Developing Mitigation-Adaptation Synergy for a Resilient Future

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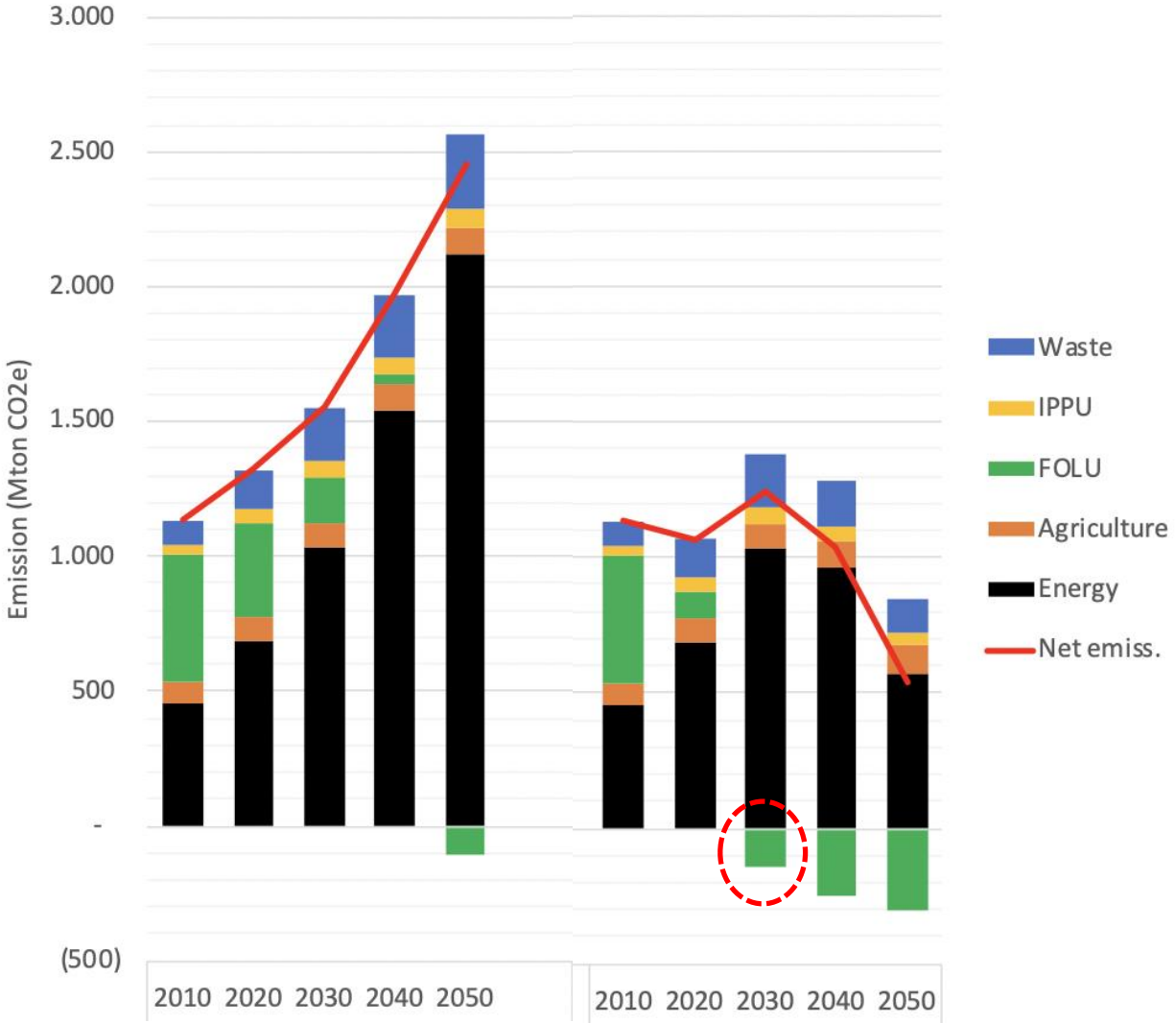
PROLOGUE

- The Indonesian government commits through the ENDC to reduce 31.9% of its emission from BaU unconditionally in 2030 and up to 43% international support (conditional target)
- The government has also expressed its long-term vision to increase its emission reduction ambitions through LTS toward NZE and reach a net sink by 2030

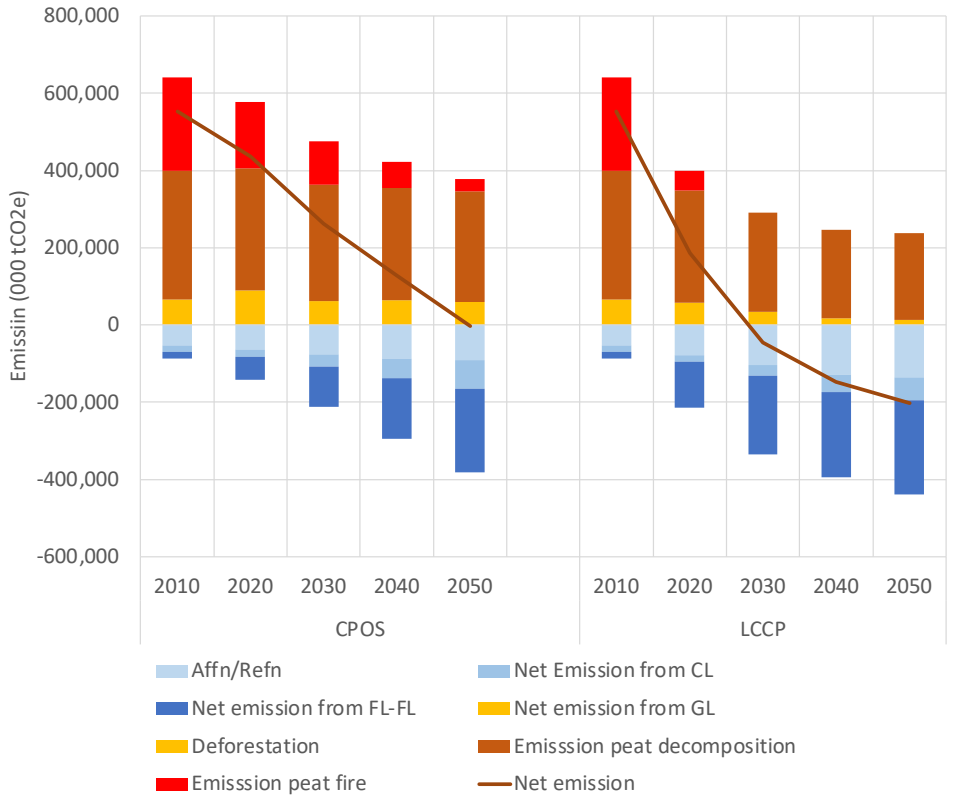
Indonesia Emission Pathways LTS



CPOS
(Extended Unconditional Target of NDC)

