



March 2016, Bandung

Outlook Indonesian Energy Mix

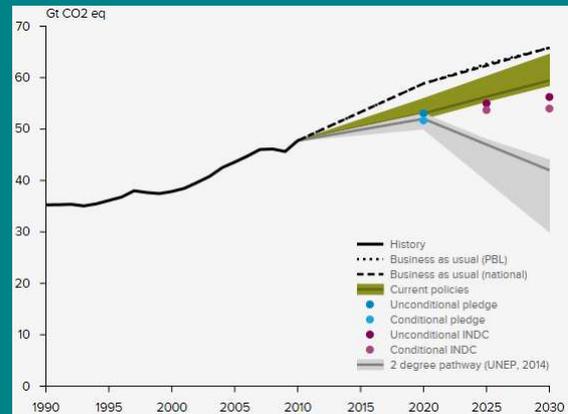
Pre-workshop ITB
Ali Ashat

INDC submission Indonesia

- Government claims:
- 6% 2014 → 23% 2025 → 31% 2050 (article Tia)

Paris Climate Conference (COP21)

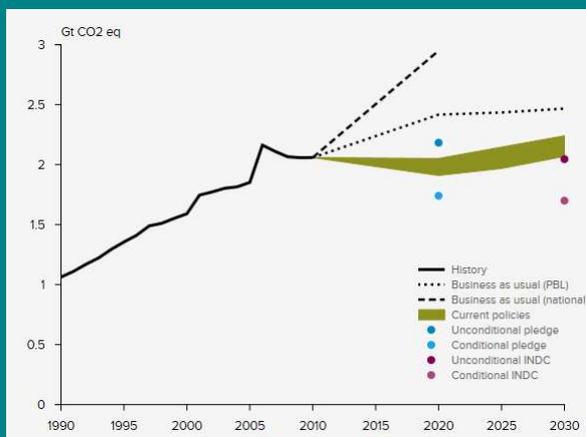
- New binding climate agreement
- Keeping the rise in temperature below 2°C
- Rich, developed countries should help developing countries with money to reduce their emissions. Every year there should be EUR 91 billion available
- The agreement will enter into force (and thus become fully effective) only if 55 countries which produce at least 55% of the world's greenhouse gas emissions ratify the Agreement
- Rachmat Witoelar, Indonesian President Joko Widodo's Special Envoy for Climate Change, said Indonesia supports the 1.5°C warming cap in the agreement instead of its previously committed 2°C.



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Indonesia

Share of global emissions in 2010: 4.3 %



Mitigation measure(s) with highest impact:

- Forestry measures (policies on logging and controlling peat land fires) including the FLEGT programme
- Target of a 15% to 23% share of renewable energy in primary energy supply by 2025 (National Energy Policy)
- Biofuel quota: 15% share of biofuels in all transport fuels by 2025

Result(s)

- The projected 2020 and 2030 emission levels resulting from the policies show a wide range due to the uncertainty in emissions from LULUCF.
- The uncertainty makes it difficult to determine the ambition level of the pledge and whether the pledge and INDC will be achieved.



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Challenges to geothermal investments

- High upfront costs for exploration
- Insufficient financial support, incentive, tariffs
 - Create framework to identify risks & costs, so that measures can be taken
- Limited information & data base on resources
 - Risk mitigation by portfolio management
 - Development of failure database
- Limited technical knowledge/ experience
 - WP 1.05
- Location of geothermal fields in conservation/ protected forest/ rural areas
 - Equatorial principles



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New Geothermal Law Indonesia

- Target: increase GT capacity from 1.4 GW (2015, from ca 300 locations) to 3.2 GW (2020). And in 2025, capacity should be 5.0/6.5/9.5 GW (unofficial estimates)
- New GT law should stimulate this
- Some characteristics: GT is no longer a mining activity, i.e. no royalty on depletable resource, environmentally less constrained
 - 2 types of licenses: indirect and direct utilization (indirect : conversion to e)
 - If indirect license, PLN must construct a transmission line
 - PLN must prepare a PPA – Power Purchase Agreement
 - Feed-in tariff is geographically determined
 - Various barriers have been removed (ref. previous GT law): GT in forests, bureaucracy
 - Tendering process (license bidding) still to be formalized
 - There are potential conflicts with other energy laws in Indonesia:
 - Overlapping permits with other activities (land conflicts, access roads)
 - GFF = Geothermal Fund Facility to promote GT exploration
 - In case of bank loans, operators have difficulty in providing adequate collateral
 - Authorities assess the financial capabilities and work programme of the bidder
 - Public acceptance (nimby) is often a problem



