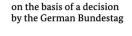
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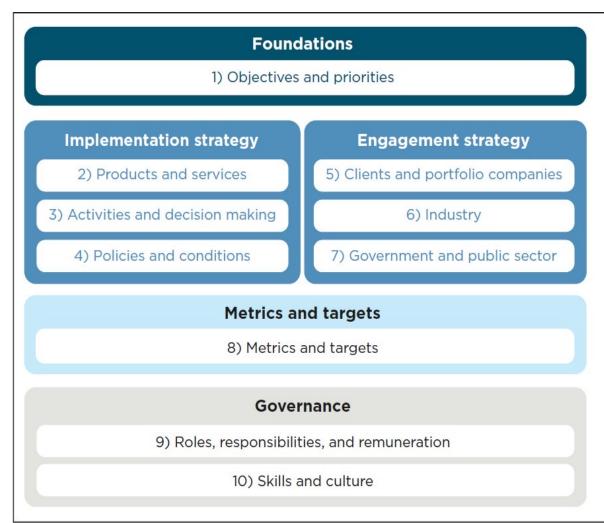




Fundamental of Solar PV Technology, Finance and Related Policies as Part of RE Deployment to Support Energy Transition in Indonesia

on behalf of Clean, Affordable and Secure Energy (CASE) for Southeast Asia

### **Summary overview**



#### **Foundations**

Organization-wide net-zero objectives, targets, timelines, and priority approaches

#### Implementation strategy

Aligning business activities, products, services and policies with net-zero objectives and priorities

### **Engagement strategy**

Communicating and collaborating with clients, portfolio companies, industry peers, civil society, and the public sector in support of net-zero objectives

### **Metrics and targets**

Metrics and targets to assess and monitor progress towards net-zero objectives

#### Governance

Structures for oversight, incentivization, and supporting implementation of the net-zero transition plan

# Potential Role of Country Platforms in Net Zero / Energy Transition in EM&DEs

Country Platforms could unlock public and private finance, needed to finance ambitious and just transitions, bringing wider economic benefits

JETP Priorities
Shared by
EM&DE
Leaders to
Date

Example

Sector

**Priorities** 



### Unlock necessary public-private financing

Crowd in private finance at scale, while making efficient and effective use of scare public / donor / concessional finance to meet significant costs of necessary energy / net zero transitions



#### Jobs, Economic Development, and a Just Transition

Drive job creation and broad-based economic growth, but especially for communities most likely to be impacted by the energy transition



#### Sector-Specific Development, Beyond Just Coal Transition

Transition towards renewable electricity, but also drive development of other sectors critical to low-carbon, climate resilient growth



### Accelerating Coal to Clean Transition

Facilitate PLN's 2021-2030 Electricity Procurement Plan (RUPTL) targets of 40.6GW of new generation capacity with 52% from renewables



### Investing in Grid Capacity and Stability

Capital investment in grid infrastructure at scale to enable renewable energy and sustainable transportation targets



#### Decarbonizing Hard-to-Abate Sectors

Finance climate action on Industrial Processes and Product Use, one of the key focus areas for mitigation Indonesia's Long-Term Strategy for Low Carbon and Climate Resilience 2050 (LTS-LCCR 2050)



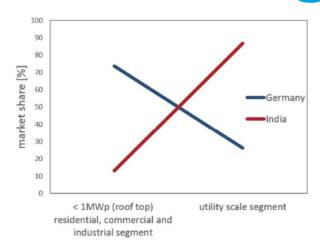
### Scaling Digital Technology for Climate Action

Digital technology itself has the potential to cut global emissions by 15%, but also to bring new opportunities to communities impacted by the energy transition

### Framework for International Solar PV

- The main objective of this course is to provide a guide to key elements in of solar PV projects. Moreover, the course addresses the main differences in market segmentation in both Germany and Indonesia and compares local framework conditions for PV plants
- Germany, on the one hand, has already developed into one of the biggest solar markets worldwide. This development has primarily been driven by offering an attractive feed-in tariff for rooftop plants as investor motivation within the residential and industrial market segments driven by National Energy Transition Program "Energiewende"
- Indonesia on the other hand, has the potential to be the biggest commercial, residential solar PV rooftop in the world, Even though Minister regulation MEMR no. 26 2021 issued but due to Monopoly of PLN the development of PV is stagnated and more internal decision from PLN is killing the industry slowly this making an understanding of rooftop-related questions an integral part of any solar investment strategy

# **Market Segment**



Solar market segmentation in Germany and India in FY 2015 (Data source: IEA 2017, Bundesnetzagentur, Solar rooftop map 2016)

#### RESIDENTIAL SEGMENT



#### INDUSTRIAL SEGMENT





#### **Site Location**

Driven by tariff structures for electricity consumers (and the availability of space), investors decide on the size and location of an installation. Energy-demanding countries like India and China initially

focused on the utility-scale segment with PV power plants located on open land, whereas the United States, Europe and Japan also have a distinct market segment for solar PV in particular, which is driven by smaller decentralized installations on rooftops and on consumer premises (the residential,commercial and industrial segment).

The reason why PV rooftop plants hold the dominant market share in Germany [2] is a government feed-in tariff (FIT) incentive, together with high resale prices for electricity — with both mechanisms supporting residential and commercial rooftop installations. The huge market share held by utility-scale solar plants in India, on the other hand, [3, 4] is based on attractive government-backed long-term power purchase agreements (PPAs) for open-field solar power plants.