FOLU Net Sink by 2030

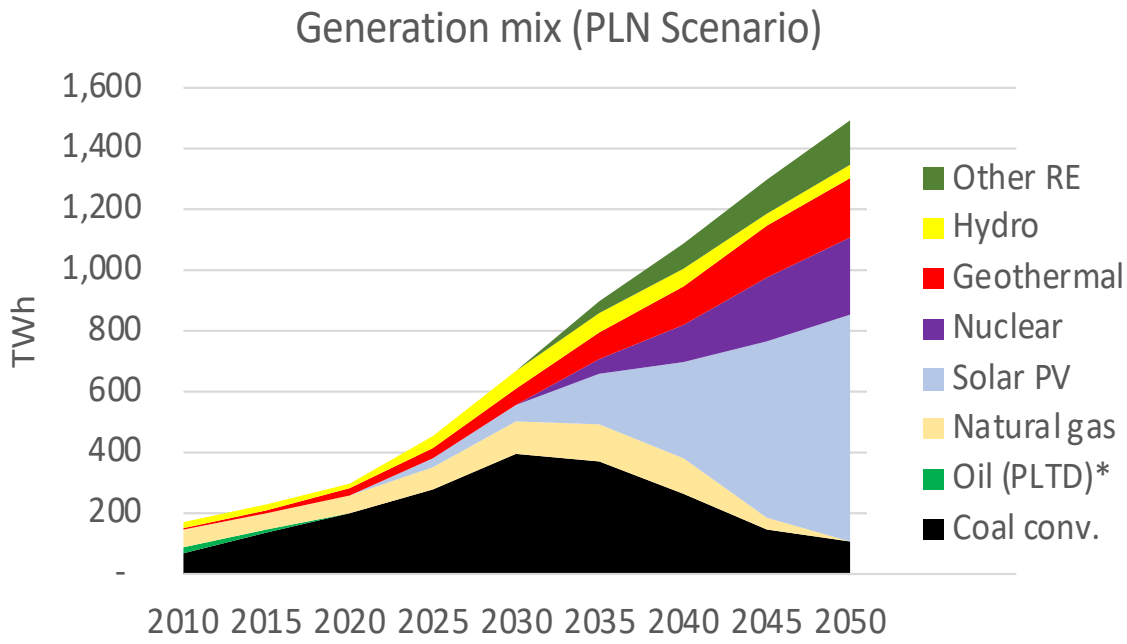
- Indonesia's low-carbon development in 2050 (496 MtCO2e) towards net zero in 2060 highly emphasizes the deep cut of fossil fuel in the **power sector** and the utilization of CCS technology and net sink role from the AFOLU sector.



Power sector policies

- The government has enacted renewable-for-electric-power regulation (Energy Minister Regulation No.50/2017), then ammended in Energy Minister Regulation No.4/2020, with more provisions that are expected to **attract investment in renewable power**.
- To promote **solar PV development**, Energy Minister Regulation No 13/2019.
- Electricity utility business plan for 2021-2030: **RE in power** generation is targetted to increase to **48%** in 2030

- Early June this year the electric utility (PLN), announce a bold target to reach carbon neutral in 2060 (*alternative scenario from PLN*).
- Some plans of coal power plant retirement has been announced—it practically will become 100% fossil-fuel free in 2060. Coal power retirement will begin in 2030 and be completed in 2056.
- The power supply will be mainly from renewable and nuclear. **A large renewable proportion** would be solar PV with batteries (50%)



Evaluation of the country's long-term target and current NDC

Fig.1: Ambition level of the long-term target (N=74).

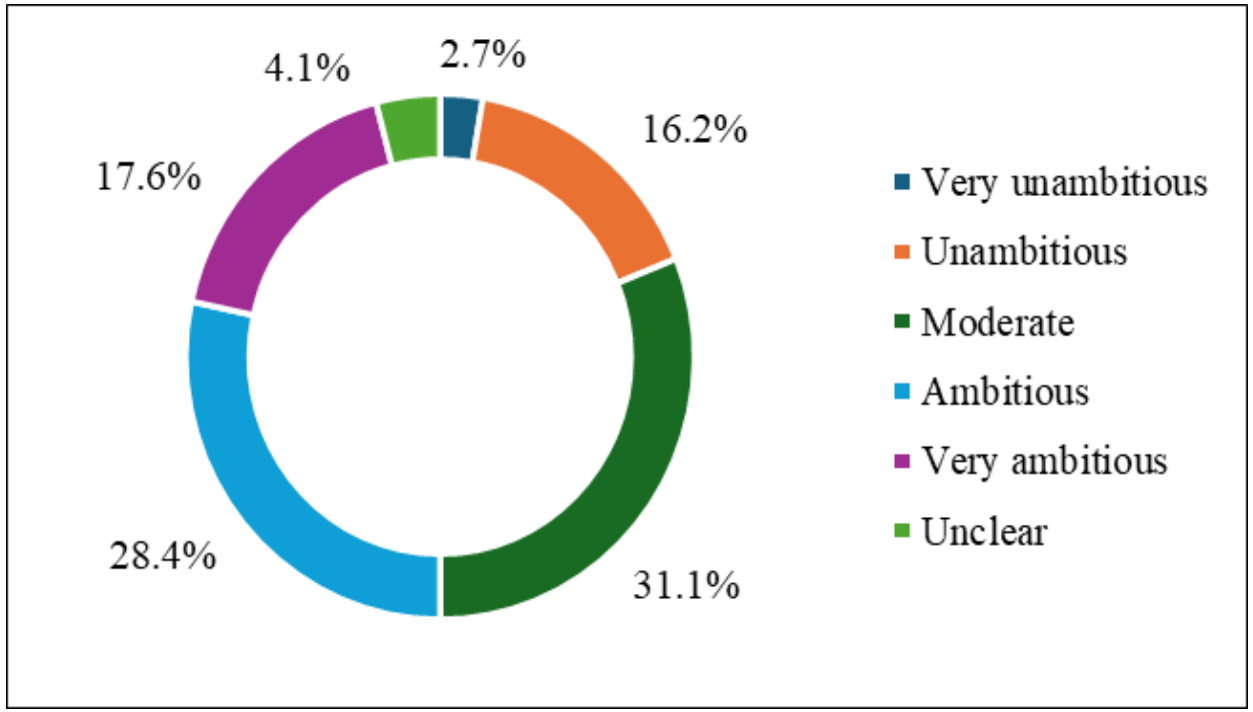
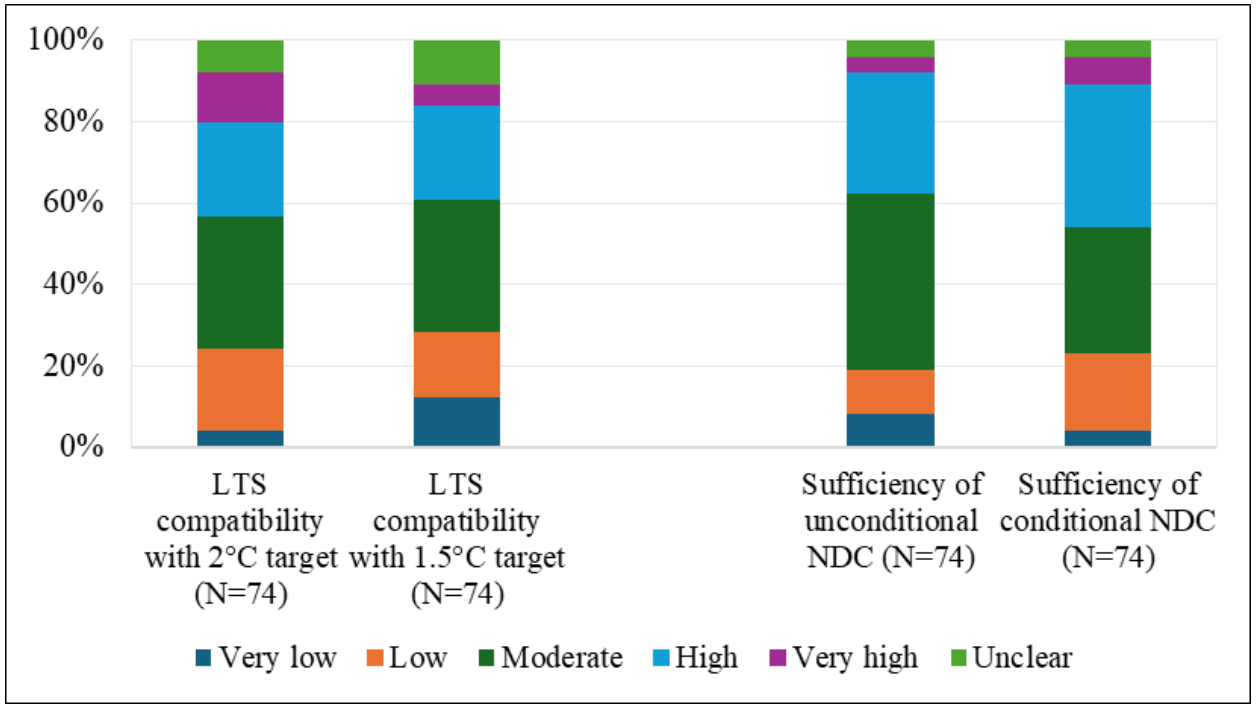
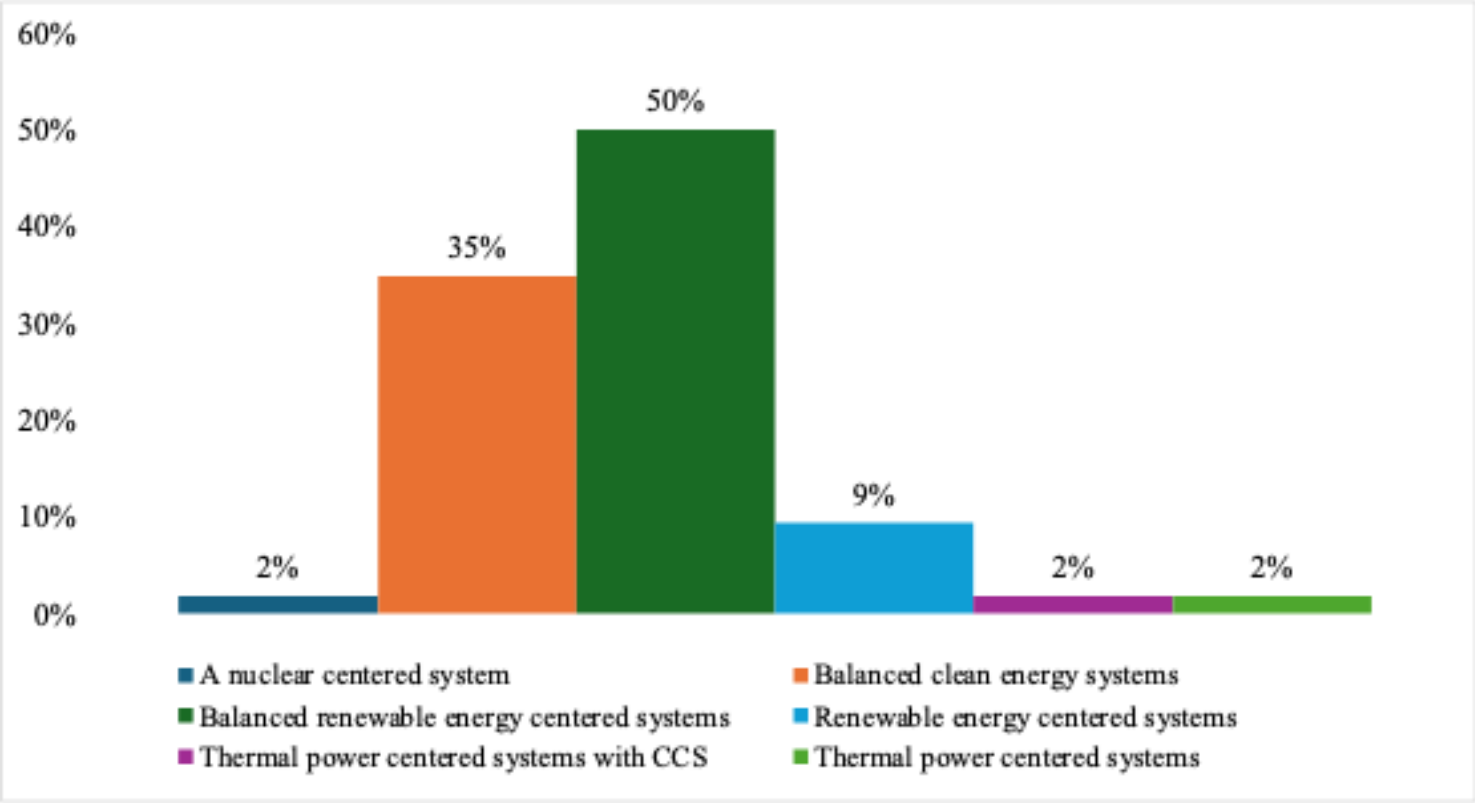


