

Power Plant and Utilities

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Background

Andri Efendy	Construction and Power Practice
Role for TKP	Account Director
Job Title	Director/Associate Director
Years of Experience	14 years
Professional Education Qualifications	Master Degree in Corporate Finance, ANZIIF Fellow CIP and Cert CII
Relevant skills and experience bring to TKP	<p>Andri brings more than 14 years of relevant global insurance experience. Prior to joining SRB in Aug 2017 Andri was during more than 9 years working for Bowring Marsh Asia Singapore, Dubai and Jakarta focusing in particular on the Asia and Middle East Regions of that organisation.</p> <p>During those 9 years he has been involved in successful project financed IPP and non-IPP projects for total values in excess of US\$5billion in a variety of countries such as Thailand, Laos, Singapore, Philippines, Turkey, Oman, Abu Dhabi, Saudi Arabia, Qatar, Bahrain, South Africa.</p> <p>These projects spanned from Greenfield projects using advanced gas turbine technology or large hydro projects, to challenging brownfield projects or portfolio acquisitions. His involvement included project development, EPC negotiations, LTSA negotiations, construction and operational insurances, political risk insurances, terrorism insurances, project finance matters and claims.</p>

Credentials

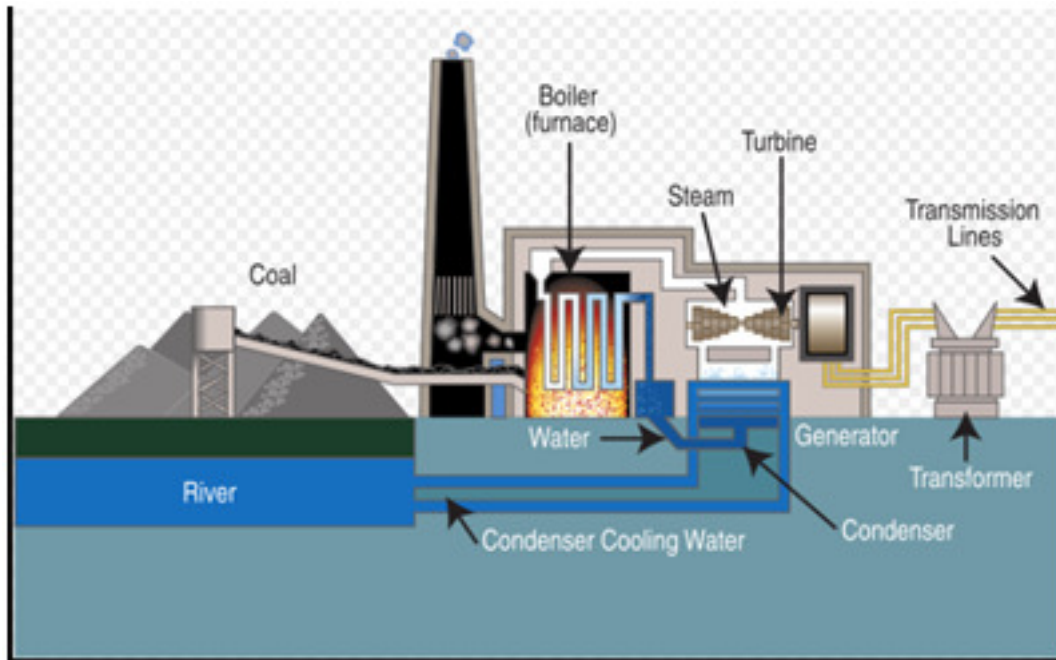
Project	Capacity	Type	Country	Asset Value (in USD)
ACWA Power	>1000 MW	Combined Cycle	Saudi Arabia	USD 5 billion ++
	2x50MW	CSP Solar	Morocco	USD 1 billion
	2x50MW	PV Solar	Bulgaria	USD 1 billion
Salalah 2	2x150MW	Combined Cycle	Oman	USD 2 billion
Ras Girtas Power	2x150MW	Combined Cycle	Qatar	USD 1 billion
Hoping Power	2x330MW	Combined Cycle	Taiwan	USD 3 billion
Ever Power	2x100MW	Combined Cycle	Taiwan	USD 500 million
Chia Hui Power	2x200MW	Combined Cycle	Taiwan	USD 1.5 billion
Central Java	2x950MW	Coal Fired	Indonesia	USD 4 billion
Sarulla Geothermal	3x110MW	Geothermal	Indonesia	USD 1.7 billion
Project Tolo	2x25MW	Windfarms	Indonesia	USD 100 million
EVN	>500MW	Coal Fired	Vietnam	USD 5 billion ++
San Carlos Sun Power	2x150MW	PV Solar	Philippines	USD 300 million
BLCP	2x750MW	Coal Fired	Thailand	USD 1 billion
Maxpower	100MW	Peaker	Myanmar	USD 300 million
Bhote Koshi Power	45MW	Hydro	Nepal	USD 100 million
Rousch Power	2x150MW	Combined Cycle	Pakistan	USD 300 million

