

# Investment to Geothermal Projects in Indonesia



ITOCHU Corporation  
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# ADVANTAGE OF GEOTHERMAL

|            | Capacity Factor | CO2(*) (g/kWh) |
|------------|-----------------|----------------|
| Geothermal | 90 % +          | 170            |
| Solar PV   | 8 – 20 %        | 90             |
| Wind       | 20 – 30 %       | 25             |
| Hydro      | 20 – 70%        | 41             |
| Coal       |                 | 1,004          |
| Gas        |                 | 543            |

(\*) Average greenhouse gas emission expressed as CO2 equivalent for individual energy generation technologies.

Source :  
RenewableandSustainableEnergyReviews42(2015)1464–1474

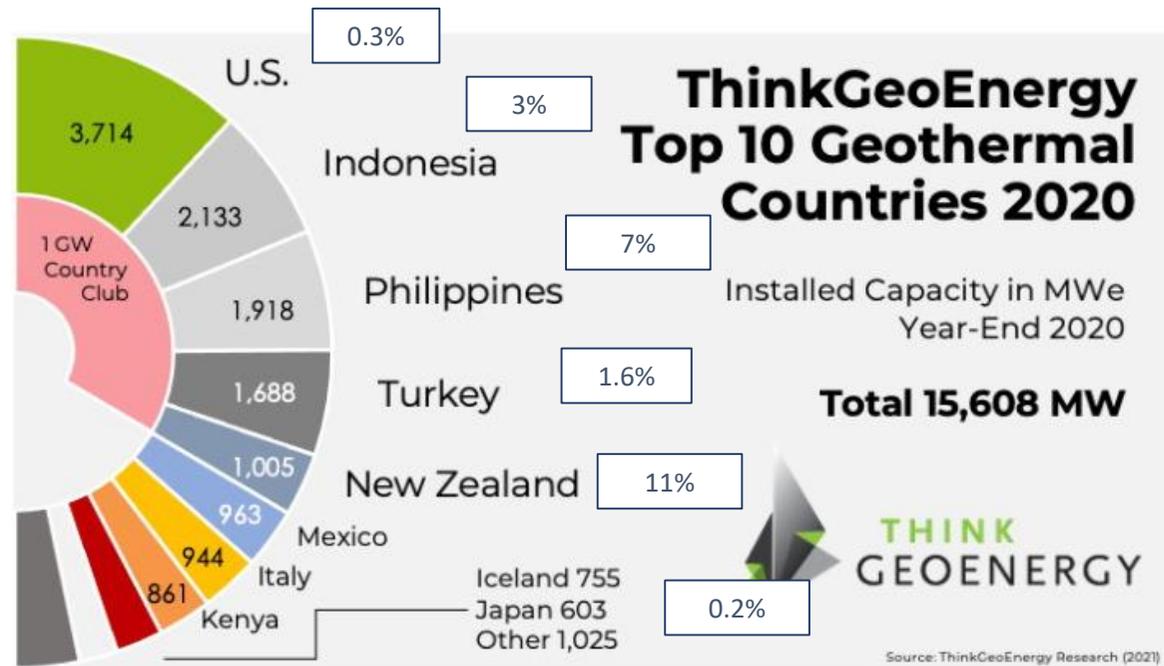
- ❑ Advantage against Other Renewable Energy
  - 24hrs Baseload
    - Independent from weather conditions
    - No restriction due to battery capacity
    - Suitable for weak power grid
  - High Capacity Factor
- ❑ Advantage against Fossil Fuel Generation
  - Effective utilization of non-exportable natural resources
  - Low CO2 emission
    - ex. Sarulla Geothermal Project, qualified for Clean Technology Fund and Canadian Climate Fund by ADB, annually reports around 1.4 million tons of CO2 reduction as part of the bank's monitoring program.