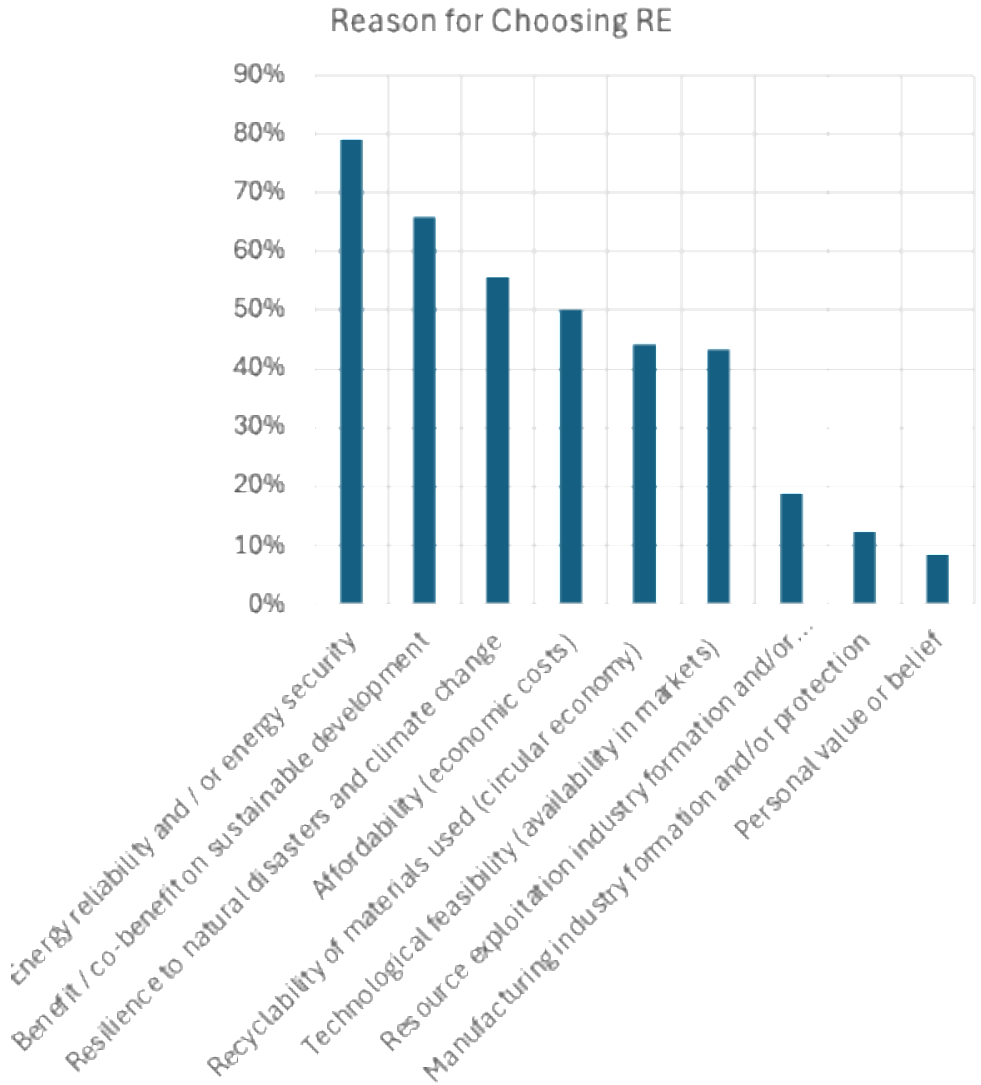
Fig.2: Compatibility of LTS and NDC with PA targets.