Risks of New Geothermal Law

- PLN is the monopolist / single buyer
- No cost recovery, long pay-out times
 - Few companies can afford this!
- Sales price is regulated, EUA price collapse does not help
 - Tariff applies as from COD (Commercial Operation Data)
- Due to geography, export not possible
- Challenges of current situation:
 - Lack of human resources
 - Tendering process to be improved
 - Pricing, funding incentives to be clarified
 - Access to site / infrastructure
 - Fiscal policies
 - High capex
 - Competition from coal; risks of renewable energy >> conventional energy
 - Banks do not understand GT
 - Lack of incentives for GT investments
 - Capex required to meet 5 GW target: \$ 20 billion



Indonesia

- 4th populous nation in the world
- Developing economy with annual economic growth (5-6%)
- Major player in world energy economy:
 - - leading steam coal exporter
 - - substantial LNG exporter
 - - net oil exporter (until recent)
- → need to develop country's RE sources



Barriers

- Economic barriers - higher capital costs for geothermal than fossil
- Regulatory barriers - absence of a clear regulatory framework
- Financial risks - project risks like credit, contractual and fuel supply risks
- Market related risks - political risk and macroeconomic risk

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Pricing

- Taxation schemes on emission? Or disincentives to emit CO₂?
- Electricity tariffs for individual consumers are politically determined by the government who pursues a social tariff-setting scheme
- price issues have considerably undermined investment in geothermal energy since the high upfront risk in developing the resource calls for higher prices per kWh. But PLN is not willing to offer competitive prices to attract investors as its cost recovery is bound by politically mandated tariffs
- Government of Indonesia allows PLN to pay up to USD 9.7 cents per kWh of geothermal energy, however Geothermal resources are diverse in size, temperature, and fluid characteristics and thus entail differences in the exploration, production, and the associated uncertainty

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- Hence, in order to overcome existing financial barriers and promote geothermal development, the focus must be on seeking a balance in distributing these risks between the government and public investor
- Governments finance identification and exploration of fields until the commercial feasibility of the projects is established and then invite tenders to bid for the development, construction and operation of the field. Here, government assumes the biggest risk, which will help them to obtain better prices for electricity production while simultaneously attracting investors.
- This type of mechanism has been used successfully to promote geothermal development in e.g. the Philippines, Iceland and Japan

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New geothermal law – 26 Aug 2014

Improvements to some of the issues that have hindered geothermal projects in Indonesia:

- Distribution of authority of government institutions over direct and indirect use of geothermal resources
- Forestry issues in geothermal development
- Licensing procedures

