SUSTAINABLE
ENERGIE PARTNERS

Sustainable Development and Renewable Energy

Achieving Net Zero Emissions Using PPAs

Index

SUSTAINABLE ENERGIE PARTNERS

Who is Sustainable Energie Partners

SUSTAINABLE ENERGIE PARTNERS

- Specialist firm providing end-to-end services for the development, construction, financing and operation of projects
- Arranger and packager of projects
- Investor
- Team of Technical and Financial experts
- Locations in London, Madrid, Sydney and Santiago

Arranger and Packager

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Development Phase	Construction and Operation
• Prepare brief for Utility or Offtaker • Assess size, design and technologies • Prepare IPP Tender • IPP criteria determined by Host • Negotiate with IPPs • Assist Host in IPP selection	• Advise Utility or Host • Prepare EPC Tender • Prepare PPA document • Negotiate PPA tariff and T&Cs • Project Manage construction • Liaise between Utility and IPP • Assist with interconnection and commissioning

Types of Projects

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Generation		Energy Storage Systems (ESS)	
Intermittent	**Baseload**	**Frequency and Intermittency**	**Large Scale**

• Solar
• Wind
• Tidal
• Wave
	• Biomass
	• Waste to Energy
	• Geothermal
	• Tidal Barrage
	• Hydro-mini and large
		• Batteries
		  • Lithium Ion
		  • Flow
		  • Wet - Acid
			• Pumped Hydro
			• Liquified Air
			• Compressed Air

SEP Track Record

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Technology	No. of Projects	Size - MW	Locations
Solar	27	327	UK, France, Germany, Italy , Spain, Chile
Wind	4	237	Australia, Spain
Biomass	5	87	Australia, Poland
Bio-diesel	2	345,000 tonnes	US, Spain

Island Grid Experience

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Tonga – 2 MW Solar Project

- Managed the tender for the selection and negotiation of the IPP
- Managed the due diligence process on tenderers and their equipment
- Negotiated the finance structures including PPA with each tenderer
- Negotiated the PPA
- Managed the construction tenders and commencement of construction

Other Pacific Nations

- Advising on solar, wind, hydro and waste to energy

Other microgrids

- Chile Mining operations

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Pacific Island Grids

Achieving Net Zero – RE Generation

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Total output of emissions from electricity generation, heating and transport is no greater than the emissions removed - no more goes out than goes in

- Reduction - planting forests, reducing deforestation, carbon capture & storage
- Diesel replacement with wind, solar, hydro
- Biomass and WTE are neutral
- No silver bullet - a million individual solutions from generation to demand management and efficiency
- The environmental sustainability revolution has spread to other sectors of life
- Farmers, community gardeners and social workers tend fields and plots
- Self-sufficiency and environmental protection are key goals
- Acquiring energy in diverse ways, including biomass, hydroelectric, solar and wind, waste to energy

Achieving Net Zero – Trading Credits

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- Even though the utility will pay more for renewable energy than it would for something like coal, costs can be contained for consumers.
- It may never be possible to move entirely off diesel or coal due to backup requirements.
- Alternative techniques to adopt are:
  - selling renewable energy credits to others
  - When utilities can't meet RE targets they buy certificates
  - Sign a contract with a wind project and agree to pay them 10 cents a kilowatt hour, sell the renewable energy credit for five cents a kilowatt hour, and that effectively reduces cost of the energy to 5 cents
  - Trade in RE Credits and capitalise on market fluctuations

Achieving Net Zero – Trading Credits

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- **A carbon credit** is a generic term for any tradable certificate or permit representing the right to emit one tonne of **carbon** dioxide or the mass of another greenhouse gas with a **carbon** dioxide equivalent (tCO_2e) equivalent to one tonne of **carbon** dioxide
- **Carbon trading** is an application of an emissions **trading** approach.
- **A carbon credit** is a financial instrument that allows the holder, usually an energy company, to emit one ton of **carbon** dioxide. **Credits** are awarded to countries or groups that have reduced their greenhouse gases below their emission quota.
- **A carbon trade** is an exchange of credits between nations designed to reduce emissions of **carbon** dioxide. The **carbon trade** allows countries that have higher **carbon** emissions to purchase the right to release more **carbon** dioxide into the atmosphere from countries that have lower **carbon** emissions.
- **Carbon trading**, sometimes called **emissions trading**, is a market-based tool to limit GHG. The **carbon** market trades **emissions** under cap-and-**trade** schemes or with credits that pay for or offset GHG reductions. Cap-and-**trade** schemes are the most popular way to regulate **carbon** dioxide (**CO2**) and other **emissions**.

