	Broken Hill Solar Plant	0	53
1/01/2018 3:00:00	Broken Hill Solar Plant	0	53
1/01/2018 3:30:00	Broken Hill Solar Plant	0	53
1/01/2018 4:00:00	Broken Hill Solar Plant	0	53
1/01/2018 4:30:00	Broken Hill Solar Plant	0	53
1/01/2018 5:00:00	Broken Hill Solar Plant	0	53
1/01/2018 5:30:00	Broken Hill Solar Plant	0	53
1/01/2018 6:00:00	Broken Hill Solar Plant	0.17	53
1/01/2018 6:30:00	Broken Hill Solar Plant	1.28	53
1/01/2018 7:00:00	Broken Hill Solar Plant	2.97	53
1/01/2018 7:30:00	Broken Hill Solar Plant	8.48	53
1/01/2018 8:00:00	Broken Hill Solar Plant	16.37	53

Datetime	Energy (kWh)
1/01/2018 0:30:00	0
1/01/2018 1:00:00	0
1/01/2018 1:30:00	0
1/01/2018 2:00:00	0
1/01/2018 2:30:00	0
1/01/2018 3:00:00	0
1/01/2018 3:30:00	0
1/01/2018 4:00:00	0
1/01/2018 4:30:00	0
1/01/2018 5:00:00	0
1/01/2018 5:30:00	0
1/01/2018 6:00:00	85
1/01/2018 6:30:00	640
1/01/2018 7:00:00	1485
1/01/2018 7:30:00	4240
1/01/2018 8:00:00	8185

Centre for Energy and
Environmental Markets

Renewable PPA Yearly Templates workbook – Data input

Party Scenario ID	Inputs				
	1Input Load	1RE Generator	2Input Load	2RE Generator	3Input Load
Scenario	1	1	2	2	3
Party	Input Load	RE Generator	Input Load	RE Generator	Input Load
Datetime	Energy (kWh)				
1/01/2018 0:30	7171	0			
1/01/2018 1:00	7102	0			
1/01/2018 1:30	7843	0			
1/01/2018 2:00	7586	0			
1/01/2018 2:30	7132	0			
1/01/2018 3:00	8385	0			
1/01/2018 3:30	7161	0			
1/01/2018 4:00	7638	0			
1/01/2018 4:30	8104	0			
1/01/2018 5:00	7740	0			
1/01/2018 5:30	7553.75	0			
1/01/2018 6:00	7528.97	85			
1/01/2018 6:30	7434.83	640			
1/01/2018 7:00	7373.7	1485			
1/01/2018 7:30	7362.93	4240			

Renewable PPA Yearly Templates workbook – Scenarios

Scenario ID	1	2	3	
Region	NSW1	NSW1	NSW1	
Datetime				
1/01/2018 0:30	91.86			
1/01/2018 1:00	88.83			
1/01/2018 1:30	73.62			
1/01/2018 2:00	71.49			
1/01/2018 2:30	69.27			
1/01/2018 3:00	68.44			
1/01/2018 3:30	69.67			
1/01/2018 4:00	67.58			
1/01/2018 4:30	67.09			
1/01/2018 5:00	67.53			
1/01/2018 5:30	65.8			
1/01/2018 6:00	61.53			
1/01/2018 6:30	66.62			
1/01/2018 7:00	68.42			
1/01/2018 7:30	69.02			
1/01/2018 8:00	69			

Centre for Energy and Environmental Markets

Renewable PPA Yearly Templates workbook – Templates

Select PPA template

Select active template:	No PPA

Provide PPA details

Off-site - Contract for Difference			
Off-site - Tariff Pass Through			
Off-site - Physical Hedge			
On-site RE Generator			
No PPA			
		Scenarios	
	1	2	3
Wholesale Price ID	NSW1		
Wholesale Exposure Volume	RE Uptill Load		
PPA Volume	RE Uptill Load		
PPA Price	60		
Excess RE Purchase Price ($/MWh)	45		
Excess RE Sale Price ($/MWh)	45		
LGC Volume Type	RE Uptill load		
LGC Purhcase Volume (MWH, Fraction)			
LGC Purchase Price ($/MWH)	10		
Yearly Target (MWh)	150000		
Yearly Short Fall Penalty ($/MWh)	50		
Yearly LGC target (LGC)	10000		
Yearly LGC short fall penalty ($/LGC)	10		