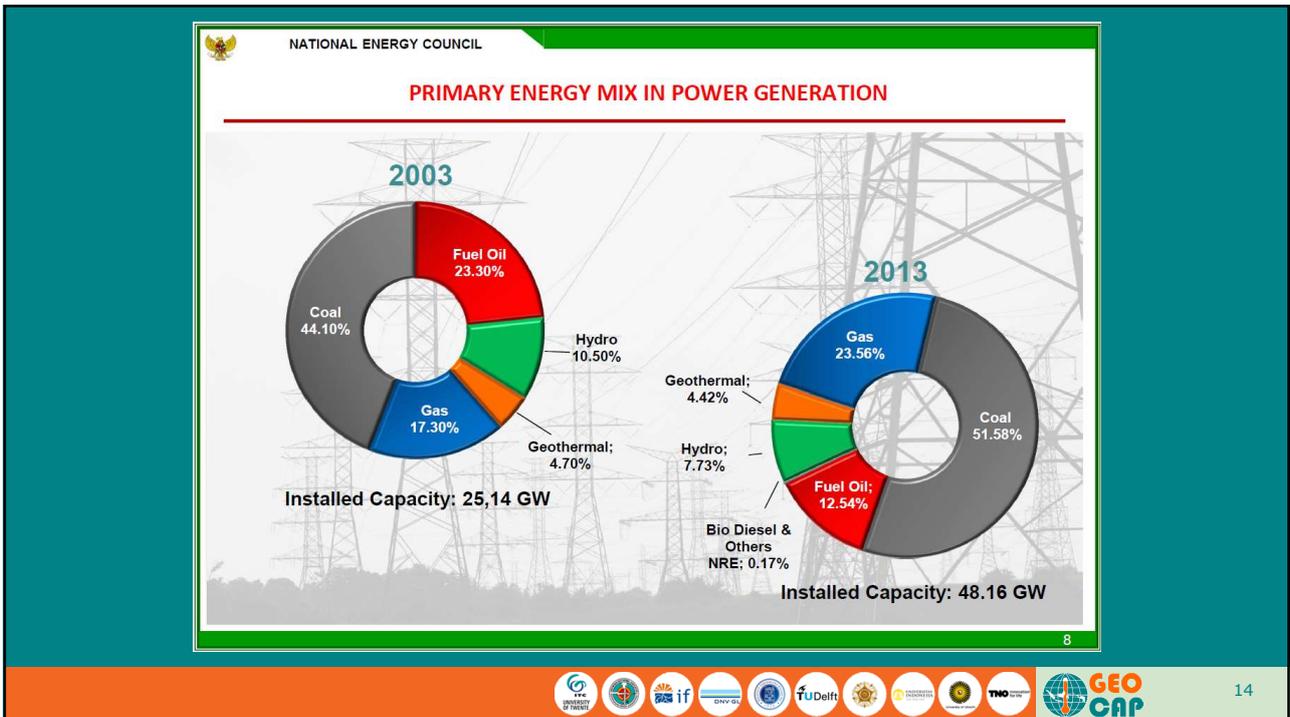
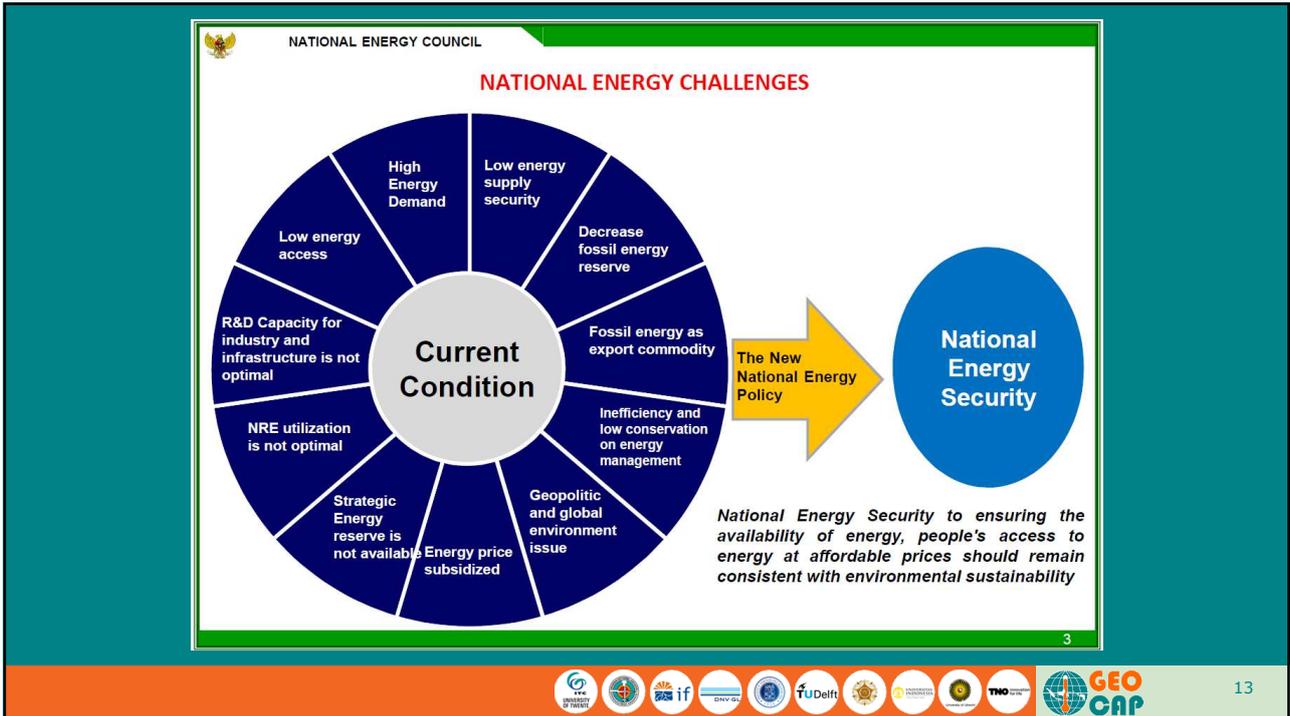
Key points of the new law included the following:

- Bill distinguishes between direct and indirect use. Law assigns authority for licencing in
 - direct use is held by central and/or provincial and/or regency government based on its location
 - indirect use to the central government only, represented by MEMR
- Geothermal activities would no longer be considered mining activities
- New geothermal projects will be developed under new, more favourable, pricing arrangements.
- Local administrations will receive a portion of the revenues derived from geothermal resources.
- Quite detailed provisions were set out regarding such things as surveys of geothermal sites, exploration, tendering procedures, the size of working areas, arrangements for determining prices and administrative sanctions, obligations of the holders of geothermal licenses, and so on

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EXPECTED CONDITIONS

CURRENT CONDITION	EXPECTED CONDITIONS
<ul style="list-style-type: none"> ▪ High Energy Demand ▪ Energy supply security has not kept up with the increase in demand ▪ Fossil energy reserve decreasing ▪ Limited access to energy : inadequate/lack of infrastructure ▪ Fossil energy as export commodity ▪ Oil imports increased ▪ Low energy efficiency and conservation in energy management ▪ NRE utilization is still not-optimal ▪ Energy reserves are limited 	<p style="text-align: center;">Increasing of National Energy Security</p> <p style="text-align: center;">Actualizing energy security and energy independency in support of sustainable national development :</p> <ul style="list-style-type: none"> ▪ change of energy management paradigm; ▪ independency on energy management; ▪ secure energy availability; ▪ optimal energy resources management; ▪ energy utilization efficient ; ▪ Increased access to energy services for the public; ▪ enhancing self-reliance in technological capability and capacity in energy industry ▪ Job/and employment availability, and ▪ conservation of the environment

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GEO GAP
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MAJOR COMPONENTS OF NATIONAL ENERGY POLICY

- Shifting paradigm in energy resource management from being treated as commodity towards development capital:
 - used for national needs
 - support and strengthen the competitiveness of national industries
 - energy resources should not be exported in the form of primary energy
- Reduce oil dependency, The share of oil on national energy mix should be less than 25% in 2025
- Increase the share of Renewable Energy to around 23% in 2025 and 31% in 2050
- Increase the access of people to energy, Electrification ratio shall be around 100% in 2020
- Enhance energy conservation, Reduce energy elasticity to less than 1 in 2025
- Establish Strategic Energy Reserves (SER)
- Energy development shall consider the balance of economic viability, energy supply security and environmental preservation

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GEO GAP
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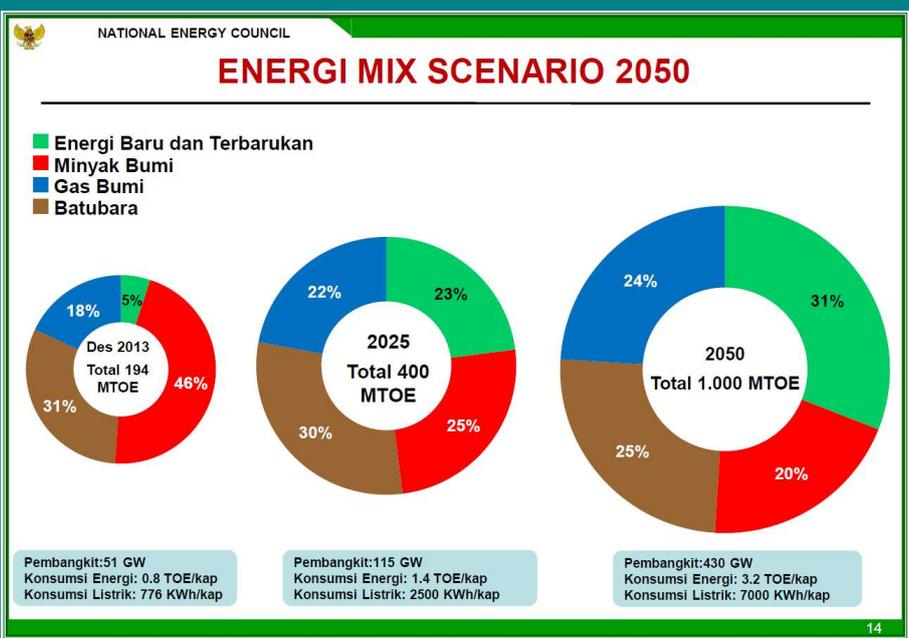
NEW AND RENEWABLE ENERGY RESOURCES