# INDONESIA IN WORLD GEOTHERMAL INDUSTRY

## Indonesia - Advantage

- ❑ Outstanding Potential - More than 23GW
- ❑ World 2nd Ranking in Installed Capacity
- ❑ Experienced Experts
- ❑ Matured Service & Supply Chain for Industry

Geothermal share against national electricity capacity (%)

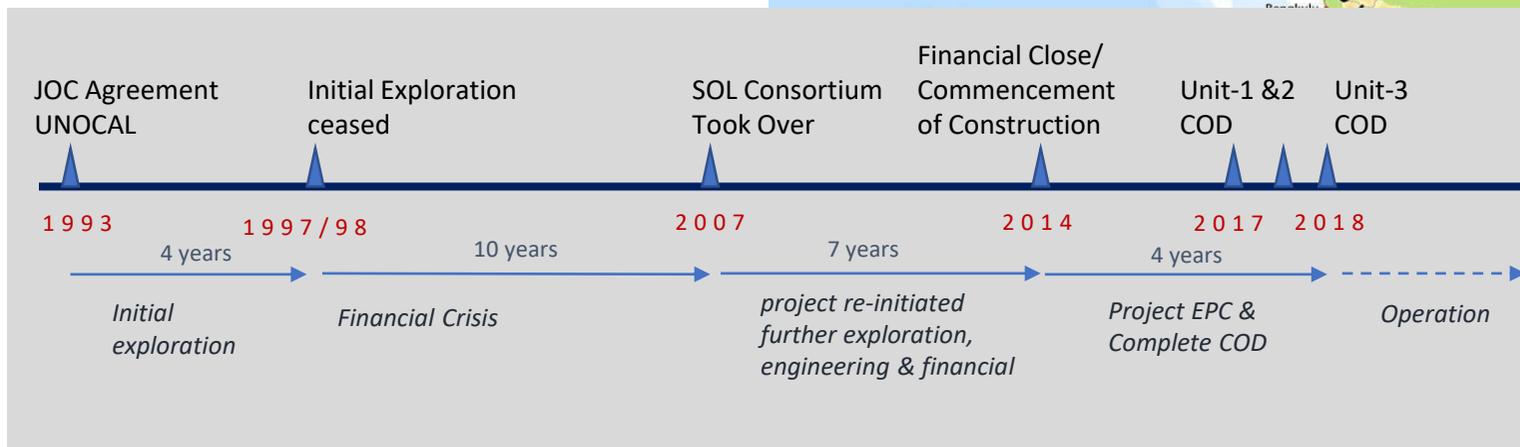
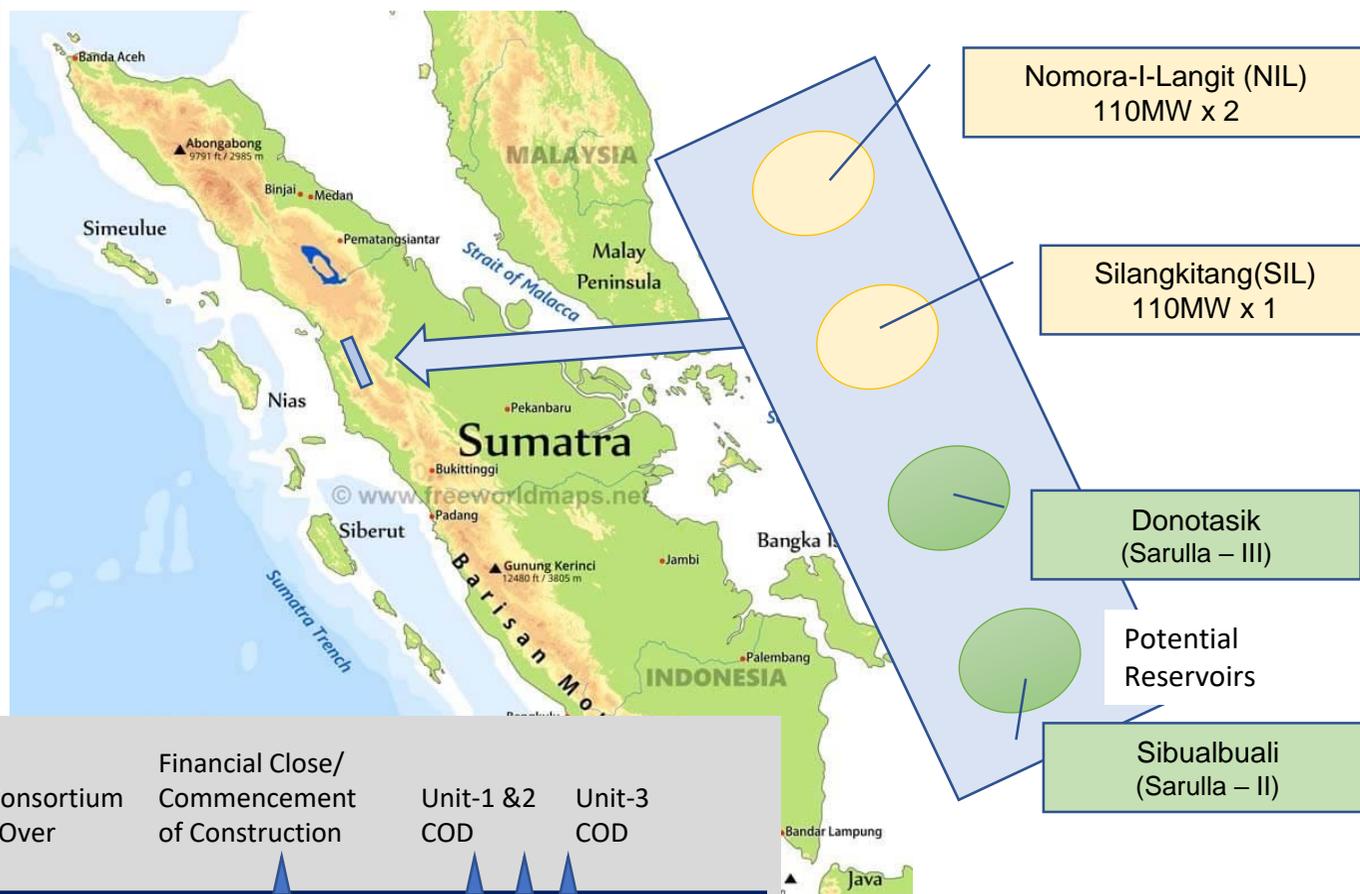


