

LEVELIZED COST OF ELECTRICITY

IN INDONESIA



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Institute for Essential Services Reform (IESR)

Jalan Tebet Barat Dalam VIII No. 20 B, Jakarta Selatan,
12810, Indonesia
www.iesr.or.id | iesr@iesr.or.id

Agora Energiewende

Anna-Louisa-Karsch-Straße 2
10178 Berlin | Germany
www.agora-energiewende.org | info@agora-energiewende.de

Author:

Deon Arinaldo
Mentari Pujantoro

Editor:

Jannata Giwangkara
Gandabhaskara Saputra

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Preview

Renewable energy technologies have undergone dramatic cost reductions in recent years, making them broadly cost-competitive with fossil fuel sources in the markets around the world. Despite the global trend, in Indonesia, renewables are still cited as expensive sources of electricity. This perspective affects how Indonesia’s future electricity system is projected, the direction and the making of the energy policy, as well as attractiveness of the country to the investors.

We use the Technology Data for the Indonesian Power Sector report by Dewan Energi Nasional (DEN) as the primary reference and refines with most recent data from other related market studies (BNEF, IRENA, etc) as well as surveys with the association, project developers, and PLN to calculate the LCOE in Indonesia. Here’s the result:

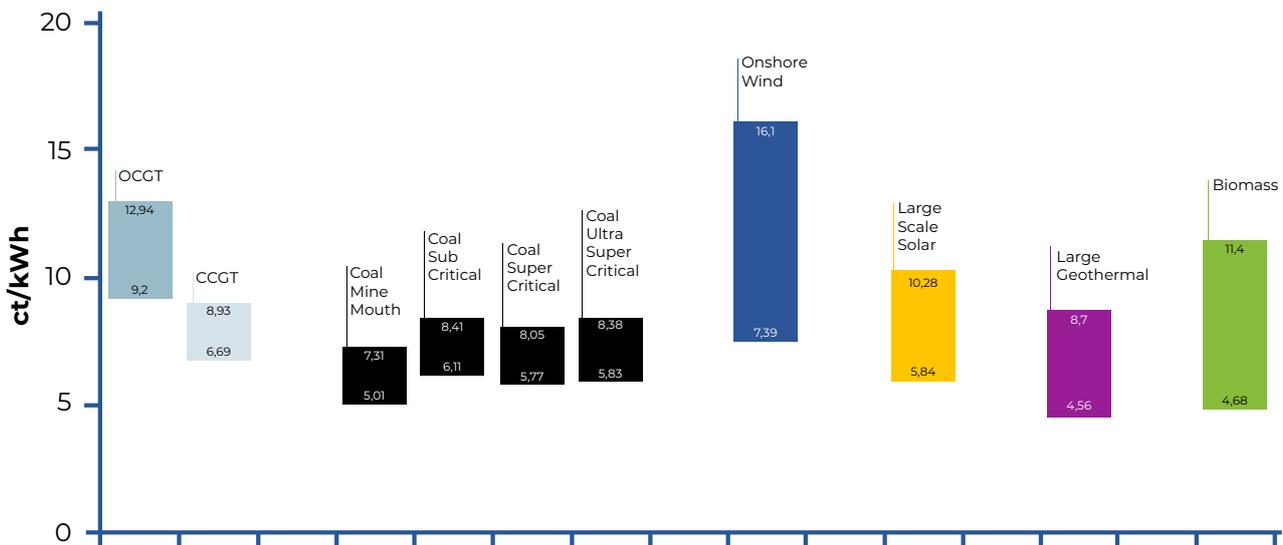


Figure 1 LCOE in Indonesia (2019)



Is renewable expensive and what is the major cost driver in different generation technologies? Here are our key findings:

- 1. Policy analysis and considerations on renewable and fossil fuel should consider the differences in their cost structure.** Renewable and future energy infrastructure are capital intensive, therefore any policy concerning the cost of capital and technology cost has a higher impact on these projects compare to its fossils counterpart.
- 2. The cost range of large-scale solar PV (>10 MW) is already on par with those of new coal power plant.** With a suitable regulatory framework, e.g. bringing financing cost down to levels in other markets, large scale solar LCOE may go down further from 6-10 ct/kWh (IDR 845-1400/kWh) to 3.5-8 ct/kWh (IDR 493-1125/kWh).
- 3. The global trend will change the playing field as LCOE from renewable is getting cheaper.** The renewable (wind and solar) has experienced a massive deployment globally which has contributed to lowering the cost of equipment. Because equipment cost makes up a high share of capital cost, the LCOE of renewables is also expected to come down along with this phenomenon. On the other hand, the fossil fuel plant has experienced an increase in investment cost due to stricter emission and environmental standards.



What is LCOE?

