

Geothermal Power Plant Development in Indonesia

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*Training for Engineers on
Geothermal Power Plant
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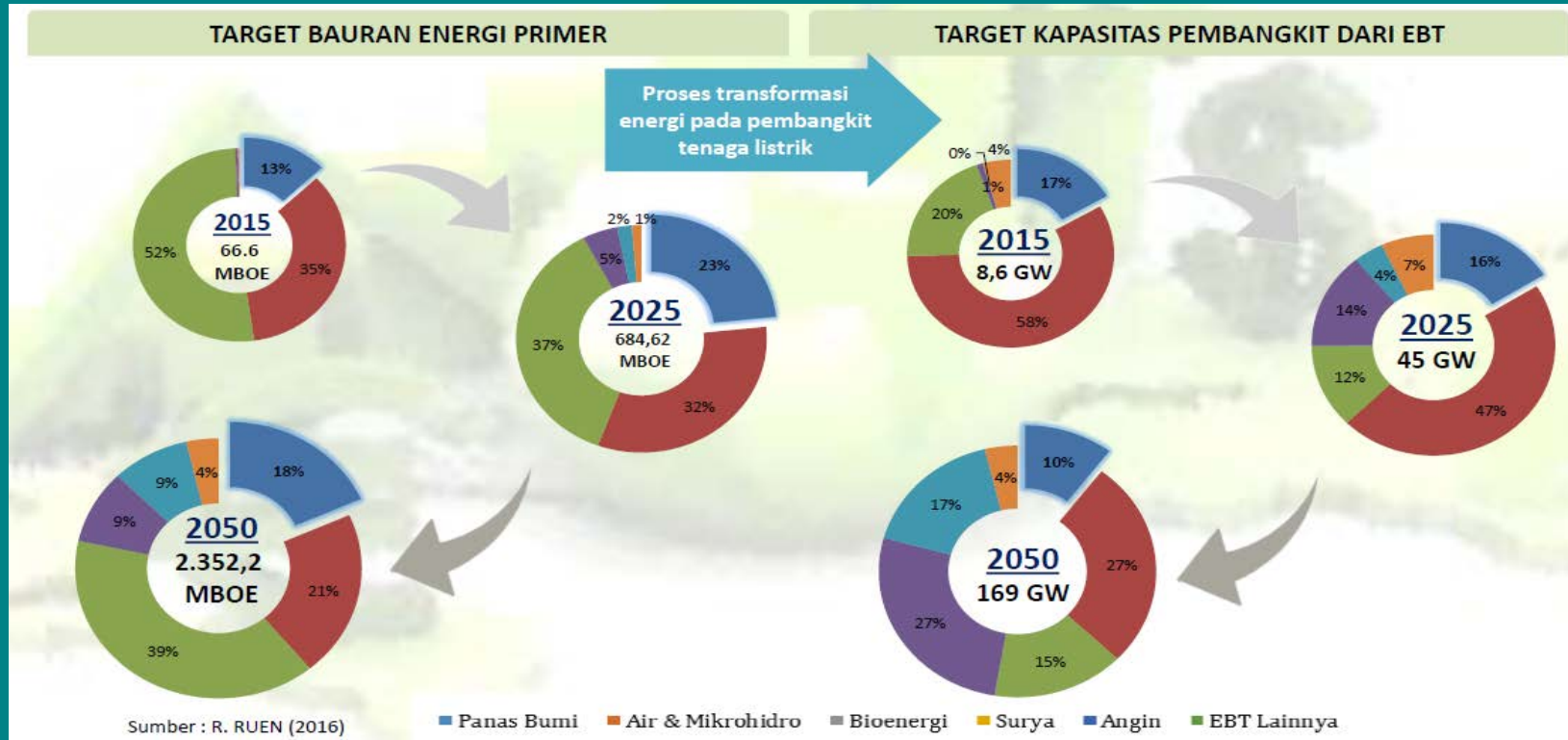


Introduction

- The potency of geothermal resource in Indonesia is identified as 11,073 MW and reserve as 17,506 MW while the indirect utilization as the electricity generation reaches 1,698.5 MW or 9.3% of the total reserve.
- The geothermal energy is in-situ energy and has different characteristic for each location (site specific).
- The government regulation No.79/2014 on National Energy Policy (KEN) states that the renewable energy should contribute about 23% in 2025 and the geothermal energy is expected to give share of 5.4% of the total energy consumption.