- Nearly 50% samples view Indonesia's long-term target to be ambitious or very ambitious. Whereas, the compatibility of LTS is evaluated to be moderate with global 2˚C and 1.5˚C target.
- *The current NDC (especially unconditional) is thought less sufficient for achieving the country's long-term target.*

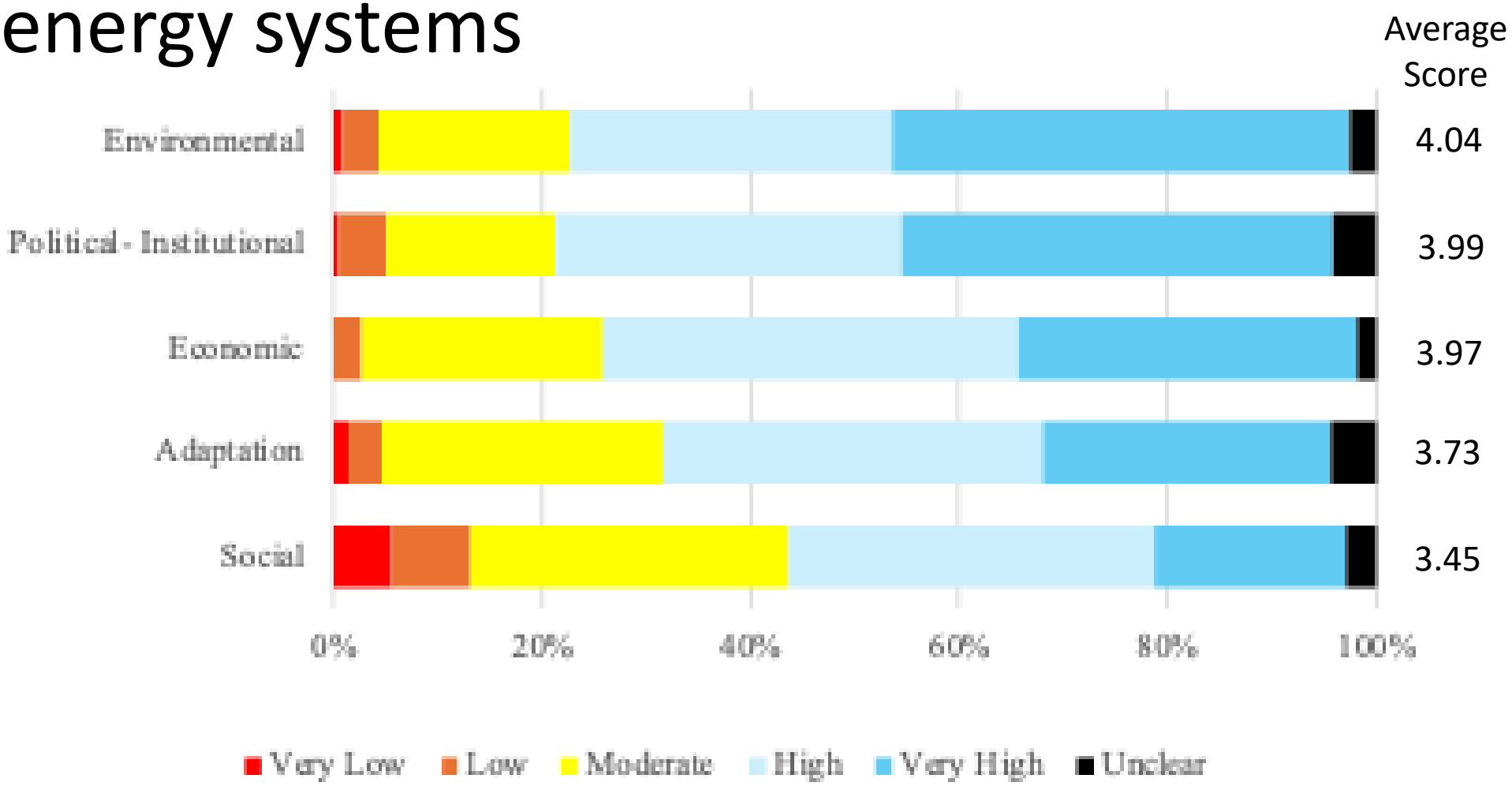
Expected of net-zero clean energy systems in the long-term by around the year 2100





- Most respondents (94%) choose that the energy systems in 2100 should be balanced RE-centered and clean energy systems
- More than 50% of respondents believe that choosing balanced renewable and clean energy centered system will contribute to energy security, benefit to SDGs, increase resilience to natural disasters & lowering cost

Potential co-benefits from diffusing renewable energy systems



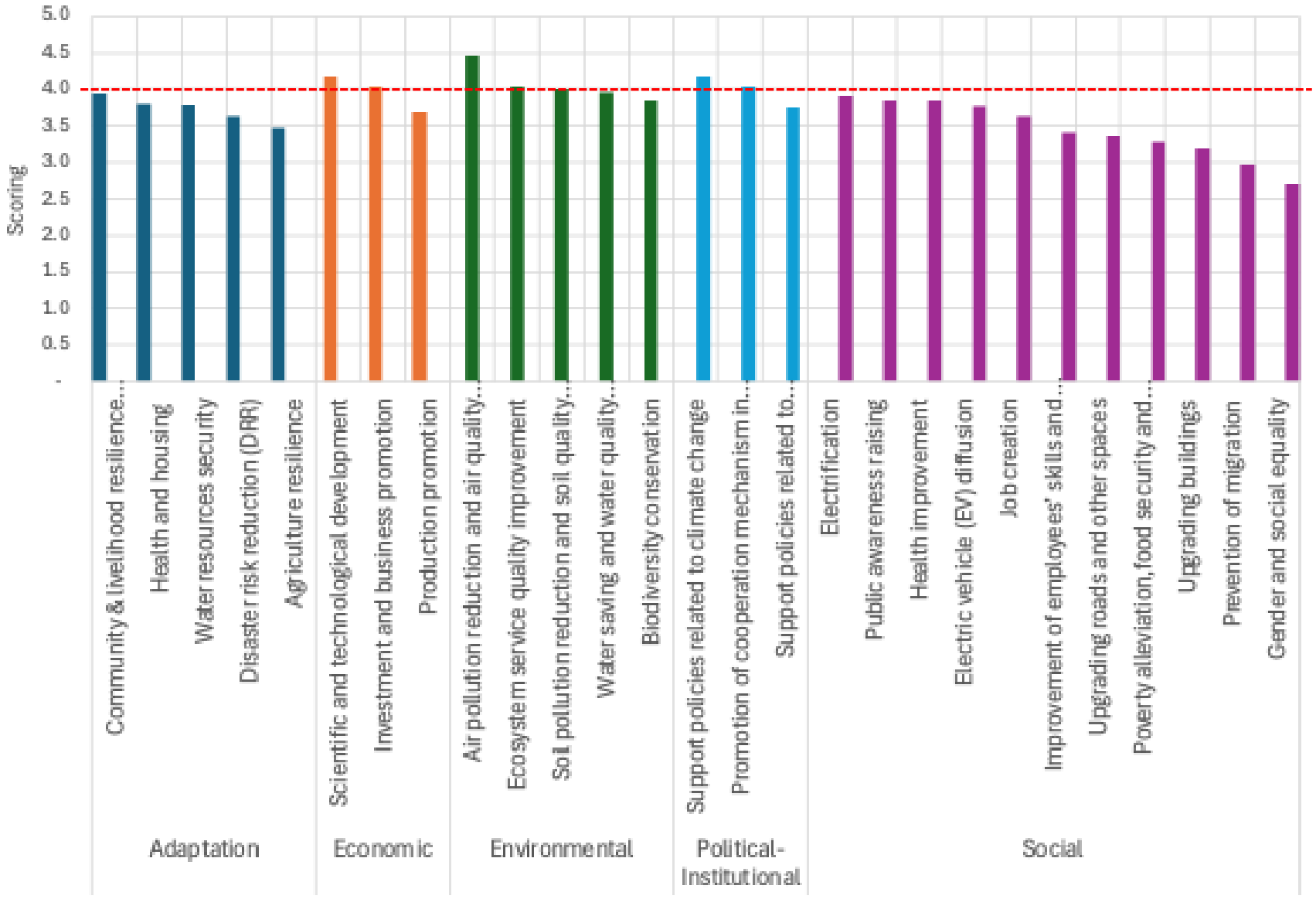
Most respondents believes there is significant co-benefit of RE system on environment, political-institutional, economic, adaptation and social