NO	TYPE	RESOURCE	INSTALLED CAPACITY (MW)	RATIO (%)
1	2	3	4	5 = 4/3
1	Hydro (MW)	75,000 MW	6,848.46 MW	9.13%
2	Geothermal (MW)	29,164 MW	1,341 MW	4.6 %
3	Biomass (MW)	49,810 MW	1,644.1 MW	3.3%
4	Solar Energy	4.80 kWh/m ² /day	22.45 MW	-
5	Wind Energy	3 – 6 m/s	1.87 MW	-
6	Ocean	49 GW ²⁾	0.01 MW ³⁾	0%
7	Uranium / Thorium (MW)	???	30 MW ¹⁾	0%

Source: Ministry of Energy and Mineral Resources , reprocessed by NEC

Note: 1) Research scale, non-energy
 2) Source: National Energy Council
 3) Research Scale: BPPT

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GEOTHERMAL DEVELOPMENT OPPORTUNITIES

- Indonesia has huge geothermal energy resources → 29 GW
- Up to the year 2014 installed capacity of 1,4 GW geothermal power plant → only 4% resources → investment opportunities
- In 2025, installed capacity of geothermal power plant is expected around 6 GW and became 13 GW in 2050

Power station

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GEOTHERMAL POTENTIAL

No.	Islands	Total Locations	Potency (MW)
1	Sumatera	90	12,760
2	Jawa & Bali	77	10,051
3	Nusa Tenggara	22	1,471
4	Kalimantan	12	145
5	Sulawesi	65	3,044
6	Maluku & Papua	33	1,146
TOTAL		299	28,617

● Preliminary Survey ● Ready to be developed
● Detailed Survey ● Installed

Source: Geological Agency, Ministry of Energy and Mineral Resources (2012)

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WHY GEOTHERMAL.....

Geothermal characteristics

- Geothermal energy is environmentally friendly
- Geothermal power is reliable power as a base load
- Limited and reversible impact of power plants on nature and society
- Geothermal energy promotes National security
- Lower cost renewable energy, stable price over exploitation time
- Less footprint
- Indigeneous resource

INDONESIA HAS TOTAL POTENTIAL GEOTHERMAL RESOURCES ESTIMATED 28.617 MW

Challenges to Geothermal Investment

- High upfront cost for exploration
- Limited information and data base on resources
- Location of geothermal fields in conservation , protectec forest and rural areas
- Insufficients financial support, incentives, tariffs
- Limited technical and institutional capacity (Scarcity of experience professionals)

INSTALLED CAPACITY CURRENTLY AT 1403 Mwe.

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WHY GEOTHERMAL.....

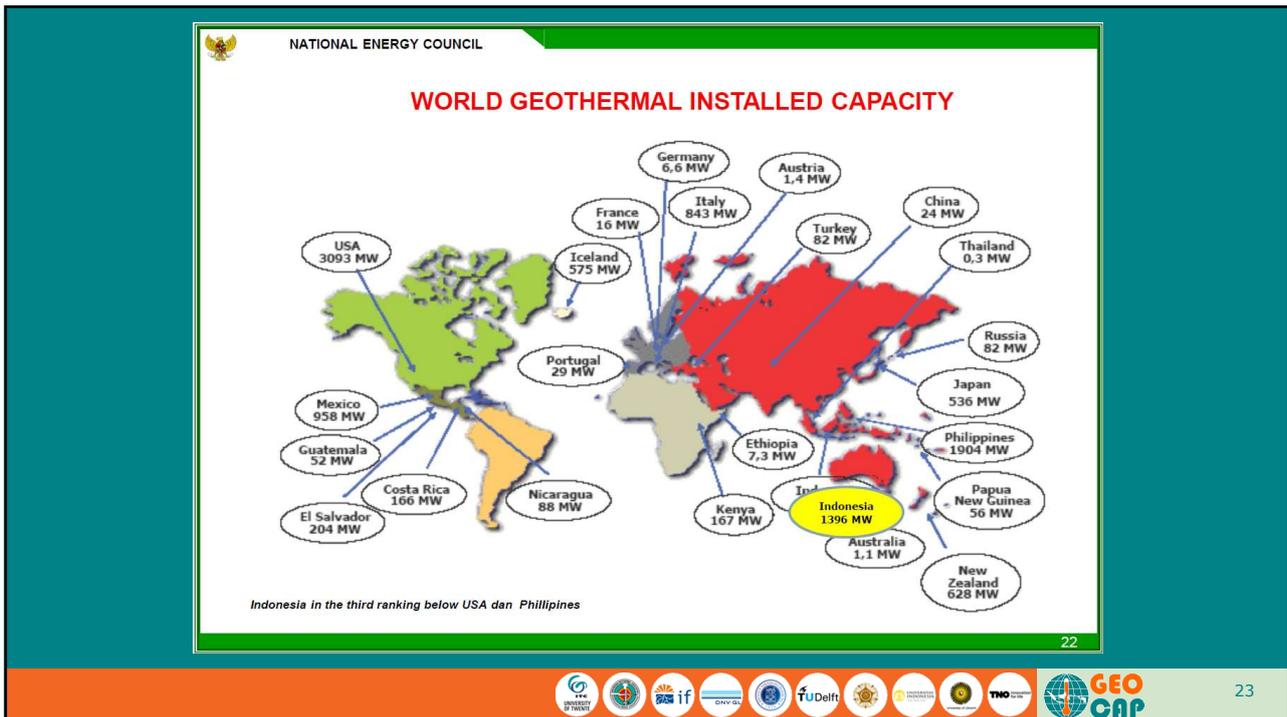
LAND USE COMPARISON (30 YEAR)