Moving to Zero Diesel

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Average Consumption of electricity for a typical island network

Period	Consumption - MWh
Peak	10
Off-Peak	4
Average Hourly	7
Daily	160
Weekly	1,120
Annual	58,240

If the installed capacity of all RE exceeds the off-peak hourly consumption (or midday consumption) then some ‘’spill’’ will occur.

Moving to Zero Diesel

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Diesel Replacement

- Assume average capacity factor of 35% for combined wind and solar
  - Then 30 MW of installed capacity of RE is required to replace 10 MW of installed diesel - assuming no weather events and consistent irradiation and wind resource.
  - Very costly capex compared with 1/3 the amount of diesel generation.
- In addition to achieve full diesel replacement must cater for weather events
  - Assume a weather event has reduced RE generation from wind and solar to zero
  - Amount of storage required is significant at 160 MWh per day
  - This cannot be supplied by batteries
  - Requires alternative large scale energy storage

Pumped Hydro-Large scale-baseload

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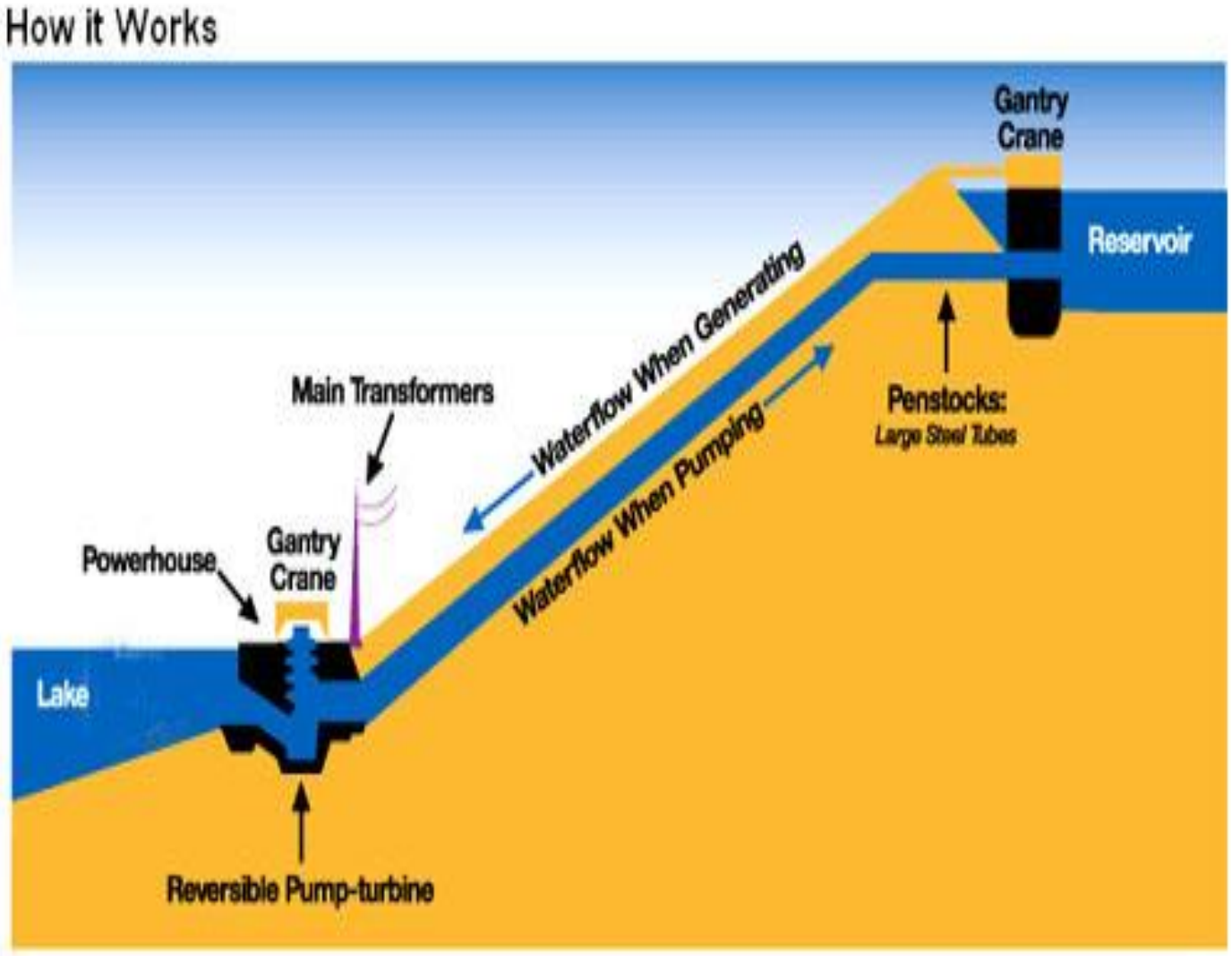