Select PPA template

Select active template:	Off-site - Contract for Difference

Provide PPA details

Off-site - Contract for Difference			
Off-site - Tariff Pass Through			
Off-site - Physical Hedge			
On-site RE Generator			
No PPA			
		Scenarios	
	1	2	3
Wholesale Price ID	NSW1		
Wholesale Exposure Volume	RE Uptill Load		
PPA Volume	RE Uptill Load		
PPA Price	60		
Excess RE Purchase Price ($/MWh)	45		
Excess RE Sale Price ($/MWh)	45		
LGC Volume Type	RE Uptill load		
LGC Purhcase Volume (MWH, Fraction)			
LGC Purchase Price ($/MWH)	10		
Yearly Target (MWh)	150000		
Yearly Short Fall Penalty ($/MWh)	50		
Yearly LGC target (LGC)	10000		
Yearly LGC short fall penalty ($/LGC)	10		

Centre for Energy and Environmental Markets

Renewable PPA Yearly Templates workbook – MLF

Provide loss factor details

Loss factor details			
	Scenarios		
	1	2	3
Load MLF	1.01		
Load DLF	1.04		
Generator MLF	0.9		
Generator DLF	0.95		

Centre for Energy and
Environmental Markets

Renewable PPA Yearly Templates workbook – Tariff

Provide time of use tariff details

Time of Use Tariffs					
Scenario	Charge Type	Charge Name	Charge Version	Volume Type	Rate
1	Network	Shoulder		Energy ($/MWh)	24.00
1	Network	Off Peak	Weekday	Energy ($/MWh)	15.00
1	Network	Peak		Energy ($/MWh)	30.00
1	Network	Off Peak	Weekend	Energy ($/MWh)	15.00
1	Energy	Off Peak	Weekday	Energy ($/MWh)	65.00
1	Energy	Shoulder		Energy ($/MWh)	75.00
1	Energy	Peak	AM	Energy ($/MWh)	85.00
1	Energy	Peak	PM	Energy ($/MWh)	85.00
1	Energy	Off Peak	Weekend	Energy ($/MWh)	65.00

↑ Expand to set Time of Use Par

Centre for Energy and Environmental Markets

Renewable PPA Yearly Templates workbook – ToU

Renewable PPA Yearly Templates workbook – Flat rates

Provide flat rate tariff details

Flat Rate Charges					
Scenario	Charge Type	Charge Name	Charge Version	Volume Type	Rate
1	Network	Access		Fixed ($/day)	45.00
1	Network	Peak Demand		Max Demand ($/MVA/	50.00
1	Market	NEM Adm		Energy ($/MWh)	0.80
1	Market	NEM Ancillary Serv.		Energy ($/MWh)	0.10
1	Environmental	LREC		Energy ($/MWh)	7.00
1	Environmental	SRES		Energy ($/MWh)	1.00
1	Environmental	NESC		Energy ($/MWh)	1.00
1	Metering and Other	Meter Charge		Fixed ($/day)	1.00

Centre for Energy and
Environmental Markets

Renewable PPA Yearly Templates workbook

Provide load shifting details

Load Shifting			
	Scenarios		
	1	2	3
Battery Capacity (kWh)			
Battery Charging Rate (kW)			
Battery Discharging Rate (kW)			

Press to run calculations (use F9 to run the model from any tab)

Run calculations

Centre for Energy and Environmental Markets

Renewable PPA Yearly Framework workbook

Defining contracts

Inputs					
Scenario ID	Contract ID	Party 1: Buyer	Party 2: Seller	Party 3: RE Generator	
1	Active	Load	Retailer	RE Generator	
2	Active	Load	Retailer	RE Generator	
3	Active	Load	Retailer	RE Generator	

Adding clauses on a contract and scenario basis - Offsite PPA (CFD)

Inputs					Output	
Scenario ID	Contract ID	Strike Price ($/MWH)	Volume (All RE, To Cover Load)	NEM Region	Volume (MWh)	Total Cost
1	Active	60.00	RE Uptill Load	NSW1	64433.77	-$1,393,113.15
2	Active	0.00	0	0.00	0.00	$0.00
3	Active	0.00	0	0.00	0.00	$0.00

Renewable PPA Yearly Framework workbook

Defining contracts

	Inputs			
Scenario ID	Contract ID	Party 1: Buyer	Party 2: Seller	Party 3: RE Generator
1	Active	Load	Retailer	RE Generator
2	Active	Load	Retailer	RE Generator
3	Active	Load	Retailer	RE Generator

Adding clauses on a contract and scenario basis
- Offsite PPA (CFD)
- Onsite PPA
- Tariffs and charges
- LGC Purchasing
- Wholesale Energy
- Penalties

Centre for Energy and
Environmental Markets

Risk Analysis workbook

- Still in the works

- A specialised tool for making it easier to analysis risk over the life of contract

- Talk to Dave if your interested in hearing more.