Policy play a big part of where the industry is heading towards utility or

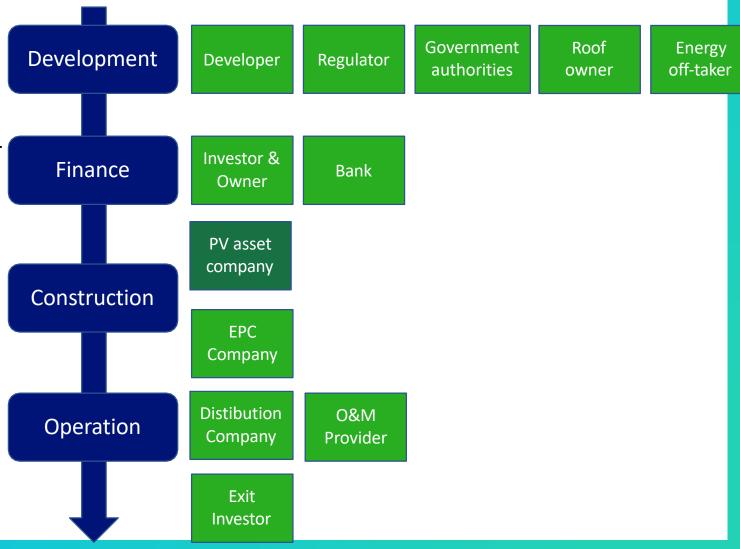
#### commercial.

PLN as single buyers will prefer more towards utility

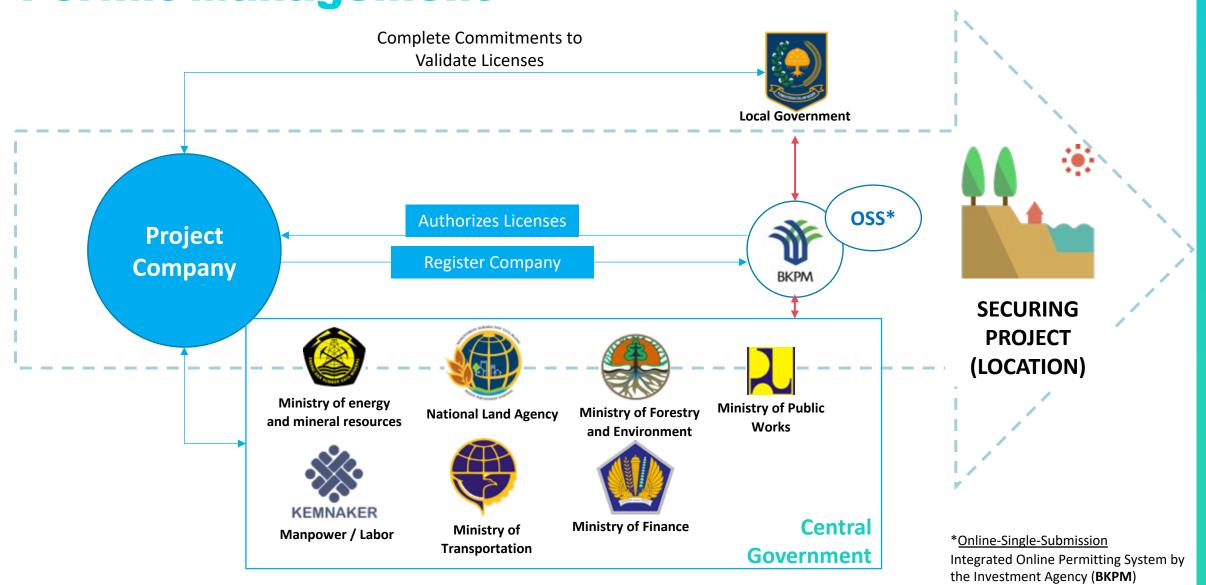
# **Stakeholders**

The life cycle of renewable energy projects can be divided into four typical phases: From development and finance to actual construction of the project and subsequent, long-term commercial operation until the plant reaches the end of its useful life.

Various stakeholders are involved throughout each of the project phases and individual players sometimes take on multiple roles in practice, especially in the case of relatively small and less complex rooftop systems



# **Permit Management**



# Requirement of Powerplant Business from OSS/BKPM

OSS PERMITTING AGENCY		Function
1	Nomor Induk Berusaha (NIB)	Registration ID of Company
2	The Approval of Foreign Manpower Utilization Plan	Rights to employ foreign employees in the company
3	Location Permit	License to acquire and secure land related for project location
4	Environmental Permit (UKL/UPL & AMDAL)	Proof of environmental compliance
5	<b>Building Construction Permit</b>	License to construction facilities
6	Certificate of Function	Proof of construction compliance
7	IUPTL	License to Operate Power Plant
8	Certification of Competence for Operators	License of the Operator managing the power plant
9	Operational License	License of the company to operate the power plant
10	Certificate of Worthiness for Plant	Proof of the plant's function and standards compliance
11	Other Commercial/Operation Licenses	-