Type of Power Plant (1 / 2)

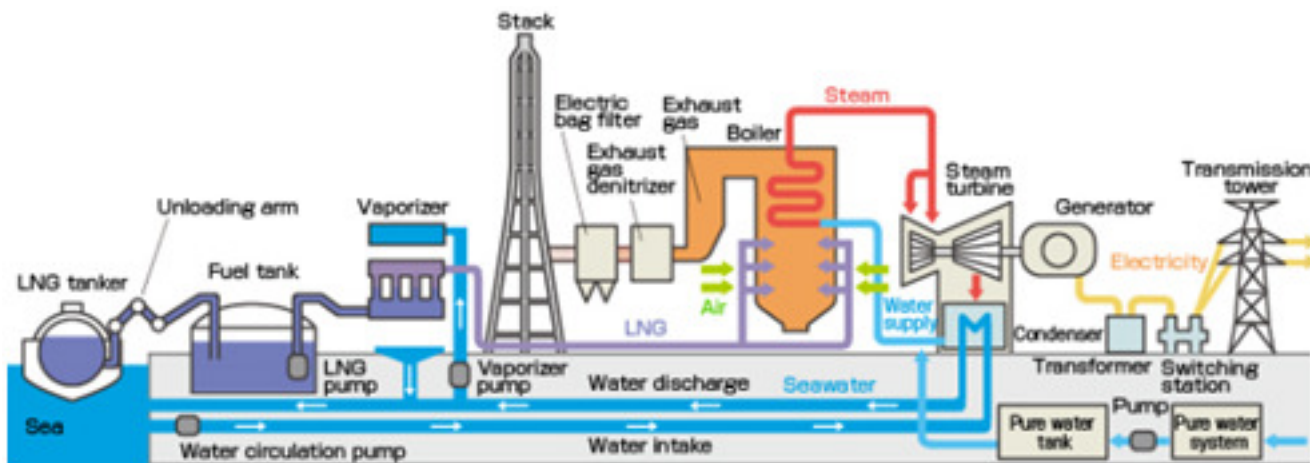
- ▶ Conventional Power Plant

A fossil fuel power station which burns fossil fuel such as coal, natural gas, or petroleum to produce electricity:

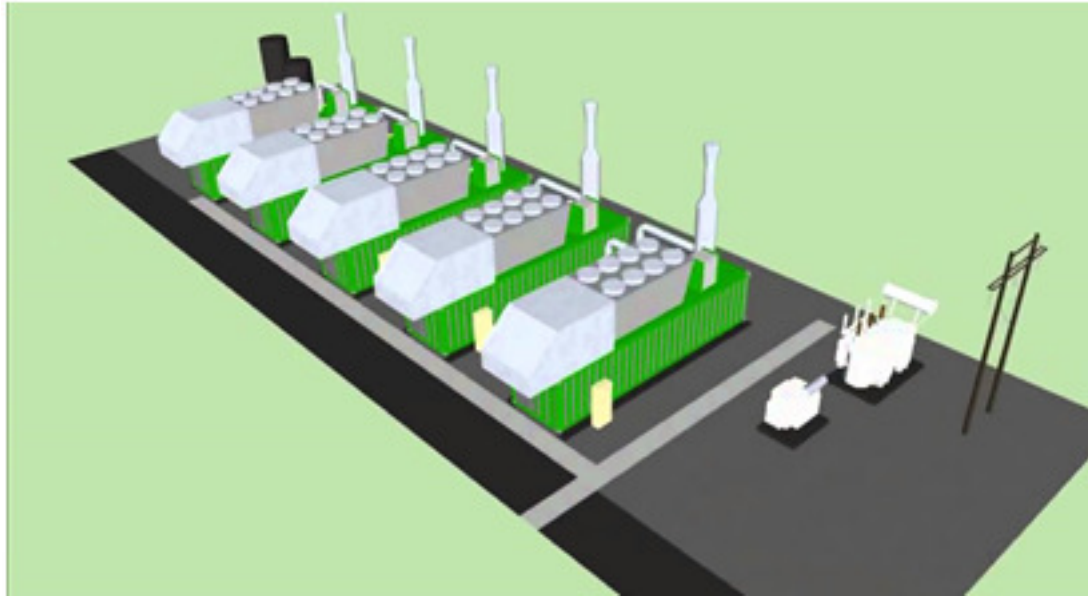
- a. Coal Fired Power Plant
- b. Gas Fired
- c. Peaker Plant (Diesel or Gas)
- d. Combined Cycled Power Plant
- e. Nuclear Power Plant