Potential co-benefits from diffusing renewable energy systems

Respondents believe that the **main** co-benefits of diffusing RE system

- Environments: air pollution reduction and air quality improvement, ecosystem service quality improvement, soil pollution reduction & soil quality improvement
- **Adaptation**: community resilience, health and housing, water resource security, DRR and agriculture resilience

The **lowest** co-benefit from diffusion RE system is gender & social equity



1 2 3 4 5

Very Low Moderate Very High

Solar energy for irrigating rice field

KATADATA/MUHAMMAD FAJAR RIYANDANU

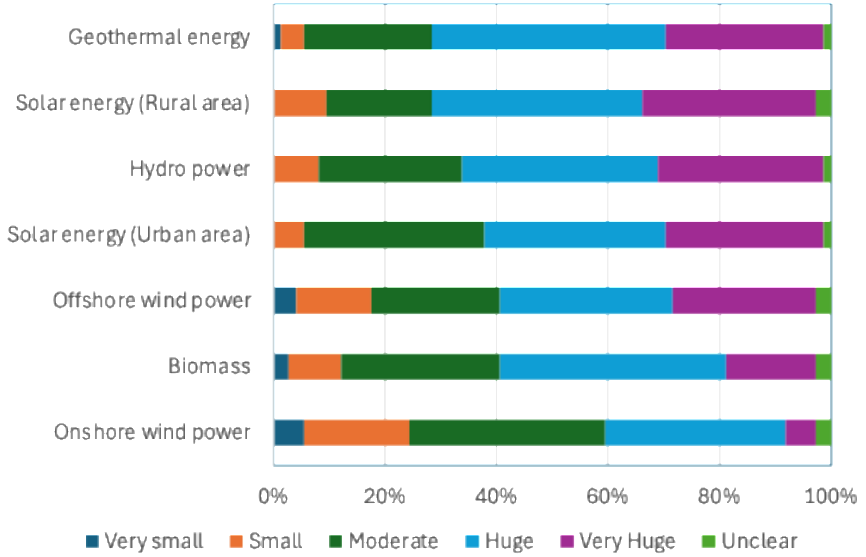
Masyarakat Desa Kaliurip, Kabupaten Banyumas, Jawa Tengah, mengandalkan pembangkit listrik tenaga surya (PLTS) untuk menghidupkan pompa air untuk mengairi sawahnya.

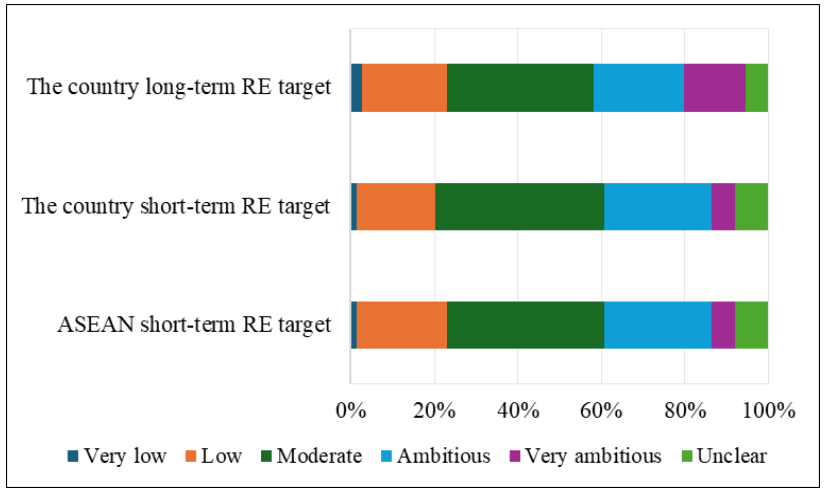
Source: Muhamad Fajar Riyandanu, 2022
https://katadata.co.id/happyfajrian/ekonomi-hijau/62ce609f74f52/berkah-melimpah-listrik-tenaga-surya-di-tanah-jawa

- Farmers at Desa Kaliurip spending for fuel of water pumping Rp25,000 per hour; For irrigating rice field a day needs to operate pumping for at least seven hours. The cost is even more expensive for residents who don't have a diesel pump as they have to pay rent of the pump facility.
- A total of 144 solar panels, each with a capacity of 310 watts/peak can support 2,100 farmers in Kaliurip Village, Purwojati District, Banyumas Regency, Central Java.
- The solar power plant (PLTS) functions to turn on the water pump to irrigate the fields – each farmers who get benefit from this will pay with rice at harvesting time (10 kg of rice for every 70 m^2 of land) - equivalent to 15%-20% of total yield.
- This effective for managing drought

TECHNICAL POTENTIAL OF RENEWABLE ENERGY

- Most of the samples give either huge or very huge evaluation to the potential of **geothermal, solar energy (rural and urban), Hydropower, offshore wind & biomass** (average score >=3.5)
- The evaluation on potential of onshore wind is moderate on average (average score 3.0).
- ***However, the respondent think Indonesia's long-term target for renewables development is moderate.***

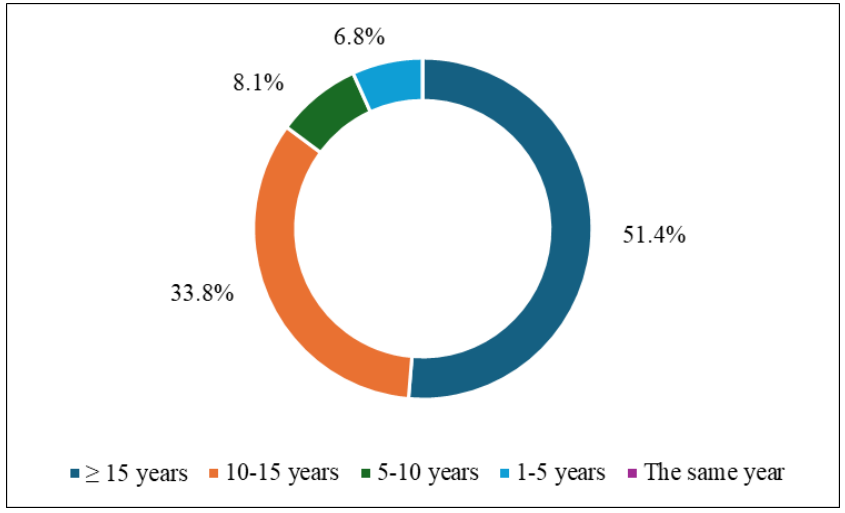




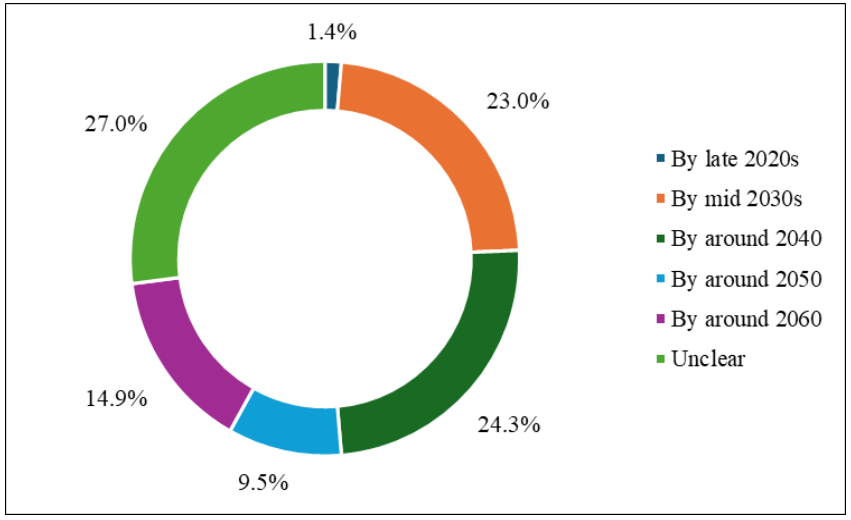
TIMING FOR POWER SECTOR DECARBONIZATION

- Around 85% samples think that power sector shall be fully decarbonized 10 years earlier than whole economy.
- Nearly 50% samples believe that market-based pricing mechanism will be fully implemented by mid-2030s to around 2040 in Indonesia, while nearly 30% samples have no idea on this.