### Summary of key project permits



In Operation







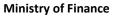








PLN

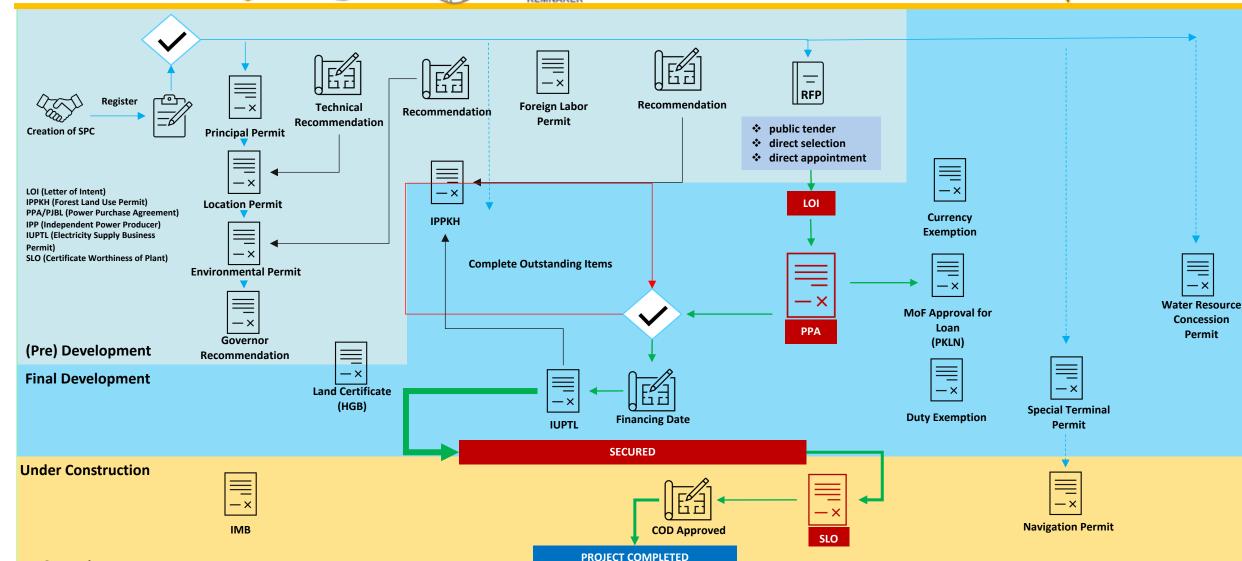




Min. of Transportation



Min. of



**Disclaimer:** Previous practice applies pre-omnibus law;

# **Ex: Obtaining Location Permit**

Establish SPC at agreed time;

**Validates Location Permit** 

Register through OSS

**Provides List of Requirements** 

### Solar Company

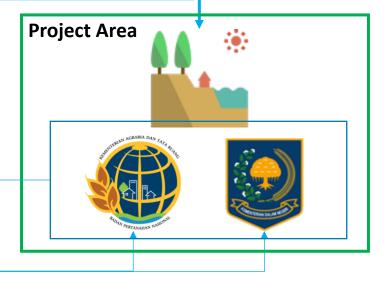
1	Nomor Induk Berusaha (NIB)	
2	The Approval of Foreign Manpower Utilization Plan	
3	Location Permit	
4	Environmental Permit (UKL/UPL & AMDAL)	
5	Building Construction Permit	
6	Certificate of Function	
7	IUPTL	
8	Certification of Competence for Operators	
9	Operational License	
10	Certificate of Worthiness for Plant	



Introduction and stakeholder engagement at local government;

Discussion and pre-commitment with landowners;

**Prospection** 



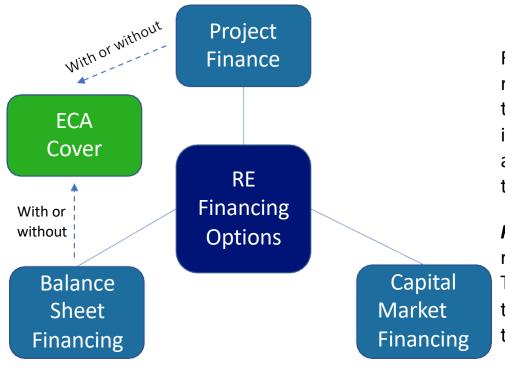
Confirms Completion of Location Permit to OSS

#### Within 10 days:

- Select location for project;
- Liaise with Local Government to initiate Location Permit Process;
- Obtain Technical Recommendation from BPN;
  - Requires survey and coordination meeting at local BPN (5 10 days)
- Obtain final Location Permit from Local Government and validated at OSS;

Location Permit allows the notarized purchase of land and registration for certificates at Land Agency under the SPC;

# **Financing Scheme**



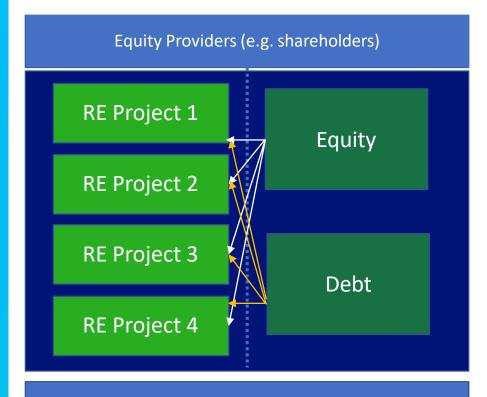
Financing on the sponsor's **balance sheet**: Sponsors with available financial resources and good creditworthiness can opt for on-balance-sheet financing to develop and realize small to medium-sized projects. This means the project investment costs are met from the company's equity or operating cash flow and classical bank investment loans with the liabilities being secured against the main corporate assets.