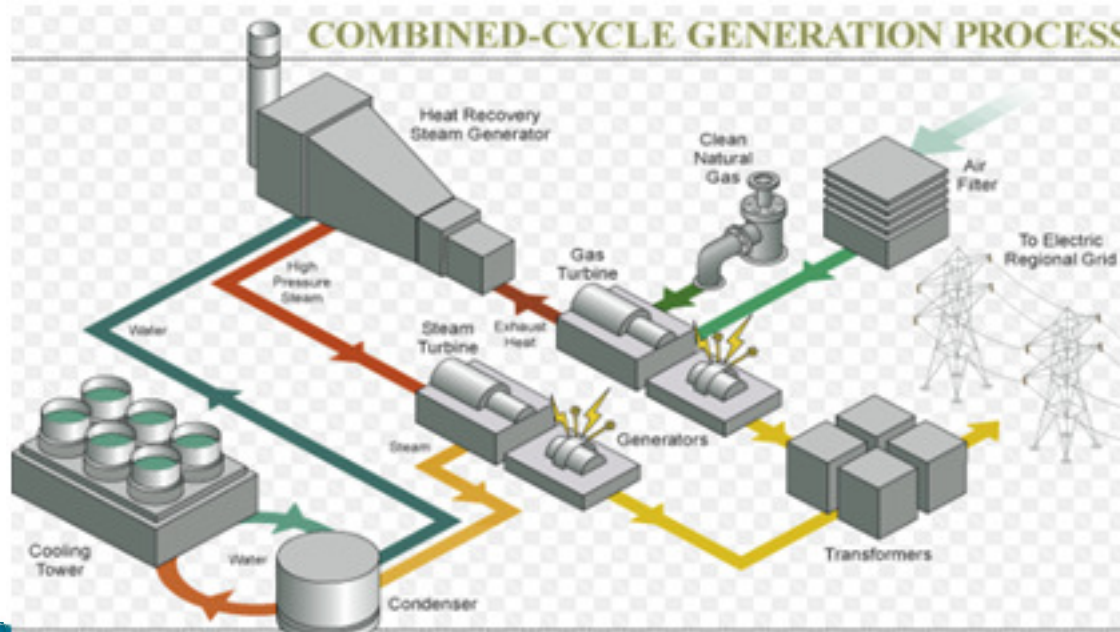
Coal Fired Power Plant Diagram



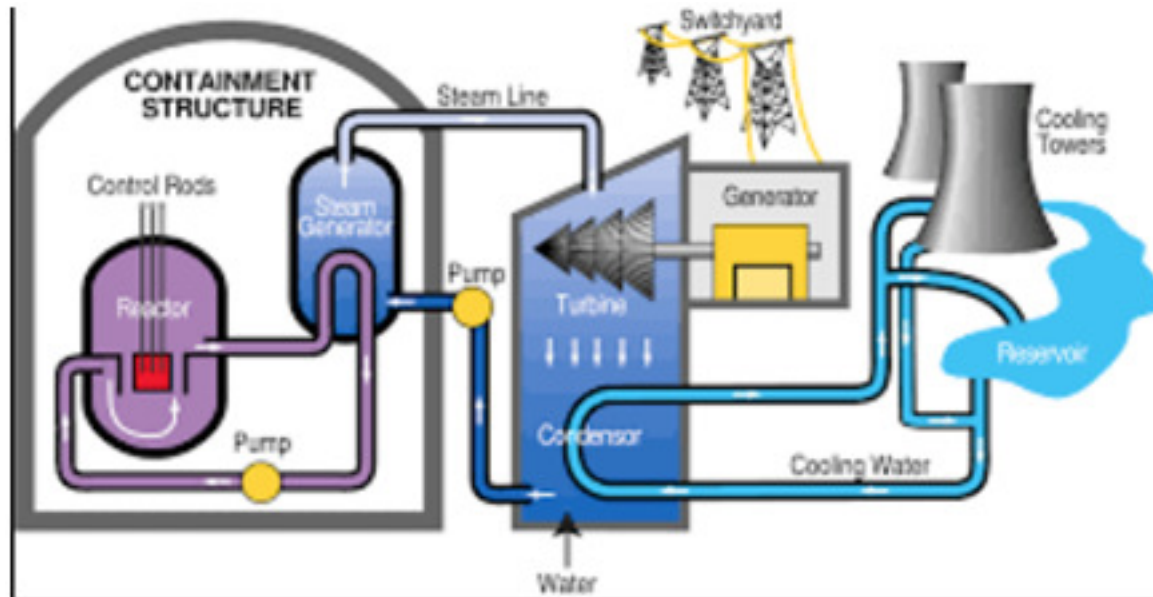
Gas Fired Power Plant Diagram