LCOE is a measurement of total cost divided by energy/electricity generated by an asset over its lifetime. It is a standard tool used in comparing the cost of different electricity generation technologies.

What are the major cost drivers in LCOE calculation?

- **Capital/Investment Cost**, which covers equipment cost, installation cost, and pre- development cost.
- **O&M Cost**, recurring cost component associated with maintaining and operating the component, e.g. fuel as variable O&M cost and land lease as fixed O&M cost.
- **Capacity Factor**, the ratio between the actual output of a power plant with the theoretically maximum possible output based on the power plant nameplate capacity.
- **Interest rate or WACC**, the rate of the cost to be paid overtime; the capital comes from the shareholders (equity) and the loan from a financial institution (debt), each with its own expected return (cost of debt and cost of equity).



The structure of electricity production cost between renewables and fossils generally differs. For instance, wind and PV have high upfront investment costs, but negligible variable O&M cost, while the cost of fossil generation highly depends on the variable O&M cost. Therefore, the cost of solar PV is more sensitive to the percentage of changes in capacity factor, WACC, and investment cost compares to coal. Understanding how a slight policy change might impact the cost is important for better-achieving policy goals

We analyzed several conditions: tapping to lower technology cost as in global market (like the lower PV module price), soft-loan with lower than 5% interest rate, and viability gap fund for both capital and equity.

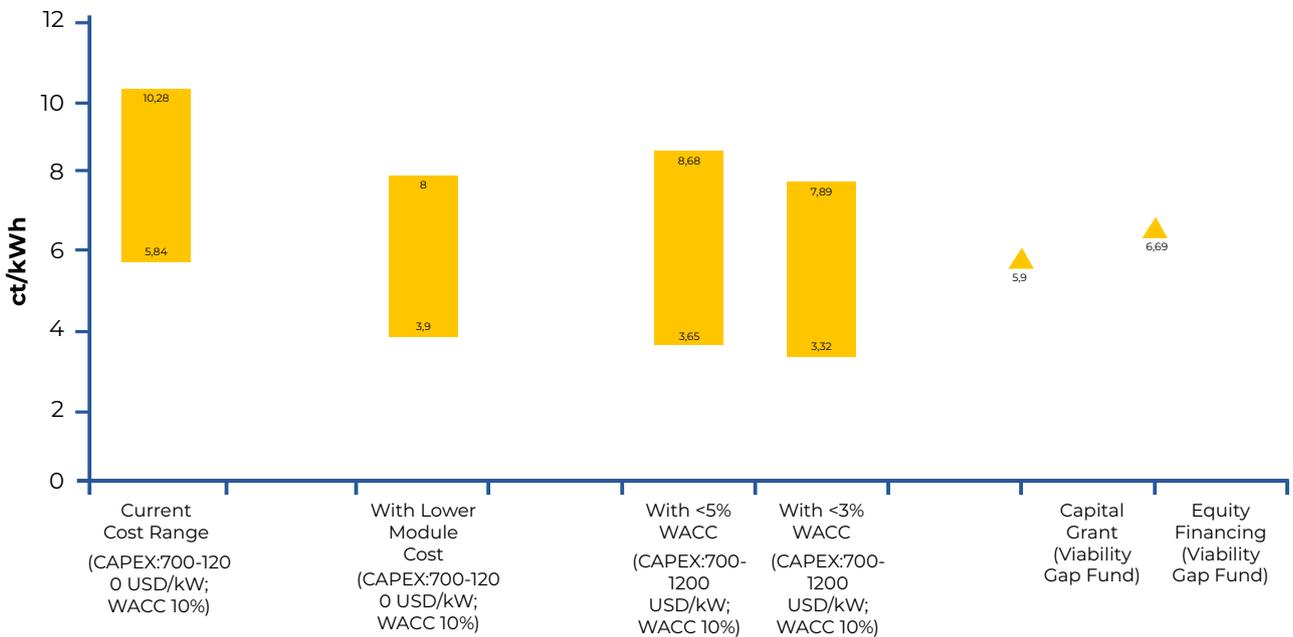


Figure 2 LCOE of the solar power plant in Indonesia with several impacts of changes in the cost component and implementing policies.



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*With a suitable regulatory framework, large scale solar LCOE may go down further from 6-10 ct/kWh to 3.5 – 8 ct/kWh; **competitive with the cost range of coal power plant.***





CONTACT

Institute for Essential Services Reform (IESR) | Jalan Tebet Barat
Dalam VIII No. 20 B | Jakarta Selatan 12810 | Indonesia

T: +62 21 2232 3069 | F: +62 21 8317 073 |

www.iesr.or.id | iesr@iesr.or.id



@IESR



@iesr.id



iesr.or.id