Geothermal Development Target



Source: Bappenas



Geothermal Potential Distribution Map

Status : July 2017

BADAN GEOLOGI
GEOLOGICAL AGENCY



KEMENTERIAN ENERGI DAN SUMBER DAYA MINERAL
MINISTRY OF ENERGY AND MINERAL RESOURCES

PUSAT SUMBER DAYA MINERAL BATUBARA DAN PANAS BUMI
CENTER FOR MINERAL COAL AND GEOTHERMAL RESOURCES



- 334 Locations Geothermal Area
- 71 Locations Geothermal Working Area
- Installed Capacity = 1,698.5 MWe (10 WKP)

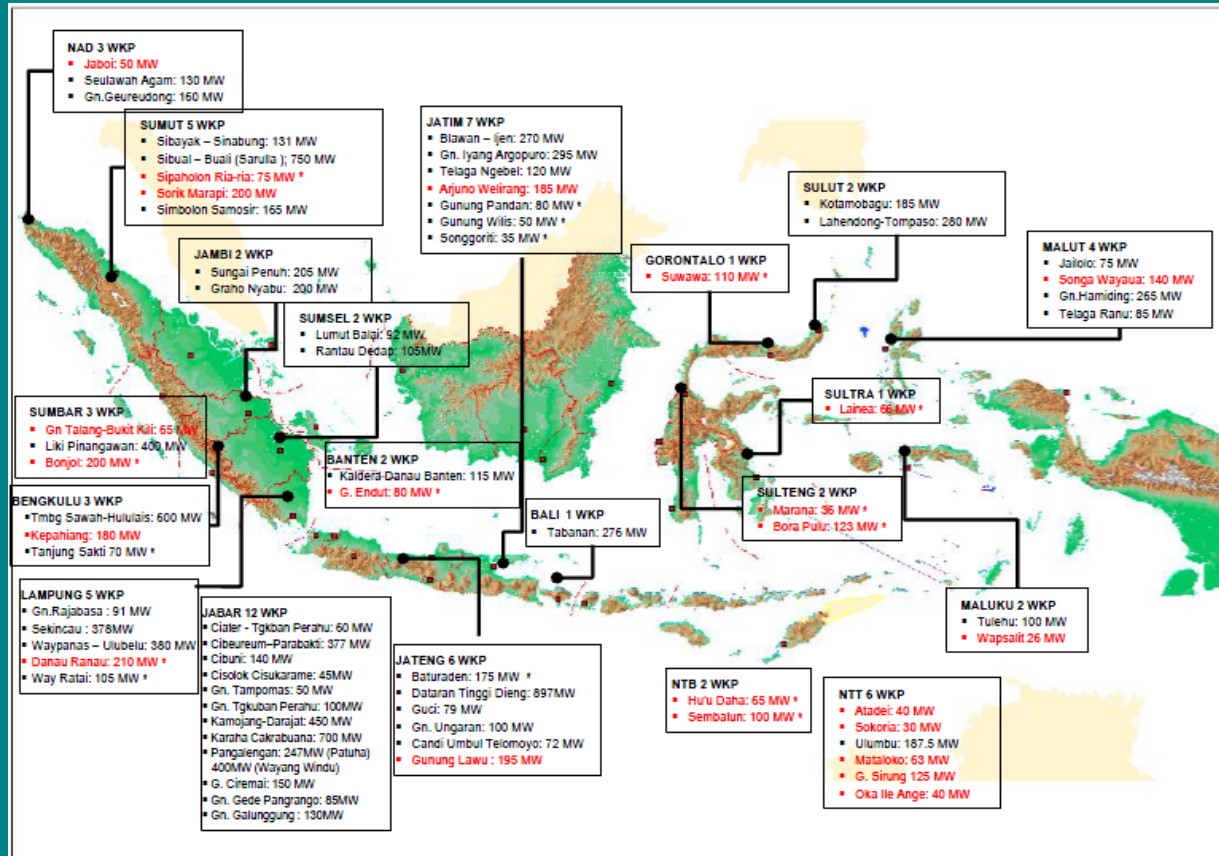
Total Potential:
28.7 GWe

- Installed
- Detailed Survey
- Ready to Develop
- Preliminary Survey

Source: Geological
Agency, MEMR
Status: July, 2017



Geothermal Potential Distribution Map

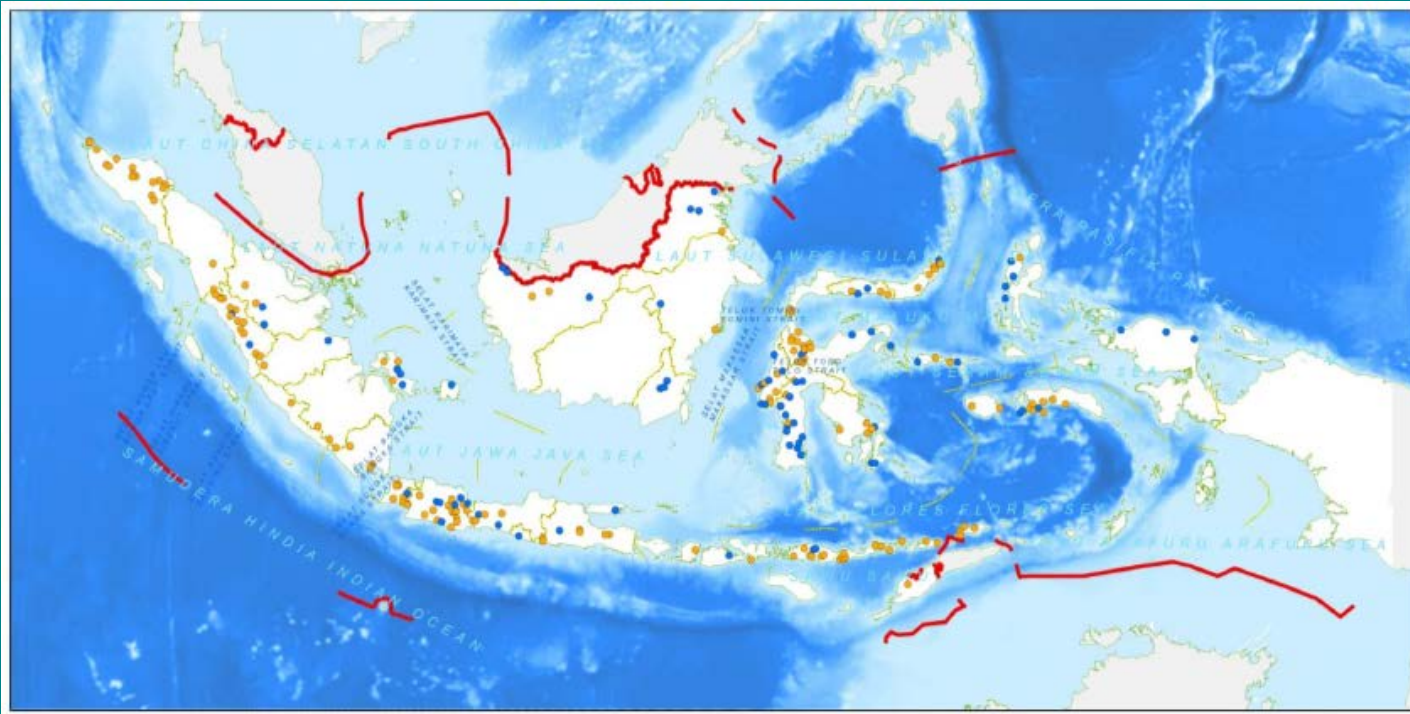


- Total Working Areas: 71
- Total potential: 13,000 MW
- Medium enthalpy : 16

Source: Geological Agency, MEMR
Status : December, 2016



Geothermal Field Distribution Based On Reservoir Temperature



Source: Geological Agency, MEMR

- Orange dot: Medium Enthalpy = 166 Locations
- Blue dot: Low Enthalpy = 80 Locations