Diesel/Gas Peaker Power Plant Diagram



Combined Cycle Power Plant Diagram



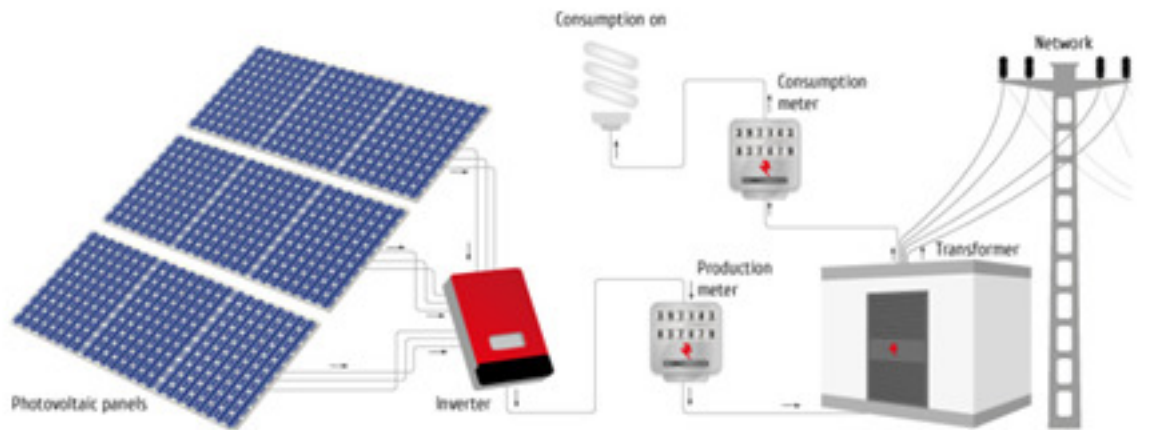
Nuclear Power Plant
Diagram

Type of Power Plant (2 / 2)

