



ENERGY ECONOMICS AND POLICY SEMINAR

Circular Economy and Renewable Energy

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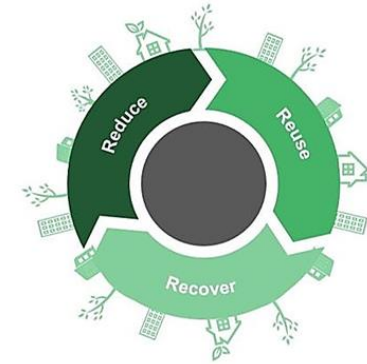
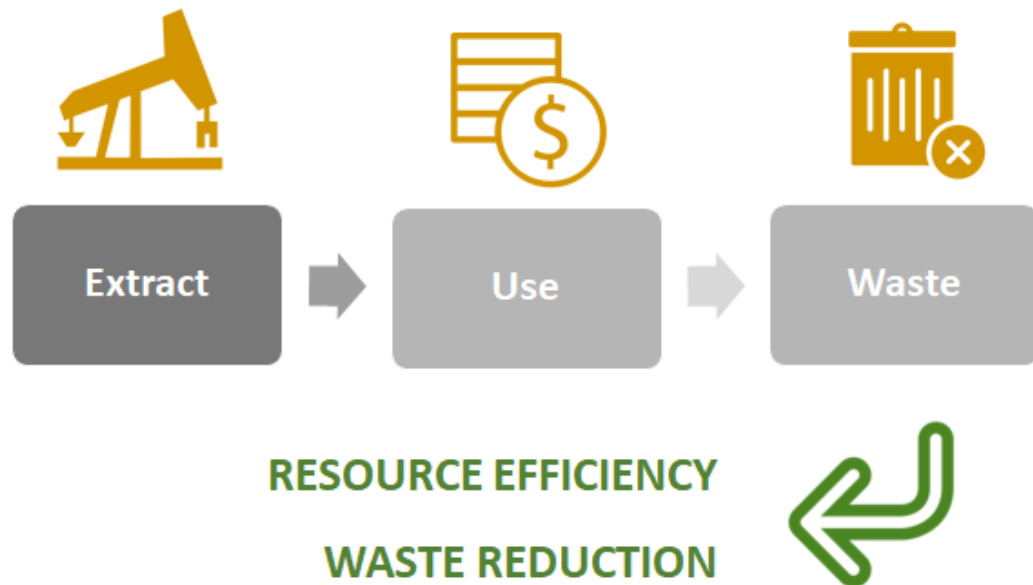
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OUTLINE

- Introduction to Circular Economy
- Circular Economy and Renewable Energy in ASEAN
- Different Types of Renewable Energy and Circular Economy
- Initiatives and Challenges per Country
- Conclusion and Recommendation

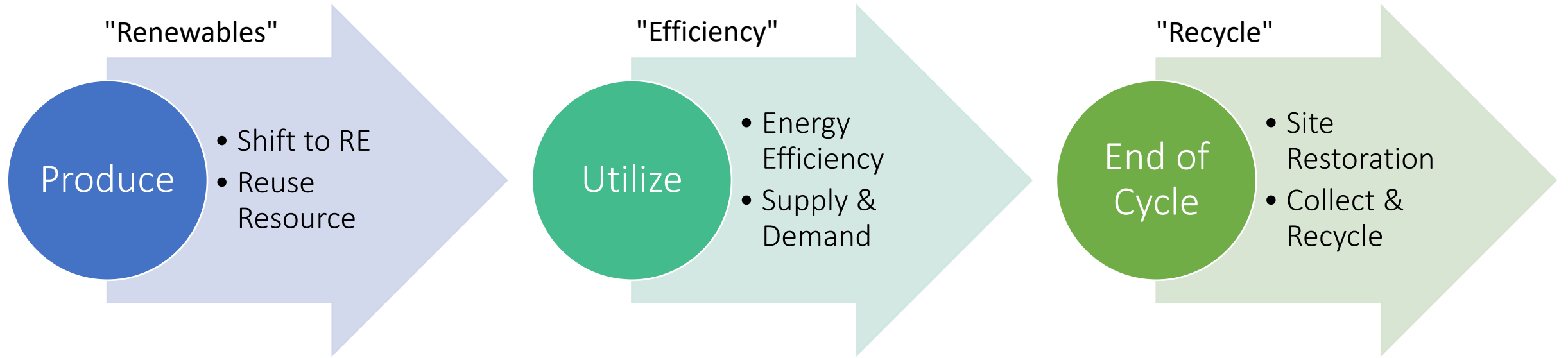
CIRCULAR ECONOMY

What? Why? How?