Geothermal Potential Distribution Based On Islands

No	Pulau	Jumlah Lokasi	Energi Potensi (Mwe)					Terpasang
			Sumber Daya		Cadangan			
			Spekulatif	Hipotetis	Terduga	Mungkin	Terbukti	
1	Sumatera	97	2.893	1.935	5.097	930	917	342
2	Jawa	73	1.410	1.689	3.949	1.373	1.865	1.224
3	Bali	6	70	22	122	110	30	0
4	Nusa Tenggara	27	225	409	848	0	15	12,5
5	Kalimantan	14	152	17	13	0	0	0
6	Sulawesi	78	1.221	314	1.242	80	140	120
7	Maluku	33	560	91	775	0	0	0
8	Papua	3	75	0	0	0	0	0
Total		331	6.596	4.477	12.046	2.493	2.967	1.698,5 *)
			11.073		17.506			

Source: Geological Agency, MEMR
Status: June, 2017



Low-Medium Geothermal Potential

No	PULAU / ISLAND	JUMLAH LOKASI / NUMBER OF LOCATION	SUMBER DAYA / RESOURCES (MWe)		CADANGAN /RESERVES (MWe)			TERPASANG / INSTALLED (MWe)	Lokasi / Location Temperatur / Termperature	
			Spekulatif / Speculative	Hipotetis / Hypothetical	Terduga / Possible	Mungkin / Probable	Terbukti / Proven		Menengah / Medium	Rendah / Low
1	Sumatera	97	2883	1935	5097	930	917	177	48	9
2	Jawa	73	1410	1689	3949	1373	1865	1224	38	13