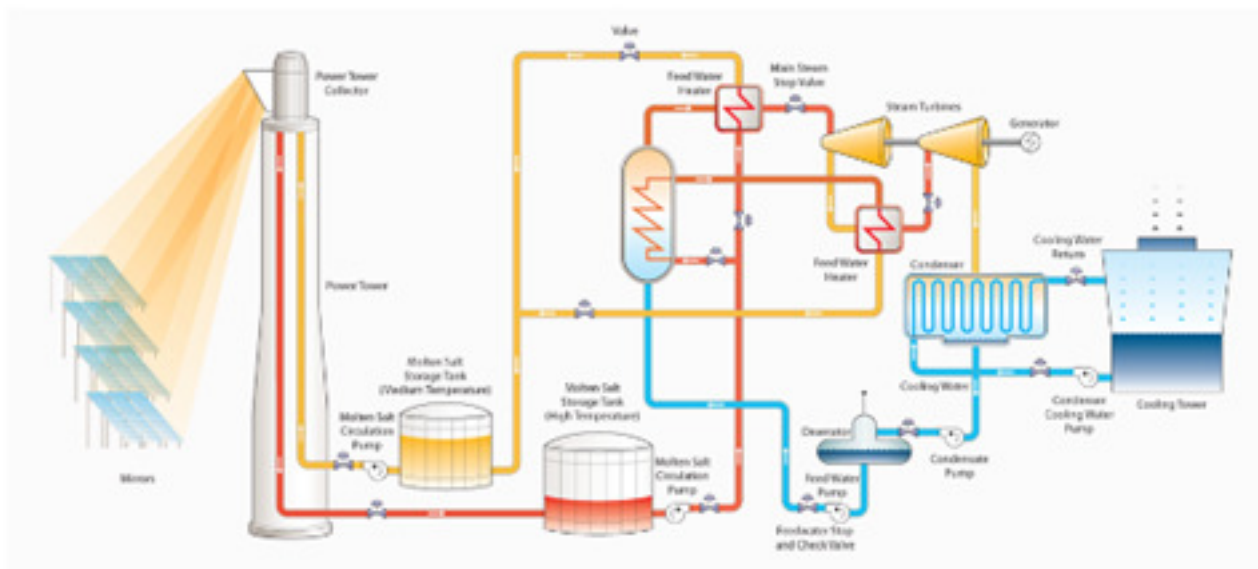
- ▶ Renewable Power Plant

Electricity and heat generated from solar, wind, ocean, hydropower, biomass, geothermal resources, and biofuels and hydrogen derived from renewable resources:

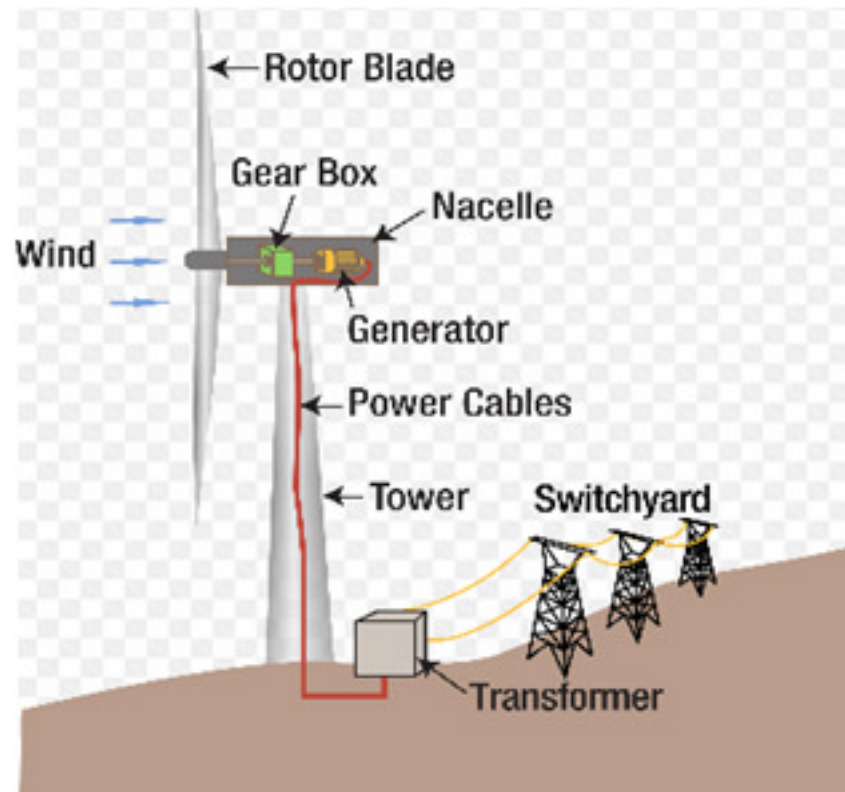
- a. Solar Photovoltaic or Concentrated Solar Power
- b. Wind farms
- c. Hydro Power
- d. Geo thermal