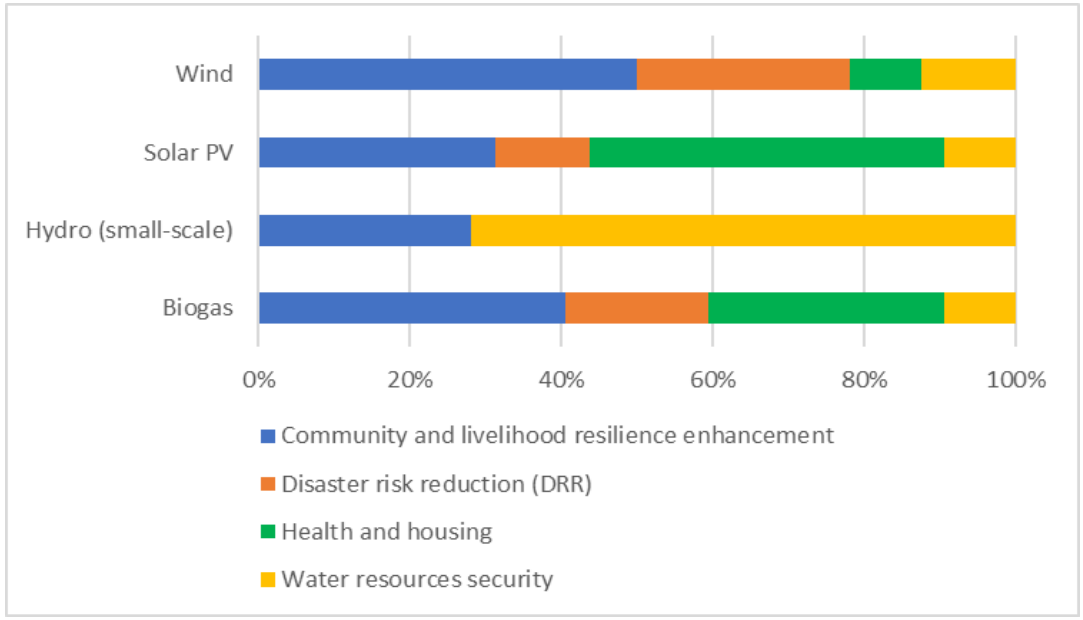
Timing for power sector decarbonization (N=74)



Timing for market-based power pricing (N=74).

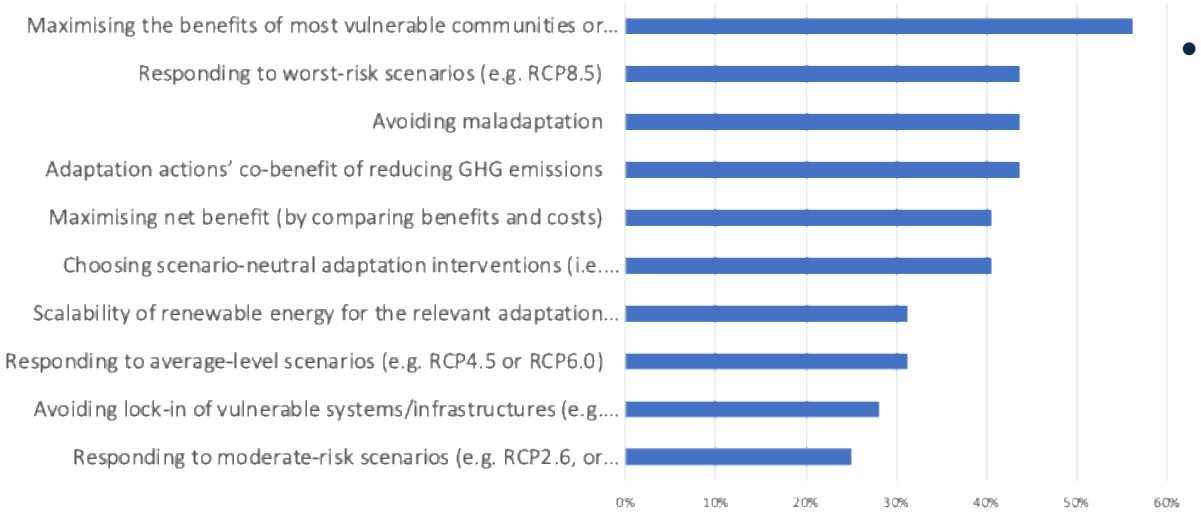


ADAPTATION SECTORS OR AREAS THAT WELL SUIT APPLYING OR UPSCALING DISTRIBUTED RENEWABLE ENERGY (N=32)



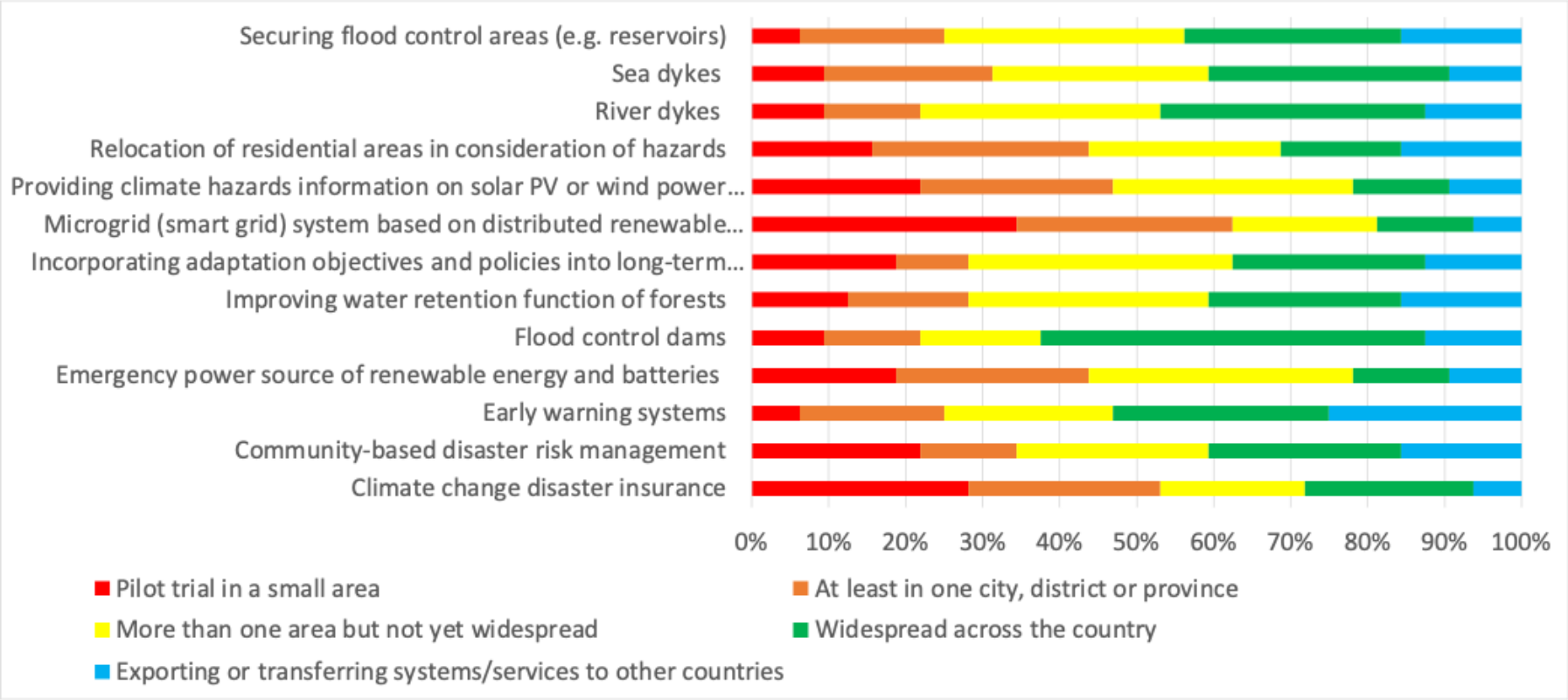
- Half of the sample agree that upscaling or distributing wind sourced renewable energy suit with community livelihood and resilience enhancement
- Around half of the sample agree that expanding solar PV as source for renewable energy will benefit health and housing sector
- Around 3/4 sample agree that hydro based in small scale energy source would likely pair with water resources security
- Biogas as source of renewable energy upscaling seems suit with community and livelihood resilience enhancement and health and housing the most