Pumped Hydro-Lower reservoir is ocean

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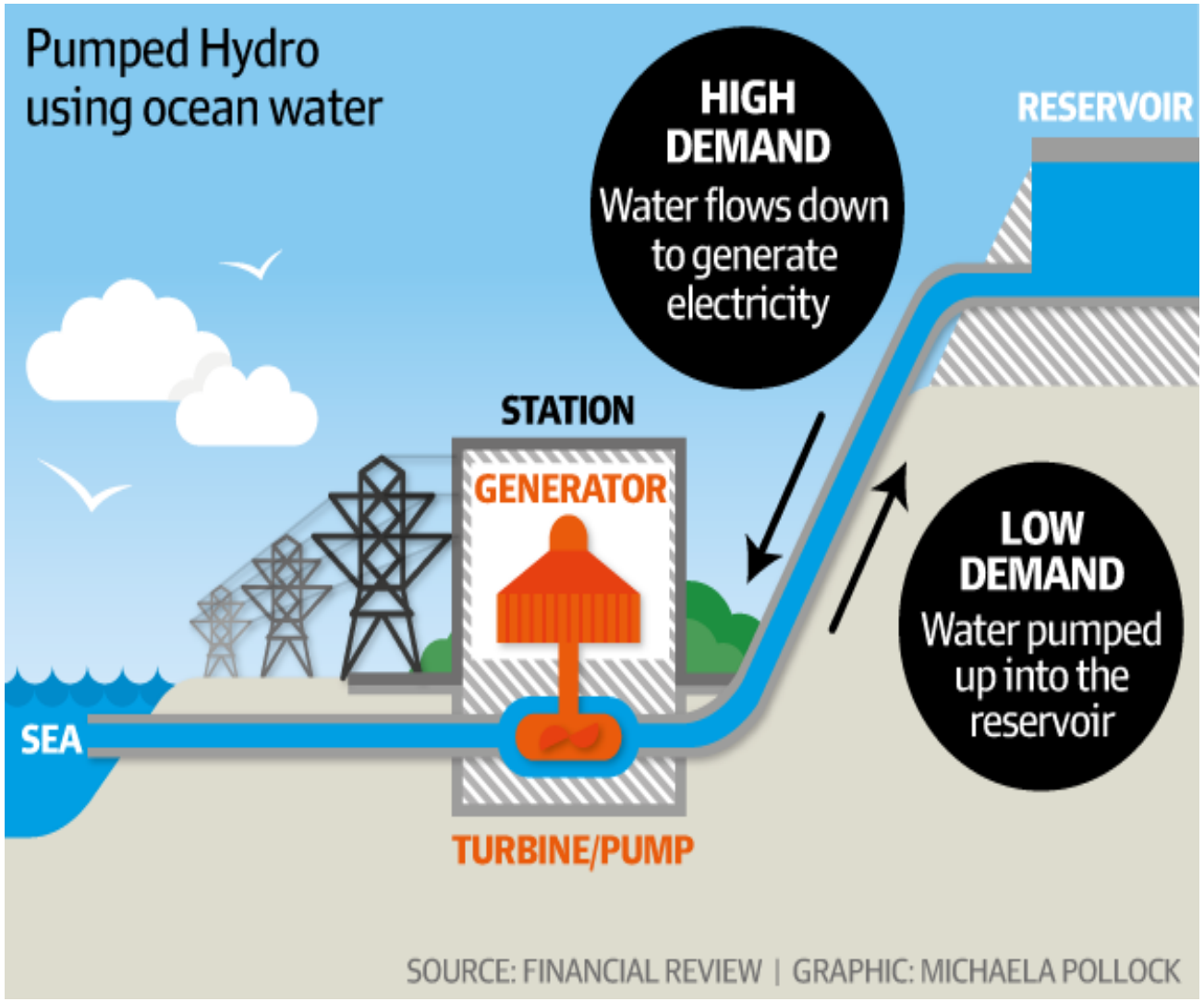