3	Bali	6	70	22	122	110	30	0	-	-
4	Nusa Tenggara	27	225	409	848	0	15	12,5	20	3
5	Kalimantan	14	152	17	13	0	0	0	3	10
6	Sulawesi	78	1221	314	1242	80	140	120	42	32
7	Maluku	33	560	91	775	0	0	0	15	10
8	Papua	3	75	0	0	0	0	0	-	3
	Total	331	6596	4477	12046	2493	2967	1533,5	166	80
			11073		17506					

Source: Geological Agency, MEMR
Status: December, 2016



Number of Geothermal Potential Locations According to Enthalpies

No.	Jenis Entalpi	Jumlah Titik	Total Sumber Daya (MW)		Total Cadangan (MW)		
			Speculative	Hypothetic	Possible	Probable	Proven
1	Rendah	46	556	105	44	0	0
2	Rendah - Menengah	8	130	13	14	0	0
3	Medium	85	2200	523	802	0	0
4	Medium - Tinggi	10	324	125	46	0	0
Total		149	3210	766	906	0	0

Source: Geological Agency, MEMR
Status: June, 2017



Current Situations

Potensi Panas Bumi



Resources 11.073 MW

Reserve 17.506 MW

Badan Geologi, Desember 2016

Wilayah Kerja Panas Bumi



70 WKP

- Eksisting 19 WKP
- Baru 51 WKP

Investasi



USD 0,44 Miliar

- 39,6% dari target USD 1,104 M di tahun 2017 (data per Juni 2017)

Regulasi (2017)