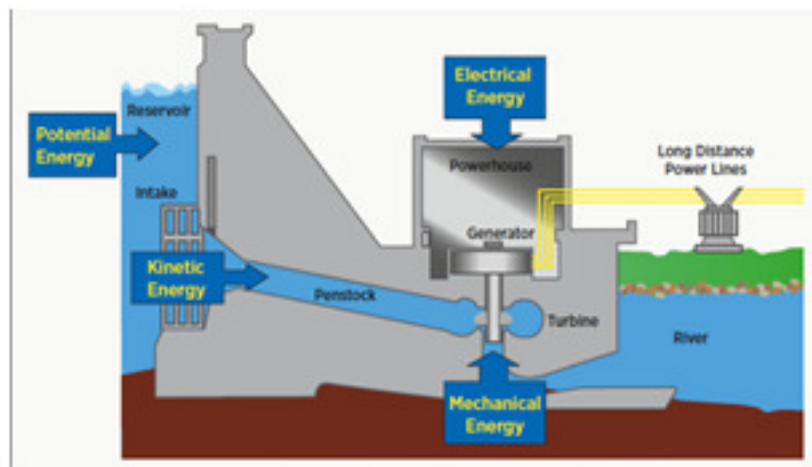
Solar PV Power Plant Diagram



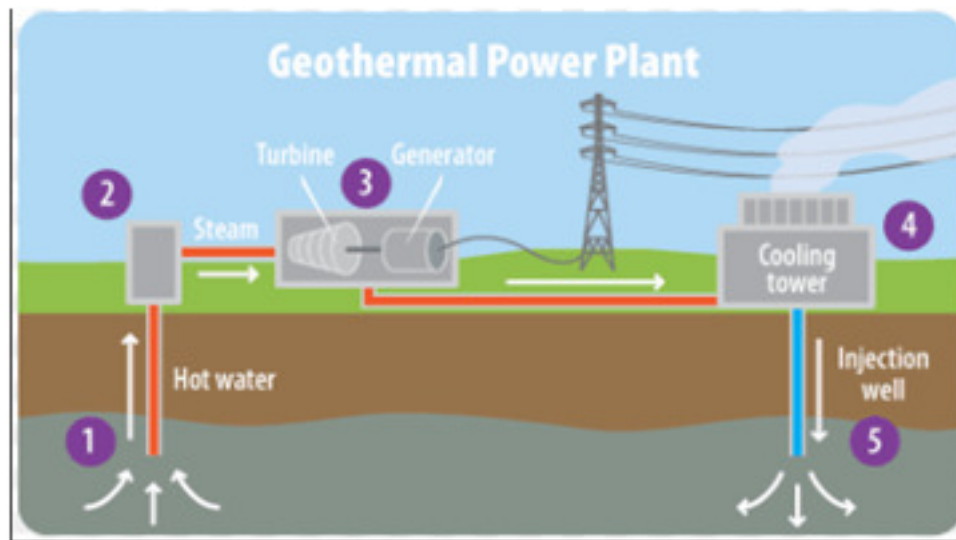
CSP Power Plant Diagram



Wind Farms Power Plant
Diagram



Hydro Power Plant
Diagram



Geo Thermal Power Plant
Diagram

Power Plant Technology

Top tier conventional Gas Turbine Manufacturer:
Alstom, GE, Mitsubishi, Siemens, Ansaldo.

Top tier Wind Turbine Manufacturer:
Vestas, GE, Siemens, Goldwin.

Top tier Photovoltaic Manufacturer:
Bosch, Conergy, Jinko, Suntech.