Barrage and Tidal-between islands & inlets

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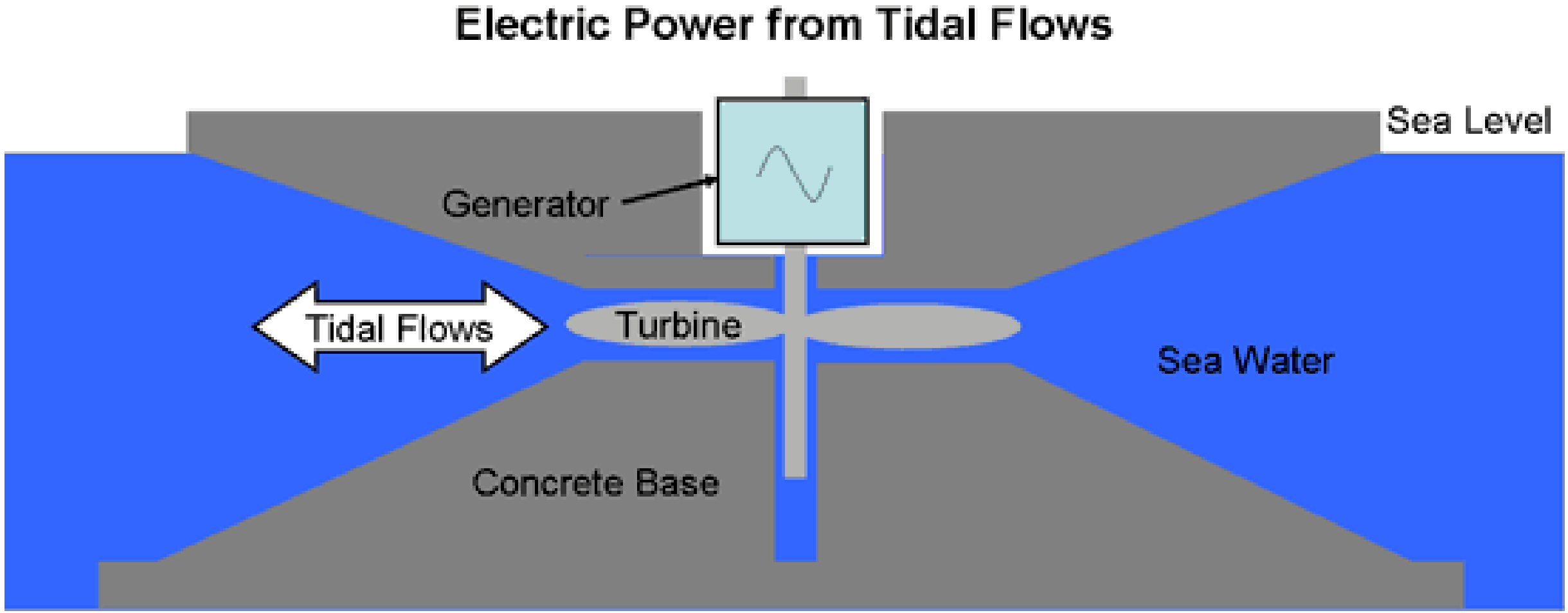

Barrage and Tidal

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Barrage and Tidal

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Waste to Energy - Baseload

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Waste to energy provides environmental clean-up

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Power Purchase Agreements and Other Finance Structures

Types of Finance Structures

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- Self funded
- Bank loan
  - Project Finance-recourse to the asset and its cashflows only. No recourse to shareholders, government, utility
  - Asset loan-recourse to shareholders under guarantees
- Aid Finance
  - Can be conditional
- External Investors
  - Local Pension Fund
  - Private Capital, Green Fund or another Utility
  - Manufacturer/supplier