Strategies for Circular Economy

- ❖ **Sustainable project design:** To minimize using raw materials which are not easy to reuse and recycle
- ❖ **Circularity in production process:** To track, trace and map of how resources are used within the production system
- ❖ **Waste Reduction:** To increase efficiency and 3Rs



Footnote: RE = Renewable Energy

How Will Renewable Energy
Come into Picture?



Circular Economy and Renewable Energy in ASEAN



*"Framework for
Circular Economy
for the ASEAN
Economic
Community (AEC)"*

ASEAN takes on Circular Economy as part of priority agenda

JAKARTA, 30 June 2021 – Today, ASEAN Secretariat conducted an online workshop on Circular Economy. The workshop gathered relevant sectoral bodies to discuss the draft *Framework for Circular Economy for the ASEAN Economic Community (AEC)*, which is one of the priority economic deliverables for Brunei Darussalam's ASEAN Chairmanship this year. The development of the Framework is supported by the Economic Research Institute for ASEAN and East Asia (ERIA).

Circular Economy and Renewable Energy in ASEAN

❖ *Several countries in Southeast Asia have their individual policies which addresses Circular Economy focused on waste and energy.*

Table 7. Policy Development on the 3Rs and Resource Circulation in Asia

Country	3Rs and Resource Circulation Policy Development
Malaysia	The 2007 Solid Waste and Public Cleaning Management Act (2007): The responsibility for solid waste management was transferred from local governments to the central government. The 3R principles were introduced. Privatisation of waste management is encouraged.
	The Five-year Plan 2011–2015 calls for increasing the rate of resources recovery from household wastes, from 15% to 25% by 2015.
	The Eleventh Malaysia Plan 2016–2020 highlights the importance of pursuing 'Green Growth' for sustainability and resilience.
	The National SCP Blueprint 2016 to 2030 provides pathways for SCP to cover the circular economy.
	The Global Cleantech Innovation Programme of the Malaysian Industry-Government Group for High Technology, in collaboration with the United Nations Industrial Development Organization, is an annual competition and accelerator-based programme that aims to identify, fund, and nurture Malaysian start-ups in clean technologies.
Philippines	The Ecological Solid Waste Management Act (2001) introduced the 3R principle. All municipalities are required to achieve 25% diversion of solid waste (recycling and reduction) by 2006. Recycling rate in 2010 was 33%.
	The National Solid Waste Management Commission coordinates, at the national level, the ministries and other related parties in improving solid waste management (inaugurated in 2001).
	The National Framework Plan for the Informal Waste Sector in Solid Waste Management (2009) was established to support the formulation of a 3R national strategy. It is an action plan for improving the conditions of the informal sector engaged in solid waste management.
	The Philippine Developmental Plan 2011–2016 increased the waste diversion rate from 33% in 2010 to 50% in 2016.
Thailand	The take-back programme for used products started for containers and packaging, used lead-acid batteries, mobile phones, and batteries, in cooperation with the manufacturers and retailers. The take-back of fluorescent lamps is also in place, in cooperation with the Japan External Trade Organization.
	The initiation of a recycling-oriented society has been implemented in more than 200 communities through the 3Rs. In some communities, a 30%–50% or more reduction in waste generation was achieved.
	The Industries Waste Exchange Program registered over 450 firms by 2005.
	The National Economic and Social Development Plan 2017–2021 has policies like zero-waste society, green industry cluster, sustainable agriculture, promoting reusing and recycling, supporting factory owners to move forward with the green supply chain/green value chain.