Top tier Hydro turbine Manufacturer:
Francis, GE

Global Power Plant Reinsurance Markets

- ▶ Reputable lead power company market(s):
AIG, Chubb, LIU, CCALA, AGCS.
- ▶ Reputable lead Lloyds Syndicate market(s):
Hardy, Millennium, Novae, Starstone, Talbot, Travelers, TM Kiln.
- ▶ Technical submission:
Proven technology, running hours, fleet leaders, model and variance, PPA review against Max IP period, Lenders' driven or Principal/EPC.
- ▶ Typical structure placement:
Ground up and layered structure lead by Lloyds Markets.
- ▶ Typical policy coverage:
CAR, DSU, 1st Year Ops, PD, BI, CAR TPL, Operational TPL

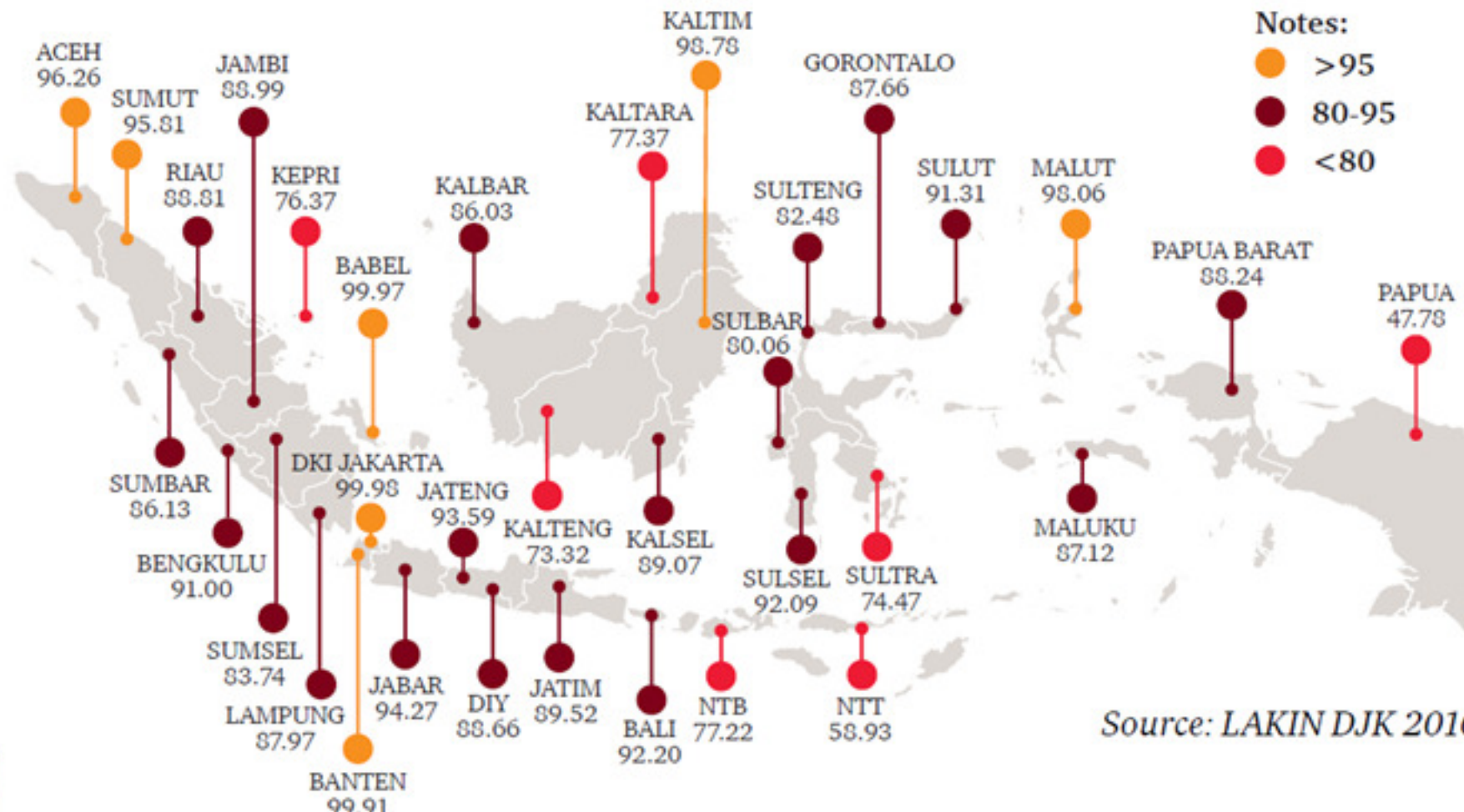
Power Plant in Indonesia (1 / 5)

In total, the PLN operated over 5,000 plants across Indonesia of which over 4,500 were small diesel plants outside of Java.