- PP 7 Tahun 2017 → Pemanfaatan Tidak Langsung
- Permen ESDM No. 21/2017 → Limbah Lumpur dan Sumur Bor
- Permen ESDM No. 23/2017 → Bonus Produksi
- Peraturan Menteri ESDM No. 36/2017 → PSP dan PSPE
- Peraturan Menteri ESDM No. 37/2017 → WKP

Kapasitas Terpasang



1.698,5 MW

- 12 PLTP pada 10 WKP
- Pemanfaatan 9,3% dari cadangan panas bumi Indonesia

Produksi Listrik



5,98 GWh

- 51% dari target 11,6 GWh di tahun 2017 (data per Juni 2017)

Produksi Uap



44,50 Juta Ton

- 51% dari target 86,72 Juta Ton di tahun 2017 (data per Juni 2017)

PNBP

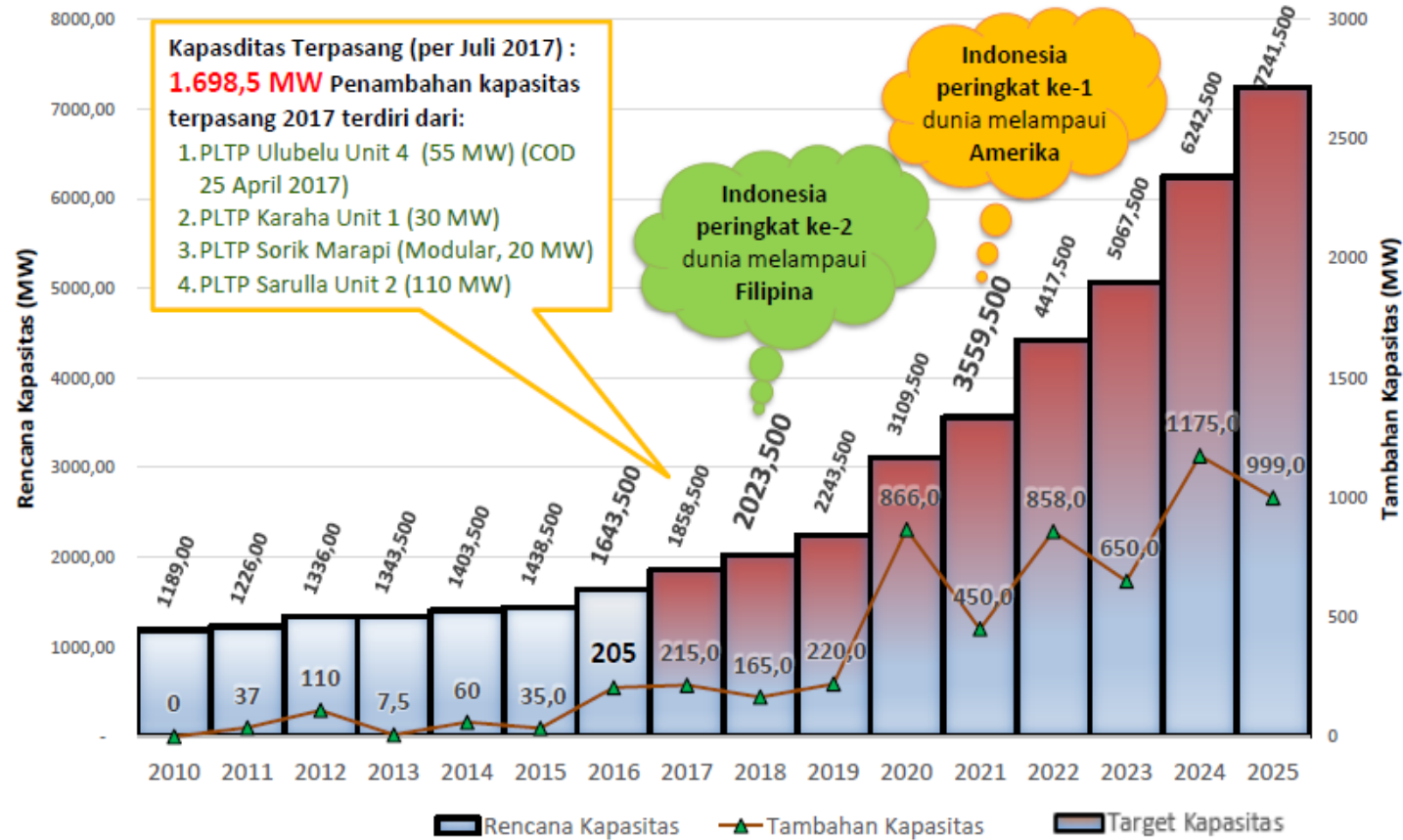


Rp 0,25 Triliun

- 37,6 % dari target Rp 0,66 Triliun di tahun 2017 (data per Juni 2017)

Source: Directorate of Geothermal, EBTKE, MEMR





Source: Directorate of Geothermal, EBTKE, MEMR

*Asumsi: Filipina (1.870 MW) dan Amerika (3.450 MW) tidak mengalami penambahan kapasitas



Installed Capacity

No.	WKP, Lokasi	PLTP	Pengembang/ Operator	Kapasitas Turbin	Kapasitas Total (MW)
1	Sibayak – Sinabung, SUMUT	Sibayak	PT. Pertamina Geothermal Energy	1 x 10 MW; 2 MW(monoblok)	12
2	Cibeureum – Parabakti, JABAR	Salak	Chevron Geothermal Salak, Ltd	3 x 60 MW; 3 x 65,6 MW	377
3	Pangalengan, JABAR	Wayang Windu	Star Energy Geothermal Wayang Windu	1 x 110 MW; 1 x 117 MW	227
		Patuha	PT Geo Dipa Energi	1 x 55 MW	55
4	Kamojang – Darajat, JABAR	Kamojang	PT. Pertamina Geothermal Energy	1 x30 MW; 2 x 55 MW; 1 x 60 MW; 1 x 35 MW	235
		Darajat	Chevron Geothermal Indonesia, Ltd	1 x 55 MW; 1 x 94 MW; 1 x 121 MW	270