How to repay external investor

- PPA – fixed or variable tariff for usage , with minimum usage
- Fixed annual payments of P&I
- Variable repayments based upon usage

PPA - Contractual structure

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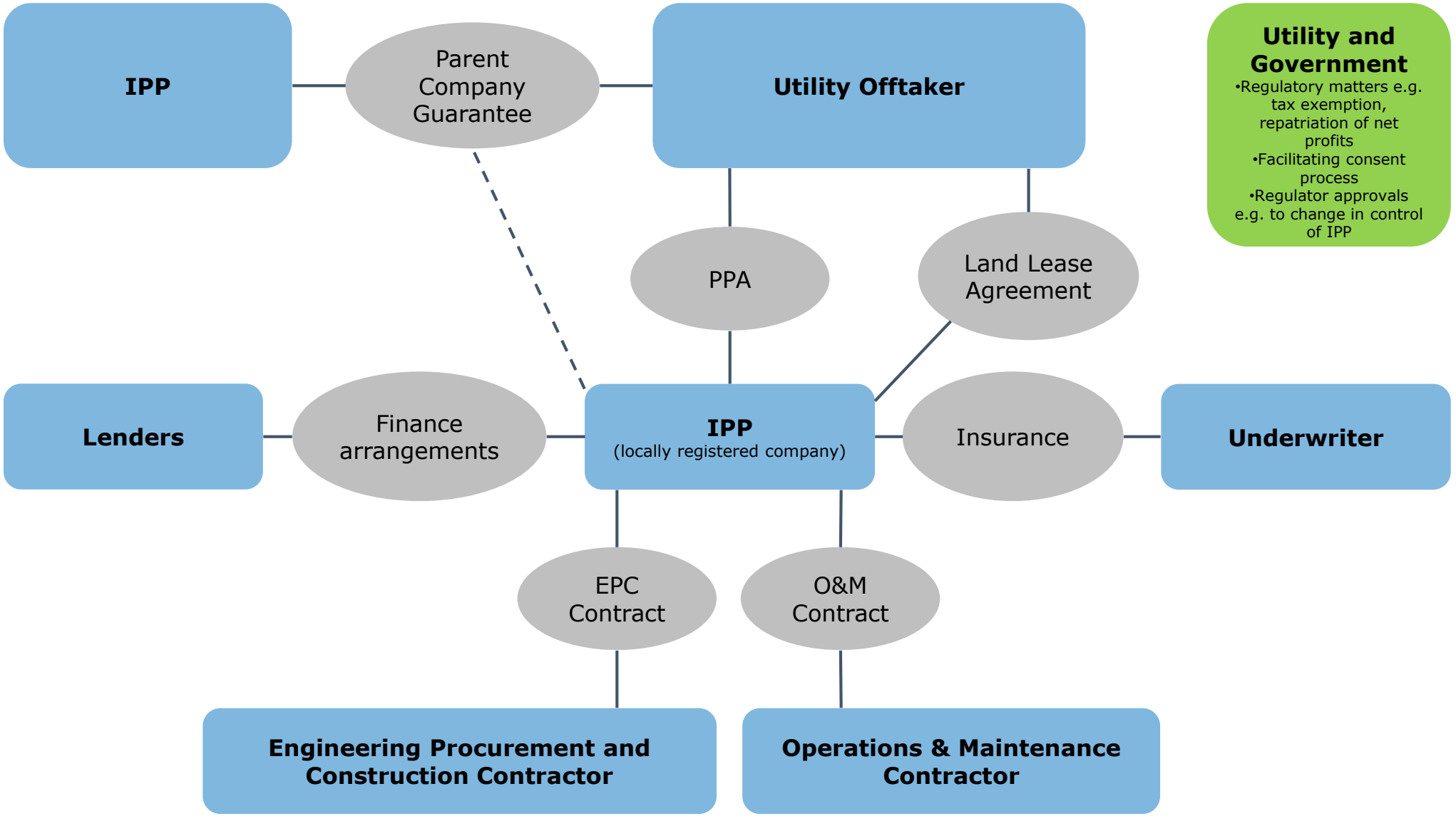