	Coal**	Solar Thermal	Photovoltaics**	Wind**	Geothermal
(sq. M)/GWh	3642	3561	3237	1335	404

Source: GEA

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Policy making

- transferred responsibility for award of concessions (Geothermal Working Areas) back to central government, under the Minister of Energy
- Development of indirect use project needs to reflect Government policy in terms of prioritisation
- addressing the regulations required to implement the new law, we need to start by understanding the geothermal development process, the various stages involved, what those stages are trying to achieve and how they interact with each other
- development process should be one of limiting risk by limiting financial exposure until the risk of failure is reduced

Taxation of geothermal in Indonesia

Non tax – fixed fees, production fees and other state levies in accordance with the provisions of legislation.

Tax – customs duties and other taxes

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Non tax – fixed fees, production fees etc

1. Fixed levy (Land rent): *Geothermal fixed levy has not yet been determined, in the mean time fixed fees for general mining apply. Levy paid to the State in return for the opportunity general investigation, exploration, feasibility studies, construction and exploitation of the mining area.*

Fixed Contribution (USD) = Province Area (Ha) x Rates (USD / ha / year)

- 20% to the Central Government
- 80% to the local government, divided as follows:
 - 16% Province
 - 64% of Regency/ city

1. Production Levy (Royalty): *Royalties are relatively small fees: 2,5 % from the sale of electricity (total project) or 5% of the sale of steam (steam field project)*

- 20% for the Central Government
- 80% for local government, divided:
 - 16% Province;
 - 32% Regency / City Produce;
 - 32% to other relevant regencies / cities in the province

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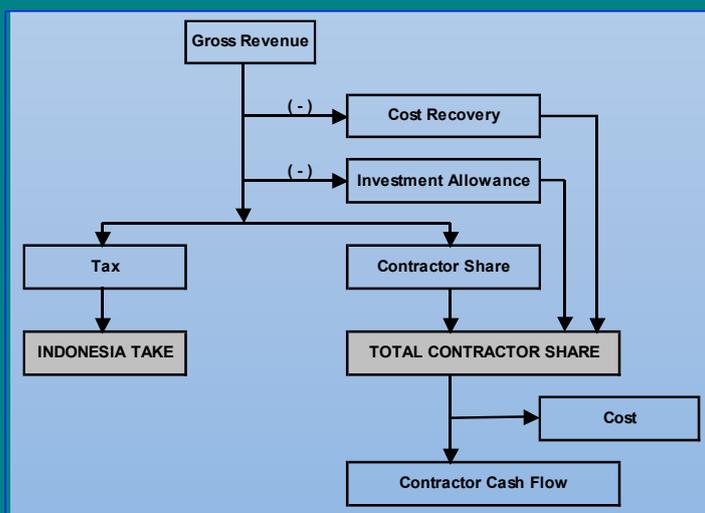
Taxes

1. Corporate tax (income tax and dividend tax)
2. Value Added Tax (VAT) - VAT is charged on goods and services in the country, the magnitude of 10%. The impact of the imposition of VAT is 10% increase in investment costs for the components of domestic goods and services.
3. Import Tax - The amount of import duties and PDRI include import duties, import VAT and Income Tax (Income Tax). Great from import duties for components that have the facility of Master List of between 0 to 10%, but for facilities that do not have a master list could reach 15%, 10% import VAT and income tax of 2.5%.
4. Other Taxes - Another tax is charged at the United Nations (Property Tax), but compared to the other tax component, the UN is relatively small

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