ThinkGeoEnergy Top 10 Geothermal Countries - year-end 2020 (source: ThinkGeoEnergy)

# PRIVATE SECTOR DEVELOPMENT

## Sarulla Geothermal Power Project

|             |   |
|-------------|---|
| Location    | North Tananuli Regency,<br>North Sumatera   |
| Capacity    | 110MW x 3 Units<br>(SIL, NIL-1, NIL-2)  |
| Sponsors    | PT Medco Power Indonesia<br>ITOCHU Corporation<br>Kyushu Electric Power Co., Inc.<br>INPEX<br>ORMAT International, Inc. |
| Project Co. | Sarulla Operations Ltd. ("SOL")   |



# PRIVATE SECTOR DEVELOPMENT

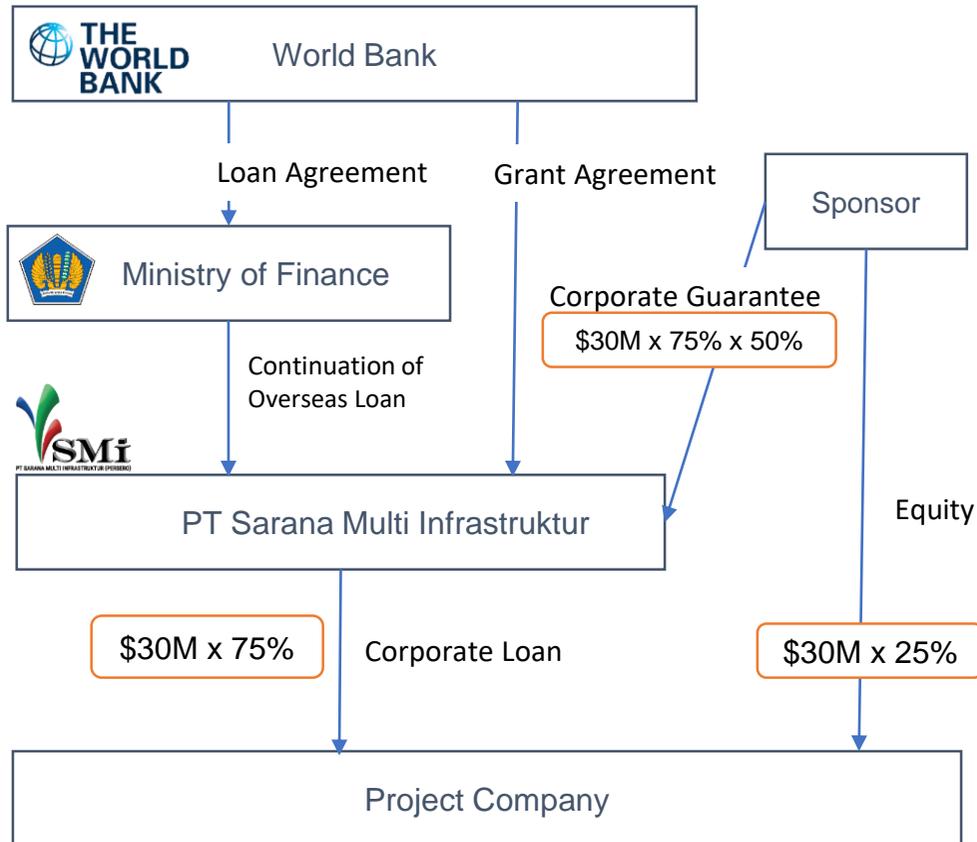
- ❑ 700MW projects completed in the last 4 years
- ❑ Out of 700MW, 460MW by the private sector
- ❑ Out of 460MW, 415MW (+ 90MW under construction) by JBIC/ADB/NEXI  
→ Total Commitment > \$2,000 Million
- ❑ Geothermal Projects remain challenging to Project Finance
  - Geothermal Unique Risks
  - Project Scale Merit

| Project      | Developers                       | Year                     | MW   | Finance  |
|--------------|----------------------------------|--------------------------|------|--|
| Sarulla      | Sarulla Operation Ltd.           | 2017-18                  | 330  | JBIC(\$490M) , JBIC EPRG(\$330M), ADB (\$350M) |
| Lahendong    | PT. PGE                          | 2016                     | 40   |  |
| Ulubelu      | PT. PGE                          | 2016 -17                 | 110  |  |
| Karaha       | PT. PGE                          | 2018                     | 30   |  |
| Lumut Balai  | PT. PGE                          | 2019                     | 55   |  |
| Sorik Marapi | PT Sorik Marapi Geothermal Power | 2019 Partially Completed | 42   | Bank of China(\$120M), EXIM China(\$120M)      |
| Muara Laboh  | PT Supreme Energi Muara Laboh    | 2019                     | 85   | JBIC(\$200M), ADB(\$110Mil), NEXI(\$130Mil)    |
| Rantau Dedap | PT Supreme Energi Rantau Dedap   | Under Construction       | [90] | JBIC(\$190M), ADB(\$225Mil), NEXI(\$130Mil)    |