**Project finance** is the raising of funds on an either limited-recourse or non-recourse basis to finance an economically separate capital investment project. The providers of the finance look primarily to the cash flow of the project - as the source of funds to service loans they may have taken out and to provide the return on the equity they have invested in the project

Different options for RE financing (Source: RENAC)

Financing using *capital market* products: The issuance of collateralized bonds with short-term or long-term repayment profiles (so called *securitization*) is a possible way of raising money on the capital markets to finance renewable energy projects. "Securitization", in the context of RE projects, is the financing or refinancing of income-generating assets through the creation of tradable-debt instruments sold to investors, which are collateralized by the RE project's assets and serviced from the cash flow that those assets yield. It could also be considered as the transformation of an illiquid asset into a security that can be traded on a secondary market.

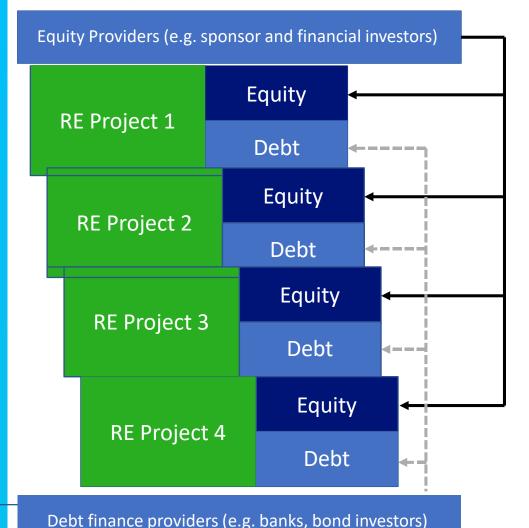
# **Balance Sheet Financing**



Debt finance providers (e.g. banks, bond investors)

- •Simplicity Balance-sheet financing is relatively easy and quick to arrange.
- Low cost It is less expensive in terms of arrangement and legal fees and the annual cost of borrowing may be lower.
- Financial structure Balance-sheet financing will normally reflect a looser, more flexible financing structure. While still significant, the tight network of contracts which creates the risk transfer in project financing is less critical to the lender. In most cases, gearing (i.e. the degree of leverage) will be lower than in project-finance transactions.
- Risk acceptance Sponsors are generally content to accept the majority of the project risks. Although on-balance-sheet financing structures can also allow for risk transfer, the degree of risk transfer is much lower than in non-recourse project financing. The entire business is at risk if there is a loan default; however, this is partly offset by lower gearing.

# **Project Financing**

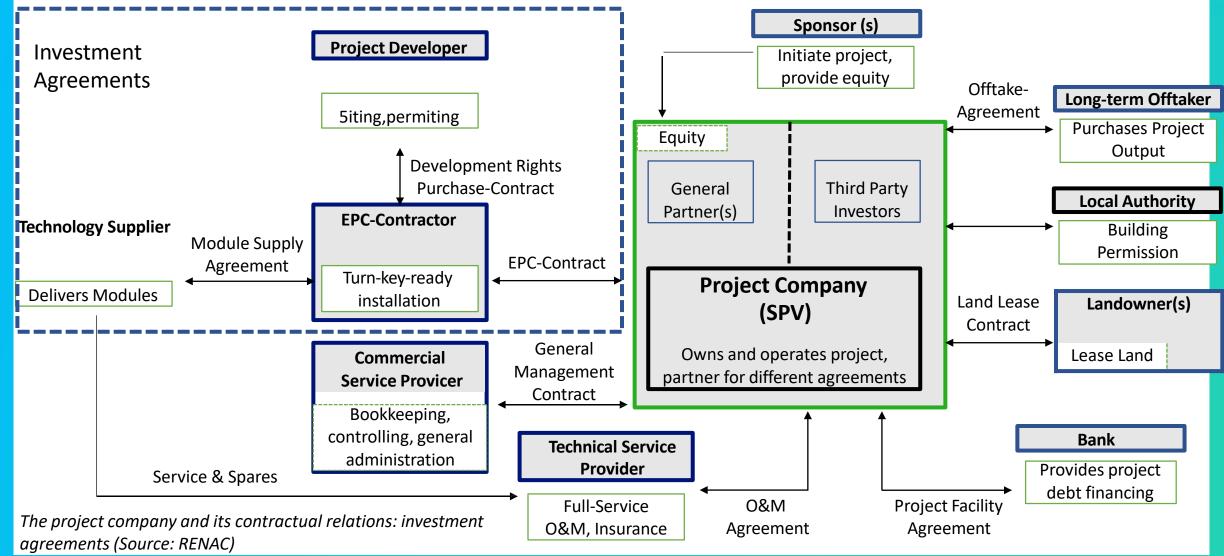


for each individual RE project.

both the sponsor's and lender's point of view, the

possibility to more effectively protect the RE project from costly

# **Contractual Arrangement**





# **Phase**

Renewable energy (RE) projects are developed, constructed and operated/owned along the process and value chain exhibited in the figure. The negotiation and procurement of the necessary financing is an integral part of the process, and is started as soon as most of the initial project-concept development work (predevelopment) has been finalized and a valid operating permit (e.g. concession) has been obtained. The financing phase can be split into four major steps:

- 1. SPV-contract negotiation. Under the project finance scheme, the sponsor starts the financing process by setting up a project company (also called an SPV or 'special purpose vehicle') as transaction partner for different project contracts.
- 2. Business planning. The sponsor collects all the data relevant to the project which is necessary in order to draw up a business plan that forecasts cash in-flows and out-flows. The business plan is an important document for negotiations with prospective lenders and will be thoroughly evaluated by them during the bankability assessment.
- 3. Bankability assessment. The bankability assessment is carried out by the lender(s) and their contracted advisors, and includes a general evaluation of the project's economic, legal and technical feasibility and all material project risks. It aims at determining the creditworthiness of the project and its ability to meet contractual payments.
- 4. Financial engineering. Financial engineering is the quantitative and qualitative structuring of a project's financing mix (the right combination and design of debt and equity) in order to reduce default risk and maximize project value; the end result is the negotiation of a loan and related collateral agreements between the project company (as borrower) and the lender(s).

### Pre-Development

- Site Survey
- Site Acquisition
- Permitting
- Environmen tal

Assessment

### Financing

**SPV-Contract** 

Negotiation

**Business** 

Planning

Bankability

Assessment

**Financial** 

Engineering

### Construction

- RE Equipment
  - Purchasing
- Cabling
- Grid
   Connection
- Turn-Key
   Installation

### 0&M

RE Asset
Ownership

- Operation
- Condition
  - Monitoring
- Maintenance

- Managem
  - ent of
  - Asset
  - Portfolio
- Admin

upstre am



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# **Completion Risk**

Risk	Description	Potential Mitigation	
Completion	Late completion	Turn-key contract incl. penalties for late	
risk		completion with solvent plant manufacturer	
Completion	Completion with higher costs	Turn-key fixed price contract with solvent	
risk		plant manufacturer	
Completion	Completion with underperforming	Turn–key contract including performance	
risk	parameters (e.g. lower biogas yield per kg	guarantees with solvent plant manufacturer	
	oDM, lower efficiency of CHP)		

# **Completion Risk**

Risk	Description	Potential Mitigation
Completion	Non-completion	Turn-key contract including completion
risk		guarantee and respective penalties with
		solvent plant manufacturer



- To mitigate completion risk, a turn-key contract including respective guarantees and penalties should be concluded with an experienced and solvent plant manufacturer
- Additionally, insurances are available to cover costs of late completion, etc.

# perational & Management Risk

Risk	Description	Potential Mitigation
Operational and management risk	All risks during operations which might lead to underperformance, interruption or standstill of	Operation & maintenance (O&M) contract including incentives and penalties with an experienced operator –
	the production process	preferably connected to the project participants (sponsor, plant
		manufacturer, etc.)

# **Technology Risk**

Risk	Description	Potential Mitigation
Technology (functional) risk	An innovative technology might not achieve the expected performance parameters	Only a proven technology with a respective track record should be chosen

# **Environmental Risk**

- Pollution
- Habitat
- Indigenous tribes
- Protected areas
- others

23 Okt

# Regulatory framework and country risk

Risk	Description	Potential Mitigation
Stability risk regarding regulatory framework & country risk	Changes in institutional framework conditions (e.g. feed-in tariffs, tax breaks, etc.) during the life time of a project.  Legal uncertainty, unclear ownership rights, expropriation risk etc.	For investors: export guarantees; investment only in countries with a reliable political framework  For governments: Provide reliable conditions to attract investments

24 OKI-2

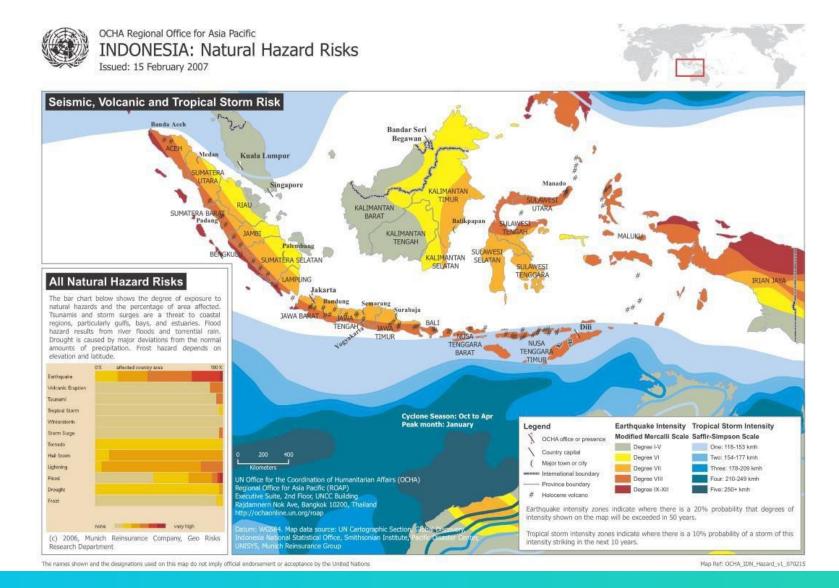
# Financial risks

Risk	Description	Potential Mitigation
Currency risk	Currency devaluation	Hedging with related financial derivatives ( <i>if</i>
Interest rate risk	Increase of interest rate	available)
Inflation risk	Increase of inflation beyond expectation	