IPP and PPA Structure

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- **PPA - Between Utility and IPP** - IPP agrees to finance, design, build, own, operate and maintain the Power Plant in return for the Utility paying a monthly or quarterly tariff from the Project Commercial Operation Date until the expiry of the term.
- **Government Guarantee** – Between Government and IPP - Government guarantees the PPA payment obligations (or at least some of them) of Utility. NOT ALWAYS AVAILABLE
- **Implementation Agreement** - Between Government and IPP- Generally will evidence Government's support for the Project, and may include obligations on Government to provide a Government Guarantee, a land lease or licence for the Power Plant site, and various other commitments from Government to IPP e.g. tax concessions, assistance with obtaining operating licence, consents and approvals.
- **Side Letter** (not always used) -Between Utility and Government - Utility passes various PPA risks through to Government e.g. land use, change in law and government action or inaction risks.

PPA – Bankability

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- A "bankable" PPA means a PPA that lenders will lend against to the Independent Power Producer (‘*IPP’*) (e.g. 70 or 80% debt, 20% or 30% equity) with recourse only to the Project assets i.e. no recourse to assets outside the Project i.e. Project Finance.
- Project assets may include Project contracts e.g. PPA and its revenue stream, shares in the IPP and the Power Plant itself. Project assets do not include, for instance, assets of the shareholder(s)/sponsor(s) to the IPP.
- The IPP is tasked with financing, designing, building, owning (asset typically transfers to Utility at termination or expiry of the PPA), operating and maintaining the Power Plant under the PPA in return for a monthly or quarterly tariff from the Utility during the operations phase (e.g. 15 to 30 years) – so the IPP funds the design and construction of the Power Plant and recovers its costs of doing so and return on equity during the operations phase.
- The IPP typically has no assets apart from Project assets – the IPP is usually a special purpose vehicle established for the sole purpose of the Project and incorporated in the country of the Project.

PPA – Bankability - Risks

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- **Lender** - may have lent 80% of the capital cost of the Power Plant as IPPs look to maximise their equity return by highly leveraging
- Consequently risks that may threaten the ability of the IPP to meet its debt service obligations are very important e.g. through reduced or compromised revenues or increased costs.
- Lenders are thus incentivised to allocate Project risk away from the IPP i.e. de-risk the IPP, either to:
  - the Utility through the PPA
  - the EPC Contractor through the EPC Contract, or
  - the O&M Contractor through the O&M Contract.
- The "bankability" of the Project is under threat if the IPP takes on too much risk i.e. the lender will be unlikely to lend to the Project if it is not "bankable".
- No one shoe fits all – the "bankability" requirements for a particular project could be quite different to another project finance deal.

Risk allocation under Bankable PPA

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RISK	LAND USE RIGHTS	HYDROLOGY (FOR HYDRO PROJECTS)	IRRADIATION (FOR SOLAR PROJECTS)	SITE CONDITIONS
DESCRIPTION	Instability/uncertainty of access and use of tribal lands. PPA is a long term agreement.	If the river flow/reservoir is insufficient to enable the IPP to generate electricity to the desired level, who takes this risk?	If irradiation levels fluctuate and the IPP is unable to generate electricity to match forecasts, who takes the risk?	PPA may include a Geotechnical Baseline Conditions Report and an Environmental and Social Baseline Conditions Report (together the *Reports*), to promote more informed IPP bids.
Issue	Land access/use issues may equate to a Political Force Majeure Event under PPA: Construction Phase – Extension of time and tariff adjustment for IPP Operations Phase – Utility pays the full tariff based on the contracted capacity being deemed to be available.	Utility may take the risk, especially if no long term reliable river flow data. Say, for instance, Utility requires the Power Plant to produce 10 MW, if there is insufficient river flow/ reservoir to generate 10 MW, then Utility will still be obliged to pay the IPP as if 10 MW had been made available to it.	The availability of solar radiation (the 'feedstock') is often seasonal and irradiation levels vary at different times of the day. This affects the quantity of generated electricity and the time it is produced, which must be managed by Utility in terms of it meeting the electricity demands of its customers.	The Reports could be inaccurate. UXO and archaeological issues may arise. Who takes this risk? IPP may incur delay and additional construction costs, and may be entitled to an extension of time and a tariff adjustment.