APPLIED (OR POTENTIALLY APPLICABLE) CONSENSUS CRITERIA FOR PRIORITIZING SHORT-TERM (TOWARD 2030) AND LONG-TERM (TOWARD 2050 AND BEYOND) ADAPTATION INTERVENTIONS IN AREA CC



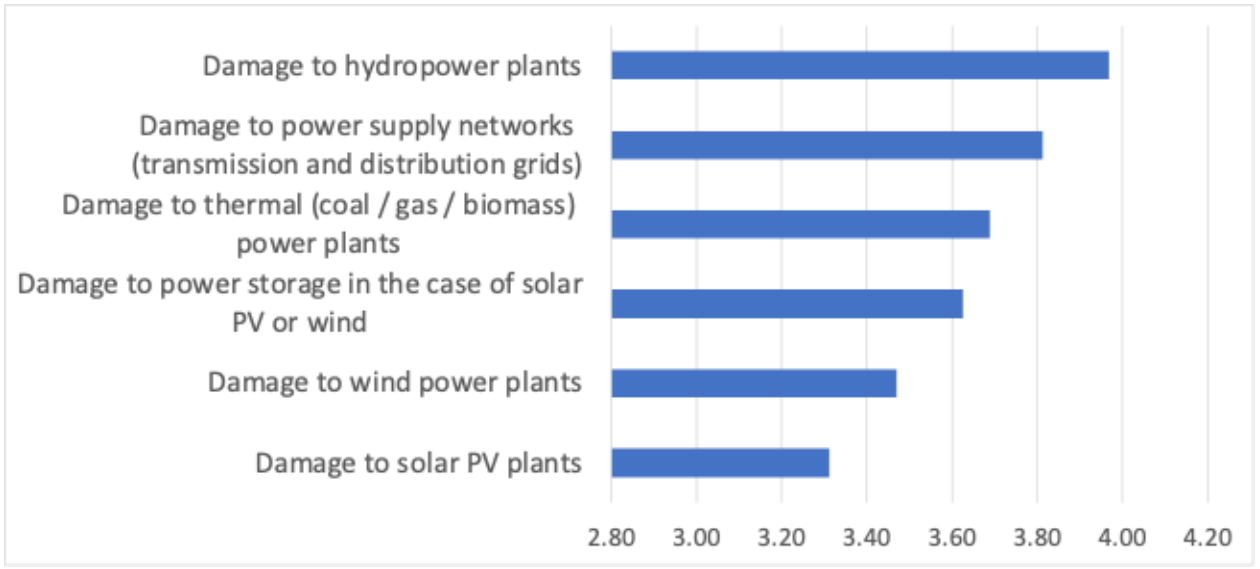
- Most of respondents agreed that important criteria to be used for prioritizing adaptation actions are their contribution to the increase of the benefits of most vulnerable community, able to respond to worst-risk climate scenario, do not lead to maladaptation and provide co-benefit of reducing GHG emission

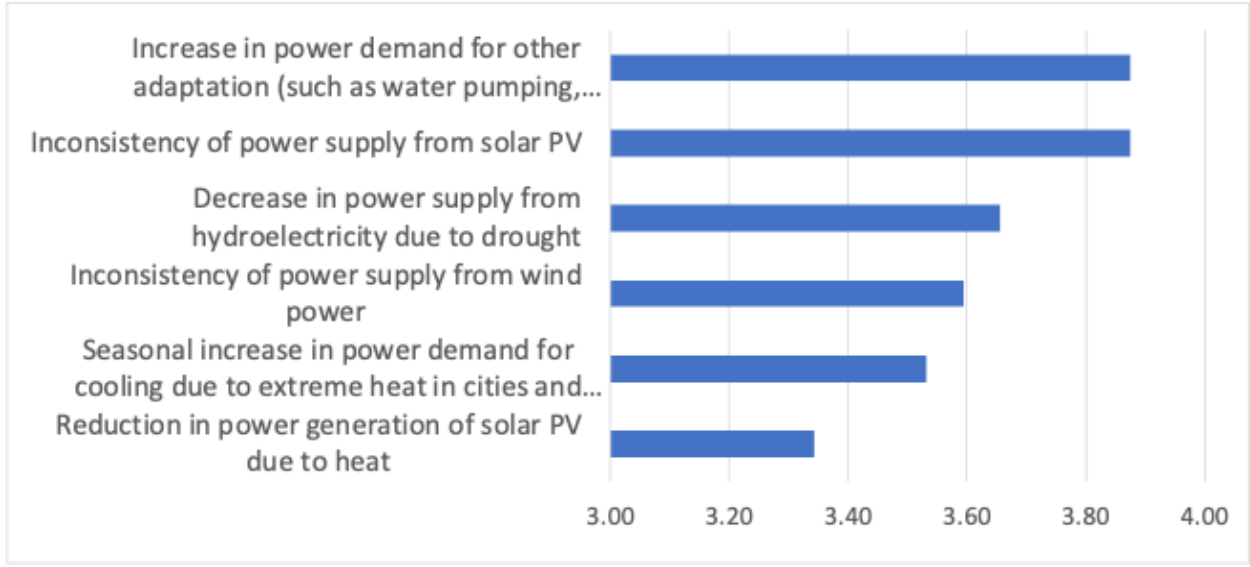
SCALE OF INTERVENTION OF ADAPTATION ACTIVITIES (N=32)



- River dykes, early warning systems, and flood control dams being the highest current scale of adaptation interventions in the area of climate change disasters
- Microgrid (smart grid) system based on distributed renewable energy is the lowest interventions that currently implemented with around 57% response in only pilot trial to at least one in city
- Emergency power source of renewable energy and batteries, Providing climate hazards information on solar PV or wind power plants (e.g. hazard maps), and Climate change disaster insurance also currently implemented around 50% in pilot trial and at least one in city scale, with Climate change disaster insurance being the lowest widespread and exporting scale