# Force majeure

Risk	Description	Potential Mitigation
Force majeure risk	Unforeseeable events with negative impact on the project (e.g. earthquake, fire, flood, war)	Insurances where feasible

### Force majeure risk - case of Indonesia



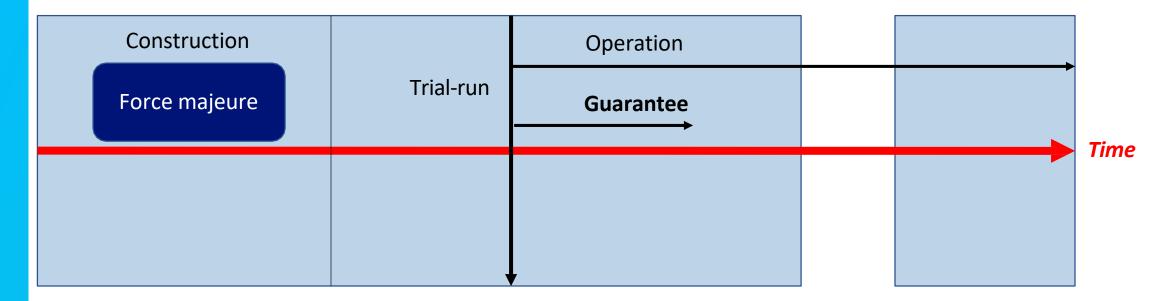
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# Financier's key measures for risk mitigation

- Insurance package request
- Debt service coverage control during redemption period
- Escrow account for debt service payments (e.g. 50% of next service)
- Quarterly control reports with yield, performance and financial figures
- Bank contracts lender's engineer for surveillance in case of underperformance
- Bank contracts lender's engineer during construction phase for site surveillance and controlling

28 Okt

### **Project Phases and Insurance Requirements**



- 1a. **Property insurance**: transport, assembly, operation
- 1b. **Business interruption insurance:** machinery breakdown and subsequent revenue losses
- 2. **Liability insurance**: Principal's liability, public liability, environmental liability

# Insurances: Examples

Risk Examples	Available Insurances
Wrong static calculation	Professional Indemnity Insurance
Damage to others, workers injured	Principal Liability Insurance
Accident	Marine / Transportation Insurance
Crane accident, module destruction	CAR (Construction all risks) and/or
Crane accident, module destruction	EAR (Erection all risks)
"cash – eater" due to delays	ALoP (Advance Loss of Profit)
Damage to people	Public Liability Insurance
Fire, lightning, flooding	Electric Equipment Insurance
Down-time of plant machinery	Loss of Profit Insurance
Insolvency of operating company	Dismantling Guarantee

# **Political Risk Insurance**

### Political Risk Insurance ("PRI") is provided by:

- The Multilateral Investment Guarantee Agency ("MIGA"), an institution of the World Bank Group;
- The Overseas Private Investment Corporation ("OPIC"), an agency of the U.S. Government,
- By export credit agencies, and
- By various private insurers, especially Lloyd's of London.

# **Political Risk Insurance**

- Investment guarantees against certain non-commercial risks (i.e., political risk insurance)
- Eligible for foreign investors with qualified investments in developing member countries
- Types of foreign investments covered include equity, shareholder loans, and shareholder loan guarantees
- Pricing determined on the basis of both country and project risk
- The investor has the option to cancel a policy after certain time, however MIGA may not cancel the coverage
- Does not require counter-guarantee but host country approval to guarantee

32 Okt

# **Performance Guarantee**

- A performance guarantee is usually provided by the contract party where they commit or guarantee to a specific level of performance
- As a minimum, guarantees must cover delay, output requirement and emissions
- The guarantees must match the provisions of the PPA or other project
- agreements and permits
- Must be based on operation at the designed technical status, operating conditions and specified fuel
- Output guarantees are usually on a unit or plant basis
- In some cases, a performance bond is issued by a bank or insurance company

# **Liquidated Damages (LDs)**

- Liquidated damages are an amount that is pre-agreed by the parties to cover damages for work not being completed on time or with less output
- Aim to keep project returns consistent under adverse circumstances
- The liquidated damages amount has to be a reasonable estimate of the damages incurred
- Liability limits must coordinate with the damages and are typically in the range of 20-35% of total contract value
- If the financial consequences of not meeting guarantees are substantial, the EPC contractor will include a certain margin in the plant price to cover such an eventuality => plant becomes expensive
- Contingencies (pre-agreed cost overrun funding) in CAPEX are an alternative