Distribution is also uneven with consumption higher in more industrialised areas, such as the western part of Java. Similarly, the level of access to the grid is mixed with electrification rates in the western part of the country as high as 99.98% (i.e. DKI Jakarta), and in the eastern part of the country as low as 47.78% (i.e. Papua).

Power Plant in Indonesia (2 / 5)

Figure 1.3 – 2016 Electrification rates in Indonesian provinces (in percentage)



Source: LAKIN DJK 2016

Power Plant in Indonesia (3 / 5)

Indonesia also has enormous potential in renewable resources, as outlined in

Table 1.1 - Renewable energy resources in Indonesia

Source	Potential Power Generation
Hydropower	75 GW
Geothermal	29 GW
Biomass/biogas	32.6 GW
Solar Photovoltaic ("PV")	207.8 GWp (4.80 kWh/m ² /day)
Wind Power	60.6 GW (3 – 6 m/s)
Ocean	17.9 GW

Source: 2016 EBTKE Statistics issued by Directorate General of New and Renewable Energy and Energy Conservation ("DGNREEC")

Power Plant in Indonesia (4 / 5)

Historical Data:

UWR Year	Plant	TD Lines	Sub Station	Total
2007	USD -	USD 12,866,378.65	USD -	USD 12,866,378.65
2009	USD 5,000,000.00	USD -	USD -	USD 5,000,000.00
2010	USD 1,457,156.53	USD 93,345.18	USD -	USD 22,936,424.67
2011	USD 23,482,096.74	USD 19,984,154.13	USD 202,859.62	USD 67,200,327.76
2012	USD 34,789,177.26	USD -	USD 4,218,934.23	USD 79,781,882.39
2013	USD 370,048,056.90	USD 122,397,019.60	USD 30,117,081.82	USD 1,843,115,027.74
2014	USD 166,432,444.97	USD 110,030,498.48	USD 25,313,203.86	USD 894,812,305.79
2015	USD 271,637,869.66	USD 41,025,637.77	USD 19,856,509.19	USD 1,786,685,236.62
2016	USD 8,032,706.77	USD 194,637,759.46	USD 17,810,186.43	USD 3,894,808,805.79
2017	USD 571,595,780.73	USD 152,884,666.19	USD 106,719,298.28	USD 1,926,106,802.80
	USD 1,452,475,289.56	USD 653,919,459.46	USD 204,238,073.44	

Power Plant in Indonesia (5 / 5)

A summary of transmission lines for each significant island in Indonesia is as follows (in kmc):

Region/Islands	25-30 kV	70 kV	150 kV	275 kV	500 kV	Total
Sumatera	-	379	10,245	1,694	-	12,318
Java-Bali	56	3,035	14,406	-	5,056	22,553
Kalimantan	-	123	3,391	163	-	3,677
Sulawesi	4	911	4,124	-	-	5,039
Papua and Maluku	-	221	-	-	-	221
Nusa Tenggara	-	-	256	-	-	256
Total	60	4,669	32,422	1,857	5,056	44,064

Source: 2016 PLN Statistics

A summary of substation transformer capacity for each of the significant islands in Indonesia is as follows (in MVA):

Region/Islands	<30 kV	70 kV	150 kV	275 kV	500 kV	Total
Sumatera	-	615	11,393	1,660	-	13,668
Java-Bali	-	2,921	47,276	-	28,500	78,697
Kalimantan	-	47	2,409	500	-	2,956
Sulawesi	30	1,015	2,138	-	-	3,183
Papua and Maluku	-	125	-	-	-	125
Nusa Tenggara	-	-	270	-	-	270
Total	30	4,723	63,486	2,160	28,500	98,899

Source: 2016 PLN Statistics

Typical Power Plant Losses in Indonesia

- ▶ Fails to meet OEM recommended inspection cycle
- ▶ Age of turbine
- ▶ Quality of fuel supply fails below OEM recommended level
- ▶ EPC contractor fails to follow EPC contract related to critical equipment erection procedures as per OEM recommendation (if its not a turnkey contract)
- ▶ Lackness in following up bulletin TIL (Technical Information Letter) update

Q&A session