Source: JBIC, ADB, NEXI, World Bank Websites, numbers in approximate

# PRIVATE SECTOR DEVELOPMENT

## GREM Facility for Geothermal Exploration



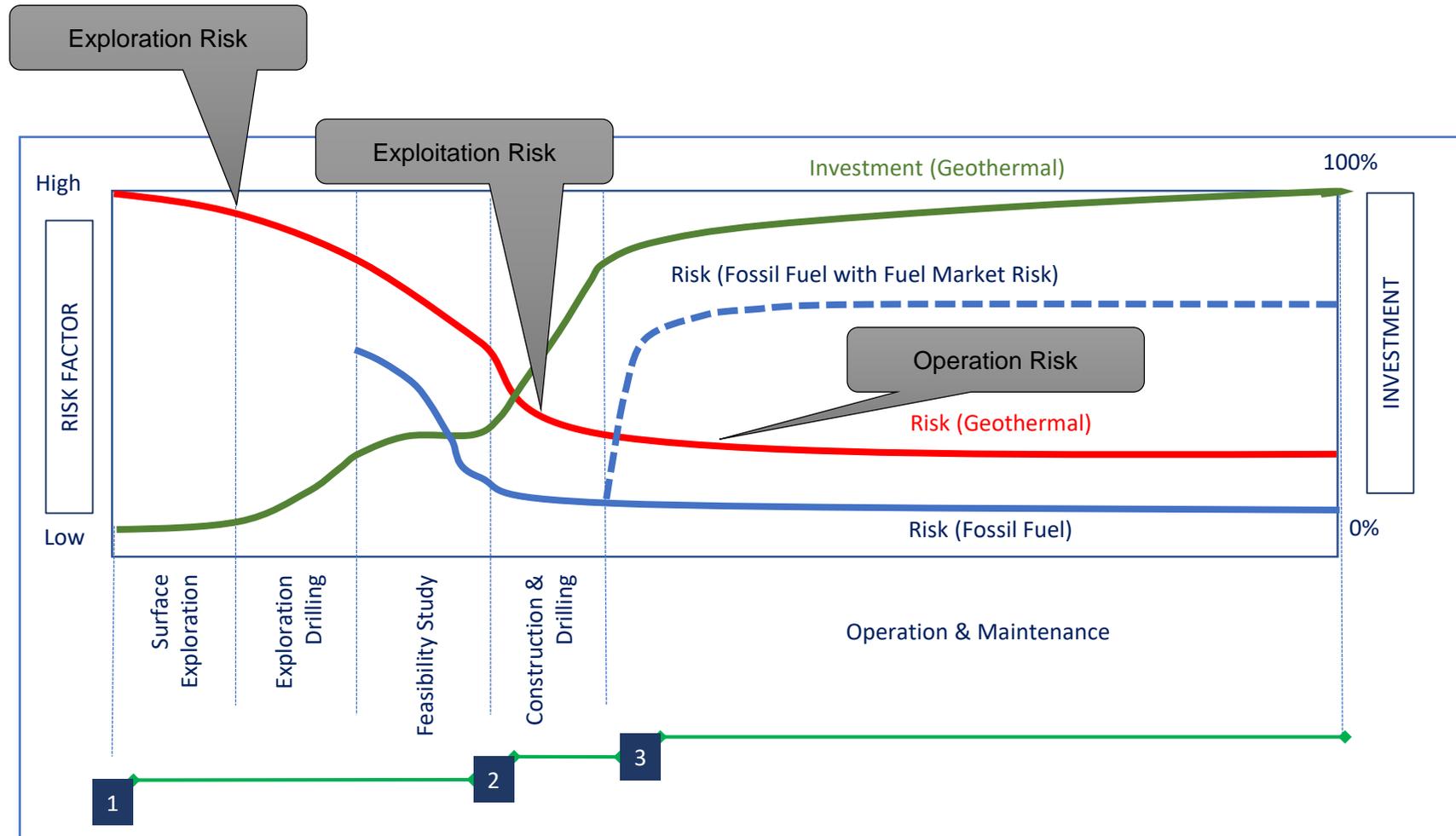
- ❑ The World Bank and PT Sarana Multi Infrastruktur (PT. SMI) are announcing the Geothermal Resource Risk Mitigation Facility (“GREM Facility”) for geothermal exploration phase.
- ❑ Up to \$30M.
- ❑ Maximum gearing ratio is 75:25.
- ❑ Corporate guarantee by Sponsor (or other type of security) is required for the 50% of loan amount.

# GEOHERMAL UNIQUE RISKS



- ❑ Geothermal involves unique risks through the project period, which cannot be hedged by insurance, contractor nor current technology.
- ❑ To boost the Geothermal development, appropriate risk mitigation is required through the all 3 phases.  
→ New Presidential Regulation regarding Renewable Energy (under drafting) is expected to adequately address those concerns.

# GEOHERMAL UNIQUE RISKS



- Experienced partners
- Appropriate risk sharing through the Project Period between Off Taker (PLN) and Private

# SUMMARY

- ❑ Renewable Energy & Baseload
- ❑ Niche industry in the world but significant opportunities located in limited countries
- ❑ Indonesia has the largest potential by far in the world
- ❑ Indonesia already has human resources and supply chains for geothermal
- ❑ JBIC and ADB have strong funding scheme for Geothermal
- ❑ High Entry Barrier & Unique Risks – Partnering & Risk Mitigation/Sharing