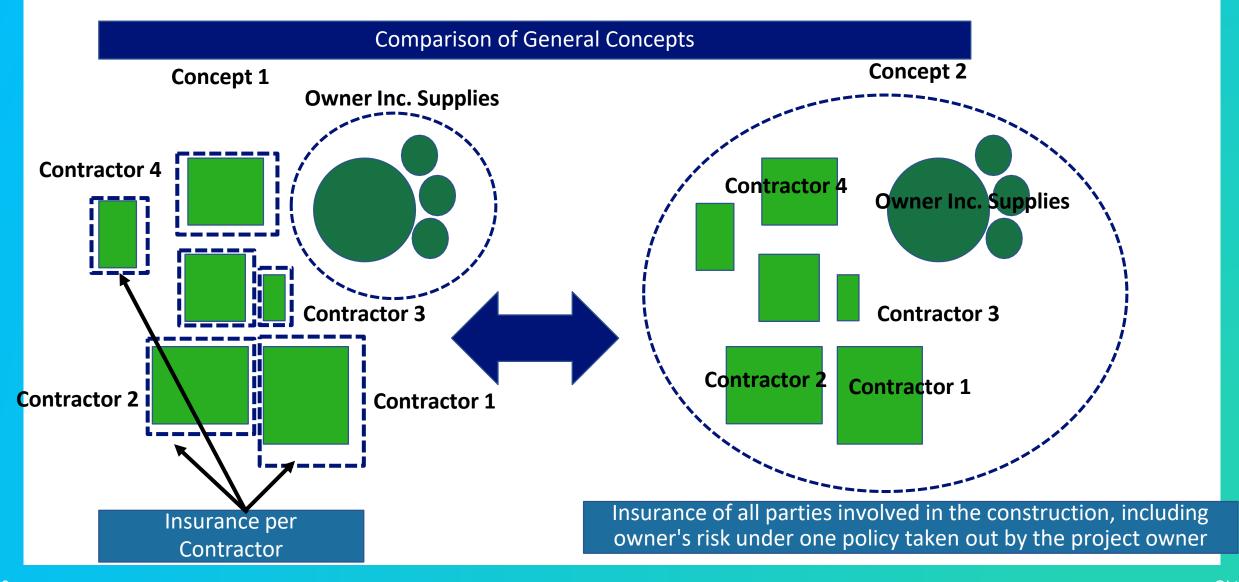
# Risk Management Programme: Advantage of a Comprehensive & Conclusive

- Insurances are only the second best solutions
- Security for the owner/operator and lender



- Show the banks that owner/operator has considered the risks of the project
- Less risk means more attractive financing conditions possibly
- Project cost are reduced because of less unexpected expenses

### **Alternative Insurance Package Concepts**



# Advantages of an SPV-controlled insurance concept

- Party with maximum interest should insure = owner
- Control of terms and conditions
  - Coverage meets the needs and requests of the project owner
  - Natural hazards
- Policy holder = recipient of indemnifications
  - > Information about each claim
  - > Lower risk in case of insolvency of the contractor
- Coverage for the risk of delay in start-up
- Bank (via SPV's proceeds account) gets cash access to all payments from the insurer!

37 Okt

# **Project Valuation**

### **Executive Summary**

The update on the project's valuation methodology consists of:

### ONE METHODOLOGY UPDATE

**3 PILLARS** 

Update on the COE / WACC macroeconomic parameters

→ Update of Risk Free Rates, Market Risk, and Countyr Risk Premiums Assessment of the business risks and how it reflects in the COE

→ Key ris areas – e.g quality of the PPA / EPC. Merchant betas have increased

"Technical" valuation items (calculation of the average gearing)

# . Macro Economic: Cost of Debt

WACC = (% Equity \* COE) + (% Debt \* Cost of Debt) \* (1-Tax Rate)

- For projects where we don't raise project finance, the cost of debt is a "normative" one,. The normative Cost of Debt is determined at the sum of i) a base Cost of Debt (akin to a risk free loan) and ii) a "project spread" (to cater for the project specific risk profile)
- Base rate cost of debt has significantly decreased to reflect low interest rate environment

Base rate Cost of Debt				
Currency	Currency Old Value		Change	
Aud	3.50%	2.30%	-1.20%	
USD	3.15%	2.55%	-0.60%	
Eur	2.00%	1.15%	-0.85%	

### Betas - 1 Pager Recap - Base Levels & Top Ups

Category		Base Level
Contracted		0.2
	Strong	0.3
Regulated	Medium	0.4
	Low	0.5
	Base Load	0.8
Manufact	Intermediate	0.9
Merchant	Peakers	1.0
	Pure Trading	1.2
Comings	EPCI	0.6
Services	Recurrent	0.6

**Important:** Based on an in-depth analysis, one of the above base levels must be applied to:

- Energy Efficiency:
  - BOOT w/o performance commitment
  - PPP
- District Heating & Cooling

#### 1. Common top-ups

**Inflation Risk** 

**FX Risk** 

Interest rate risk not fully hedged

Refinancing risks (Soft / Hard mini perm)

Counterparty risk (if not sovereign)

Price (cost-side) commodities (fuel electr., steam, chemicals etc)

#### 2. Specific top-ups

For Contracted assets check contract quality below

For Contracted Thermal Generation assets

Volume Risk (both Merchant and Contracted)

Merhant Electricity Price

**District Heating & Cooling** 

**Energy Efficiency** 

**EPCI** and Recurring Services

Specific M&A Services

#### 3. Contract quality top-ups (potential cap at 0.35)

- 1) Main Indicators
- 2) For features if not included in Cash Flows

The top-ups are detailed in Appendix and in the Beta Grid. They must be systematically checked and applied



