Indonesia's Energy Dilemma: Palm Oil vs Geothermal

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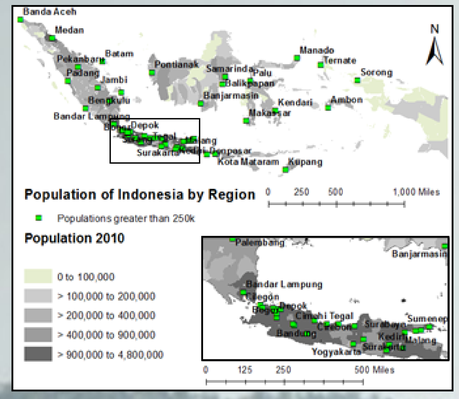


Methodology

This project considers Indonesian land use while taking into account current population, locations of palm oil plantations, protected forest areas, current and proposed power plant locations, geothermal sites, and Indonesia's power grid. A land use analysis was performed to consider the types of land used for production while locating geothermal sites capable of producing energy. These were cross referenced with the current electric grid system in Indonesia.

Recommendations

- Government of Indonesia must recognize that palm oil-based biodiesel energy is not renewable and has a large carbon stamp,
- Prevent the expansion of palm oil plantations by extending the moratorium,
- Remove the subsidies connected to palm oil production and biofuel, shifting the newly free federal funds toward renewable energy investments,
- Work with international organizations to switch on- and off- grid systems centered on using geothermal and solar energy,
- Assist land owners to switch from palm tree production to forest protection or agriculture to prepare for the increase in population,
- Create incentive to preserve the forest by joining a market which trades carbon.

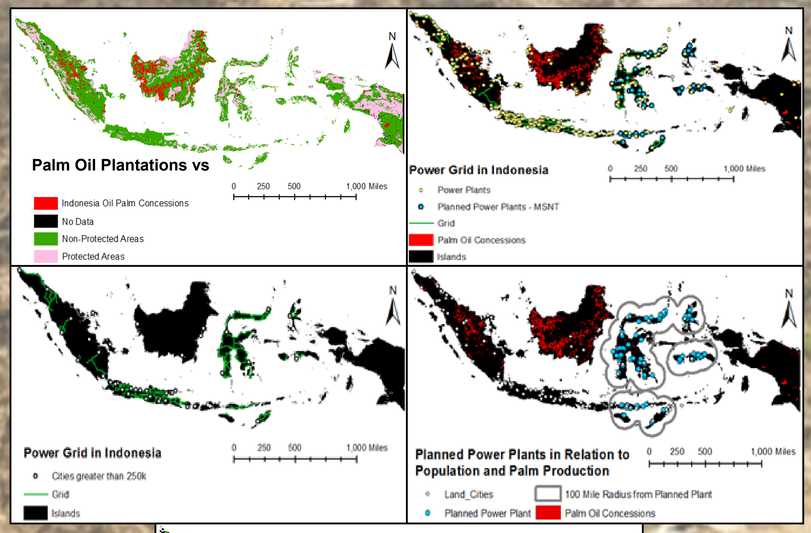
Background

Indonesia faces the need to reallocate land to accommodate the development required by a populous of 261 million people, with an potential growth of 57.5 million by 2050 (World Population Prospects, 2017). To meet the increasing public demand and expectation for future growth, the government has, through its Nationally Determined Contributions, NDCs, based on the need for sustainable development and reliable sustain power. Thus, the government plans to shift the energy mix to increase the amount of renewable energy to 23% by 2025 and a potential of 31% by 2050 through palm-oil based biodiesel while also committing to decrease CO2 emissions by 26% by 2025 (Richter, 2017). Currently, 11.9 million hectares (MHa) are used for palm oil production; a number which will need to increase to meet biodiesel expectations (Wijaya, 2017)**. The land use cost of palm oil production and subsequent annual emissions of 1682.17 million tons of CO2 show that biodiesel is not the correct choice and the nation must research true renewables (WRI, 2014).**

Indonesia's geographic position on the Ring of Fire contains 40% of the world's geothermal potential energy, though currently uses 6% of its potential (Gunningham, 2013). Indonesia must reclassify biodiesel as a non-renewable energy and focus on using true renewable energy such as geothermal. Investing into geothermal energy will create opportunities for Indonesia's population while harnessing a mostly untapped renewable energy source to meet expectations in the NDC of meeting renewable energy and carbon emission goals.