Example PPA life cycle

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Conditions precedent to closing date	Construction phase up to COD	Operations phase	Power Plant hand-over phase
Development Phase Security from IPP	Construction Phase Security from IPP	Operations Phase Security from IPP	Power Plant hand-over Security from IPP
e.g. 6 months Parties to use best endeavours to perform their respective obligations to achieve closing e.g. IPP achieving financial close. Utility's sole remedy for IPP failing to achieve closing is to draw the Development Security (PPA also terminates).	**e.g. 36 months** IPP is liable for liquidated damages for late completion. Note extension of time grounds to the Implementation Schedule as described below.	**e.g. 30 years** Note the term extension grounds described below.	**e.g. 12 months** Last 12 months of Operations Phase – ensure Power Plant is handed-over in the required condition.

Finance Structure-Key Learning Objectives

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- Requires a comprehensive understanding of the competitive dynamics, market environments, project risk factors and integration challenges associated with the large-scale transition to renewable power
- Understand the key market and business environment requirements for the sustained growth of renewable power
- Examine the development process, investment requirements and economic risks and returns for renewable power projects
- Review current and emerging solutions to large-scale renewable power integration
- Develop an integrated approach to combining financial, technological and socioeconomic factors in renewable power market analysis
- Converse with project partners, suppliers or investors
- Know what to look for when evaluating long-term, sustainable renewable power market opportunities
- Identify key investment, project development and policy risks
- Learn how to identify, analyse and critique competing market solutions

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Tonga
2 MW Solar PV

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Tonga – Solar Project

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- Tonga currently has two main solar facilities of 1.0 MW and 1.3 MW which are both operated and maintained by the Utility. Other minor plants (Vv 420kw, Hp 550 kw, 200kw)
- 50% RE target by 2020- the Introduction of IPP/PPA will assist to expedite moving Tonga towards achieving this target
- Utility conducted a Request for Price (RFP) starting in 2015 for interested IPP participants for installation of up to 6 MW of additional solar PV under a Power Purchase Agreement in February 2016. IPP was selected after an exhaustive and detailed selection process.
- An MOU was executed with IPP on 1 April 2016.
- Detailed engineering report on the installation and interconnection of 6 MW including battery storage.
- Negotiations with IPP on the PPA and the technical and engineering aspects of their proposal has been conducted in detail since 1 April 2016.
- The PPA document executed on 12 September 2016. construction commenced 5 December 2016

PRIMARY OBJECTIVES

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- To assist in complying with the renewables energy target of 50% renewables by 2020.
- To utilize 3rd party private sector finance for renewable electricity generation.
- Reduce the reliance on imported diesel fuel for power generation.
- Achieve sustainable, affordable and reliable electricity for the nation.
- Maintain Utility financial viability.
- Support the strategic direction of lowering electricity tariffs for the nation.

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Tonga IPP Project-Key Learnings

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Offtaker facilitate all local issues for the IPP – thus de-risking for IPP, to avoid loading of price:

- Know upfront what the fair and reasonable tariff should be – undertake own modelling and risk analysis
- Offtaker arrange all approvals including Government, enviro and Regulator.
- Offtaker arrange land and lease.
- Offtaker perform interconnection.
- Offtaker arrange import requirements for equipment.
- Fixed tariff.
- Liquidated damages
- Engineering studies for construction and interconnection

Tender

- Wide ranging-not just established players.
- informal - to enable negotiations.

Offtaker's Rights

- Liquidated damages
- Step-in
- Approve all equipment
- Approve design
- Approve regular construction phases-almost PM

Pacific Nations – SEP Services

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- Prepare Renewable Energy Roadmap – how to integrate RE into existing network and generation mix to reach RE target
- Prepare Energy Storage Roadmap – essential in determining how to ramp up the installed RE to prevent ‘’spill’’
- Review and determine what types and size of storage, battery and large scale, is appropriate
- Determine Roadmap for diesel shutdown and de-commissioning
- Review various finance structures, including PPAs, to determine most attractive
- Prepare tenders for suppliers. Evaluate tender responses.
- Negotiate MOUs, Term Sheets, PPAs, Project Finance, EPC Contracts
- Project Manage site preparation, construction, commissioning and interconnection

Questions

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To obtain further details on the following:

- Legal requirements of PPAs
- Bankability
- Project Finance
- Risks for the Utility in Project Finance and PPAs
- Structuring the PPA
- Relationship between Utility and IPP

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