1. Common Top-ups  All	<ul> <li>Inflation Risk</li> <li>FX Risk (based on historical volatility see hereafter)</li> <li>Interest rate risk not fully hedged</li> <li>Refinancing risks         <ul> <li>Soft mini perm</li> <li>Hard mini perm</li> </ul> </li> <li>Counterparty risk (if not sovereign) – not as top-up but -&gt;</li> <li>Price (cost-side) commodities (fuel, electr., steam, chemicals, etc</li> </ul>	<ul> <li>0.05</li> <li>See Sheet "FX vol" (next slide outline)</li> <li>0.05</li> <li>0.05</li> <li>0.10</li> <li>Off-taker spread CoE &amp; CoD</li> <li>0.10</li> </ul>	
2. Specific Top-ups			
& check for contracted Thermal Generation assets	<ul> <li>Fuel Risk (not standard or not liquid)</li> <li>CO2 tax risk if not passed through</li> <li>Environmental Regulation</li> <li>Thermal O&amp;M and fuel Not Passed through</li> </ul>	- 0.05 - 0.10 - 0.05 - 0.05	
& check Volume Risk (both Merchant and Contracted)	<ul> <li>Elec. Generation – Wind (onshore)</li> <li>Elec. Generation – Solar</li> <li>Elec. Generation – Hydro &amp; Geothermal</li> <li>Elec. &amp; Gas Transmission / Distribution</li> </ul>	<ul> <li>(PBase Case / P90) – 1.1</li> <li>(PBase Case / P90) – 1.05</li> <li>(PBase Case / P90) – 1.3</li> <li>To be discussed with AIFA Corp</li> </ul>	
& check Merchant Elec. Price	<ul><li>For RES and nuclear only</li><li>Technology (batteries)</li></ul>	- 0.10	<del></del>
& Specific Distric Heating & Cooling	<ul> <li>If embedded EPCI &gt; 30% EV</li> <li>If without guaranteed #connections / IF invest &gt; 50% EV</li> </ul>	- 0.10 - 0.10	
& Specific Energy Efficiency	- Energy Efficiency guaranteed	- 0.10	
& Specific EPCI and Recurring Services	<ul> <li>Procurement (Mat. Supply incl/emph. Price, cost overrun)</li> <li>Large / Complex EPCI</li> <li>Hard performance commitment given</li> <li>Engineering hard hrs contractual Cap.</li> <li>Not back to back with sub-contracts</li> <li>If not incumbent or HR unavailability</li> </ul>	- 0.05 - 0.05 - 0.05 - 0.05 - 0.05	Recurring - 0.05 - n/a - 0.05 - n/a - 0.05 - n/a - 0.05 - 0.05
M&A: EPCI and Recurring Services Specific	<ul> <li>M&amp;A – Recontracting Risk per period</li> <li>Backlog</li> <li>Pipeline</li> <li>Forecast</li> <li>Concentration risk limited# of clients</li> <li>M&amp;A – Common Top-Up(s)</li> <li>Backlog</li> <li>Pipeline</li> <li>Forecast</li> <li>Concentration risk limited# of clients</li> </ul>	- No - 0.10 - 0.20 - 0.10	Recurring - No - 0.10 - 0.20 - Idem

# **Beta Top-ups Emphasis on Contract Quality**

- As mentioned base level betas are set at the lower of the range (best in the sector level / gold standard) therefore proper assessment has to be done and confirmed of the high standard contractual framework. Thoroughly tested if not passed Top-ups should be applied
- The aggregate of contract quality top-ups can be capped at 0.35, but it is not obligatory to apply this cap

# 1st Checklist – Main Indicators of Substandards Contract Quality

Quanty	
No Take or Pay obligations on customer (does not apply to RES projects)	0.10
2. Absence Government/Off-taker Force Majeure that gives full cost and time relieve (for neg effect on CoD or operations)	0.025
3. Termination amount doesn't cover Equity (in addition to Debt)	0.025
4 Business Plan Extend beyond initial contract term -4.a. Not allowed to imply and/or assume contract extension -4 b. if developed Merchant market and assumes full merchant beyond contract -4.c if no developed Merchant market, but full merchant assumed beyond contract	Not allowed 0.05 0.20
5 No Passthrough of government action of inaction in the broadest sense (tax, regul., licenses, permits,)	0.05

# 2<sup>nd</sup> Checklist – Contract quality features which should have been included in CAPEX and or Cash Flow Forecast. "IF" not included apply Top-ups

1. DLDs and PLDs insufficient to keep equity whole	0.10
2. (Limited) NTP > 2% of CAPEX to be given before effective contract in order to keep schedule	0.025
3. Absence of Quality, Inspection and test rights to witness and monitor EPC/suppliers at their production sites	0.025
4. Performance testing and commissioning period and regime below Business guidelines and if missing below industry standards	0.025
5 Pre-existing soil, sub-soil risk and environmental contamination with the project or sponsor and not with the government or EPC (during construction)	0.05
6. Payments ahead of milestone completion i.e. EPC contractor is cash positive on the contract	0.025
7. Overall CAP and subcaps on PLDs and LDs are < Engie business guidelines or industry standards	0.025
8. No or Weak Protection for Change in Law, regulations or taxation	0.05
9. Bonding from EPC from a bank <a-< td=""><td>0.025</td></a-<>	0.025
10. Insurance deductibles > standards or precedents	0.025
11. Obtaining construction permits not with EPC and/or not obtaining permits despite efforts not a Govern't Force Maieure	0.025