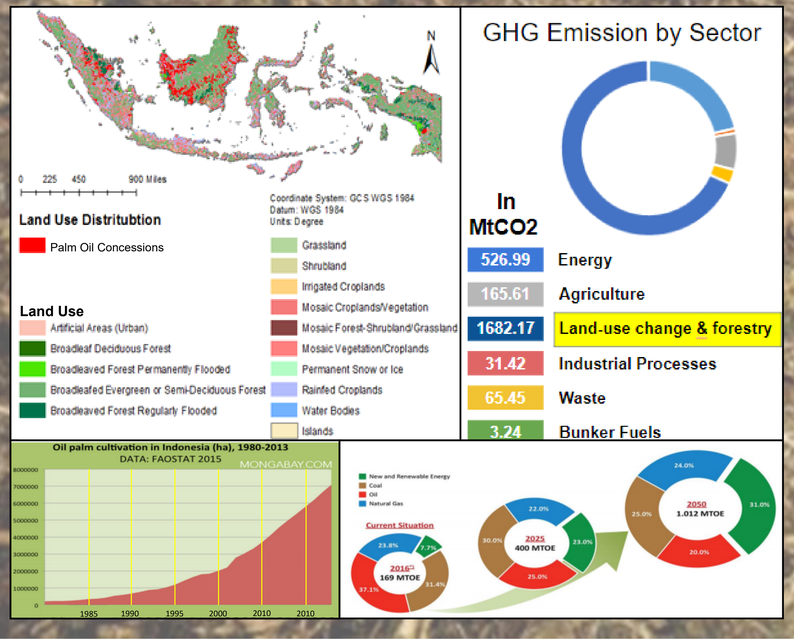
Data Sources

ArcGIS, Global Forest Watch, World Resources Institute, World Bank, Government of Indonesia



The Potential of Renewable Energy in Indonesia

Energy Resources	Potential	Installed Capacity
Geothermal	28,661.7 MW	1343.5 MW
Hydro	74,000 MW	7.059 MW
Mini-micro hydro	769.7 MW	512 MW
Biomass	13,662 MW	75.5 on grid
Solar	480 kW/h/m^2/day	42.78
Wind	3-6 m/s	1.33 MW



Results

Indonesia requires a two prong on-grid/off-grid solution based on its infrastructure and power grid. Geothermal based energy will provide electricity to communities and industries on-grid as it produces consistently 24/7. An off-grid solution is also required to supply electricity to 12,659 villages without or inadequate electricity, with the best combination being a combination of solar and biodiesel (MEMR, 2016). Palm oil supplies communities with jobs and resources. Parallel jobs in the agriculture or agroforestry fields are best substitutes for such workers and communities to supply communities with work and will encourage nutrition based diets based on what is grown. Any logging or clearing of land should occur nearest to communities, as this prepares for future population growth.

Future Considerations

Certain information in Indonesia is lacking due to lack in research or inaccuracies in data collection due to the difficulty in terrain surveying and of almost 17,000 islands only 6,000 are inhabited (Hidayat, 2017). Similar concern is gaps in time or only certain areas having been surveyed. While this information on site locations and area of palm plantations can be spliced together, information concerning land use and population is more difficult because of constant changes and area gaps. Finally, technical working ability of Indonesian was required at points to understand reports written for use inside Indonesia. Continued research will look at solar panel area possibilities and other energy producing technology which is advancing and more amiable for island communities like tidal energy.