5	Dataran Tinggi Dieng, JATENG	Dieng	PT. Geo Dipa Energi	1 x 60 MW	60
6	Lahendong – Tompasso, SULUT	Lahendong	PT. Pertamina Geothermal Energy	6 x 20 MW	120
7	Waypanas – LAMPUNG	Ulubelu	PT. Pertamina Geothermal Energy	4 x 55 MW	220
8	Ulumbu - NTT	Ulumbu	PT. PLN (Persero)	4 x 2,5 MW	10
9	Mataloko - NTT	Mataloko	PT. PLN (Persero)	1 x 2,5 MW	2,5
10	Sibual-Buali - SUMUT	Sarulla	Sarulla Operation Ltd.	1 x 110 MW	110
TOTAL					1.698,5

Source: Directorate of
Geothermal, EBTKE,
MEMR
Status : June, 2017



Selected geothermal fields



Sibayak '95
Reserve: 170 MW
Production: 12 MW



Dieng '02
Reserve: 580 MW
Production: 60 MW



Lahendong '01
Reserve: 175 MW
Production: 60 MW



Gunung Salak '94
Reserve: 600 MW
Production: 375 MW



Wayang Windu '99
Reserve: 385 MW
Production: 227 MW



Darajat '94
Reserve: 432 MW
Production: 255 MW



Kamojang '83
Reserve: 333 MW
Production: 200 MW

Source: Directorate
of Geothermal,
EBTKE, MEMR



Geothermal Development Obstacles in Indonesia

- Lack of subsurface data and information of the offered working areas, so that the risk of development is high.
- Licensing is not easy for geothermal development in forest area, especially in forest conservation.
- The regulations are not synchronized among ministries and even local government.
- Electricity pricing is not attractive for investors.
- The rejection from community (social problems).
- Political situation (local) may affect the continuation of the development.
- Tender processes (the bidding winners fail to implement the program)



Thank You