FUTURE KEY CLIMATE RISKS TO THE POWER SECTOR





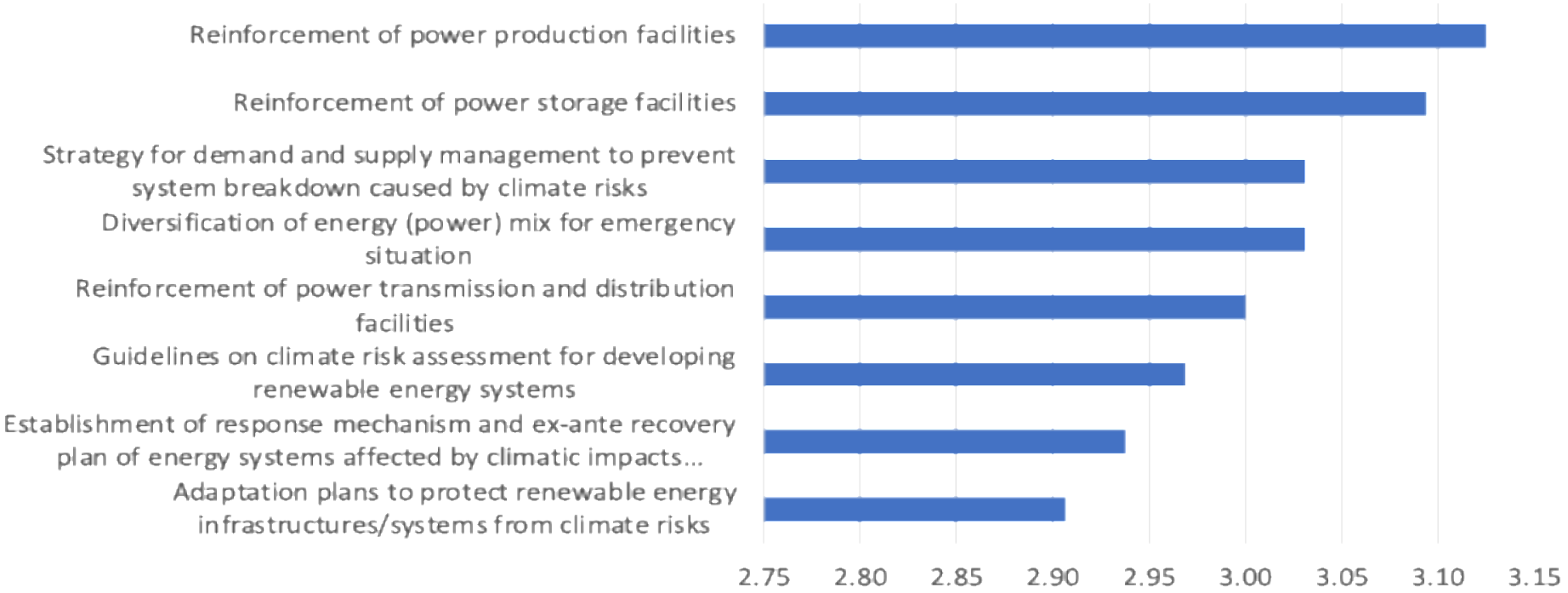
1 2 3 4 5

Very Low Moderate Very High

- Most of respondents believe that power sectors expose to high risk of climate change, which will cause damage to infrastructure particularly hydro power, supply network, thermal powerplant and solar/wind power plant (score of more than 3.5
- Climate change will also have serious effect on the performance of power sectors: casuing inconsistency of power supply from solar PV, increase power demand

ACTIONS FOR ENSURING PREPAREDNESS

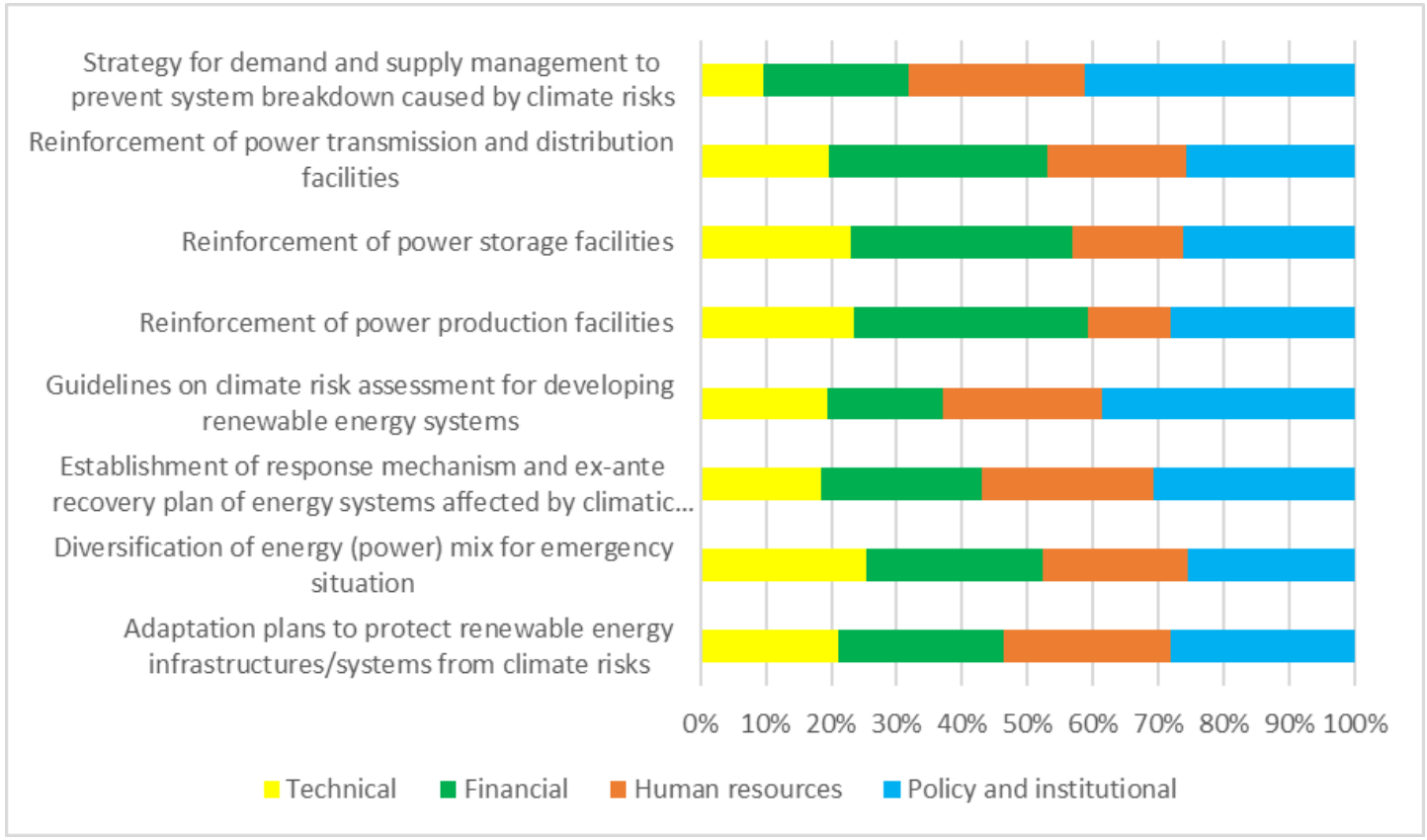
The current level of preparedness to make renewable energy infrastructure resilient to climate risks (N=32)



- Most of the respondents think that actions for ensuring preparedness to make renewable energy infrastructure resilient to climate risks) is on medium level preparedness
- Reinforcement of power production facilities and Reinforcement of power storage facilities is actions with the higher score compare to others
- Adaptation plans to protect renewable energy infrastructures/systems from climate risks is at the lowest score on preparedness level

KEY BARRIERS TO RESILIENT FUTURE RENEWABLE ENERGY INFRASTRUCTURE

Main barriers (or challenges) encountered during the implementing of identified adaptation priorities (N=32)



- Respondents stated that all eight priorities adaptation actions face four barriers in their implementations, mainly policy and institutional barriers (31%) followed by financial barrier (27%), human resources (22%) and technical barrier (20%)
- Key barriers for implementing strategy for demand and supply management to prevent system breakdown caused by climate risks (41%) and use of guideline on climate risk assessment for developing RE system is policy and institutional.
- Financial barriers considered as the key barrier is reinforcement of power transmission & distribution facilities, and power production facilities

EPILOGUE

- Renewable energy will play vital role for Indonesia to meet the Indonesian target to reach NZE
- Indonesia has large renewable energy potential, however many respondent think Indonesia's long-term target for renewables development is moderate.
- Accelerating the adoption of RE system in power sector provide significant co-benefit on environment, political-institutional, economic, adaptation and social.
- Most of RE system considered to be more vulnerable to climate change, however level of preparedness to make renewable energy infrastructure resilient to climate risks) is not high
- A number of barriers exist for establishing resilience RE infrastructure, mainly policy & institutional barrier and financial barrier
- Simplify permitting processes for renewable projects to reduce administrative bottlenecks. Coordinated efforts among ministries (e.g., Ministry of Energy, Environment, and Forestry) can ease project approvals, especially for land use in solar and wind projects
- Incentivize Green Investments by developing incentives like tax holidays, subsidies, and import duty exemptions for renewable energy technologies and parts to make projects more financially viable.
- Development of innovative financing mechanisms by exploring community-based financing and crowdfunding, especially for small-scale renewable projects, which can engage local communities and reduce financial barriers for rural electrification
- Accelerate the implementation of carbon pricing policy to provide financial incentives for low-carbon energy investments.