Country	3Rs and Resource Circulation Policy Development
Lao PDR	The 8th 5-year National Socio-Economic Development Plan 2016–2020 (waiting for approval from the National Assembly) includes: <ul style="list-style-type: none"> • green and clean city development; and • green and sustainable urban development through waste reduction and integrated waste water refreshment system.
	Vision 2030, 10-Year Strategy 2016–2025, and 5-Year Work Plan of Natural Resources and Environment Sector provide for the: <ul style="list-style-type: none"> • participation in green growth to achieve sustainable development; • support of green productivity, and reduction of natural resources consumption in the industrial and tourism sectors, and households; and • reduction of impacts on environment from development and investment activities (e.g. reduction of CO₂ emission from transportation sector, and the like).
Viet Nam	3R-related laws and policies: Under the 2005 Law on Environmental Protection, 14 decisions were taken in relation to 3R and solid waste management. Decree No. 57 on integrated solid waste management in 2007; and Decision No. 1440 on planning/construction of solid waste management facilities in three central economic regions until 2020 in 2008.
	The 3R National Strategy (approved by the prime minister) targets 30% recycling of collected waste; 30% separation-at-source rate for households, and 70% for firms for 2020.
	The National Strategy on Cleaner Production in Industry Toward 2020.
	National Programmes on Sustainable Consumption and Production (NPSCP) for the period 2011–2020, with Vision 2030.
Cambodia	The Green Growth Roadmap, endorsed in 2009, outlines a framework for environmentally sustainable and socially inclusive development and growth in Cambodia. The master plan is currently being developed.
Singapore	The 3R Guidebook for Hotels , prepared by the National Environment Agency and the Singapore Hotel Association, offers a step-by-step and practical guide on planning and implementing 3R programmes.
	The 3R Guidebook for Shopping Malls , prepared by the National Environment Agency, offers guidelines to help shopping malls improve their current waste management practices, and identify opportunities for 3R. These guidelines focus on minimising the need for disposal of waste by shopping malls.
	The Sustainable Singapore Blueprint 2015 has strategies for smart city, 3R, energy, and water-efficient household appliances. It has clearly mentioned the need to use 3R on resources due to limited landfill spaces.
Indonesia	The Waste Management Law No. 18/ 2008 focuses on waste reduction, recycling, reuse, and treatment as resources, extended producer responsibility, etc. The country has a weak policy for 3R and resource circulation.
Myanmar	Relevant rules and regulations are yet to be framed (UNCRD, 2013).
Brunei Darussalam	Recycling in Brunei Darussalam is still in the infancy stage and the country faces many challenges (UNCRD, 2013). It lacks proper institutional policies for 3R. The hazardous oil and gas industrial materials are mostly exported to the



Different Types of Renewable Energy and Circular Economy

Solar PV

Applicability/ Advantages/ Disadvantages



Waste volume

78 million

Metric tons by 2050 globally

Content breakdown

- Glass **76%**
- Polymer **10%**
- Aluminum **8%**
- Silicon **5%**
- Copper **1%**
- Silver **< 0.1%**
- Tin, lead **Trace**



Selected recycling process

Pyrolysis to recover silicon followed by acid/electrolysis process to recover copper and silver



Drivers and barriers



Drivers

Barriers

Policy and Economic

Take-back/ collection scheme

Lack of profitability to recycle

Market

Cost saving from reuse and recycling of materials

Unorganized and fragmented supply chain

Social

Reducing human health risk

Lack of consumers willingness

Environment

Ensuring appropriate EoL

Emissions and pollution generated during recycling

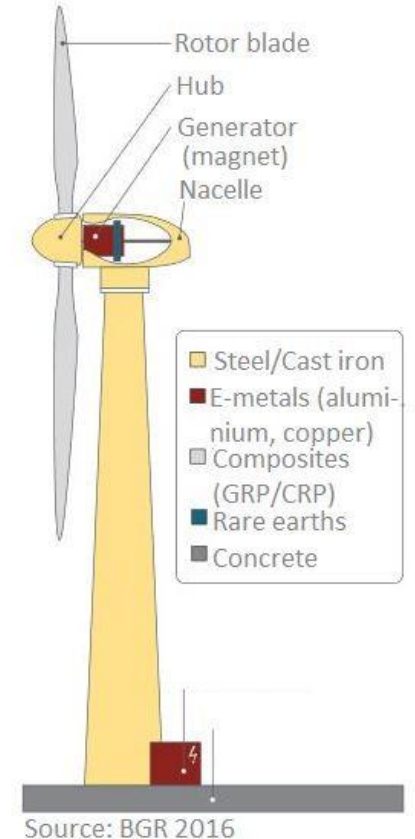
Value Chain

From decommissioning to recycling of solar panels



Wind Power Applicability/ Advantages/ Disadvantages

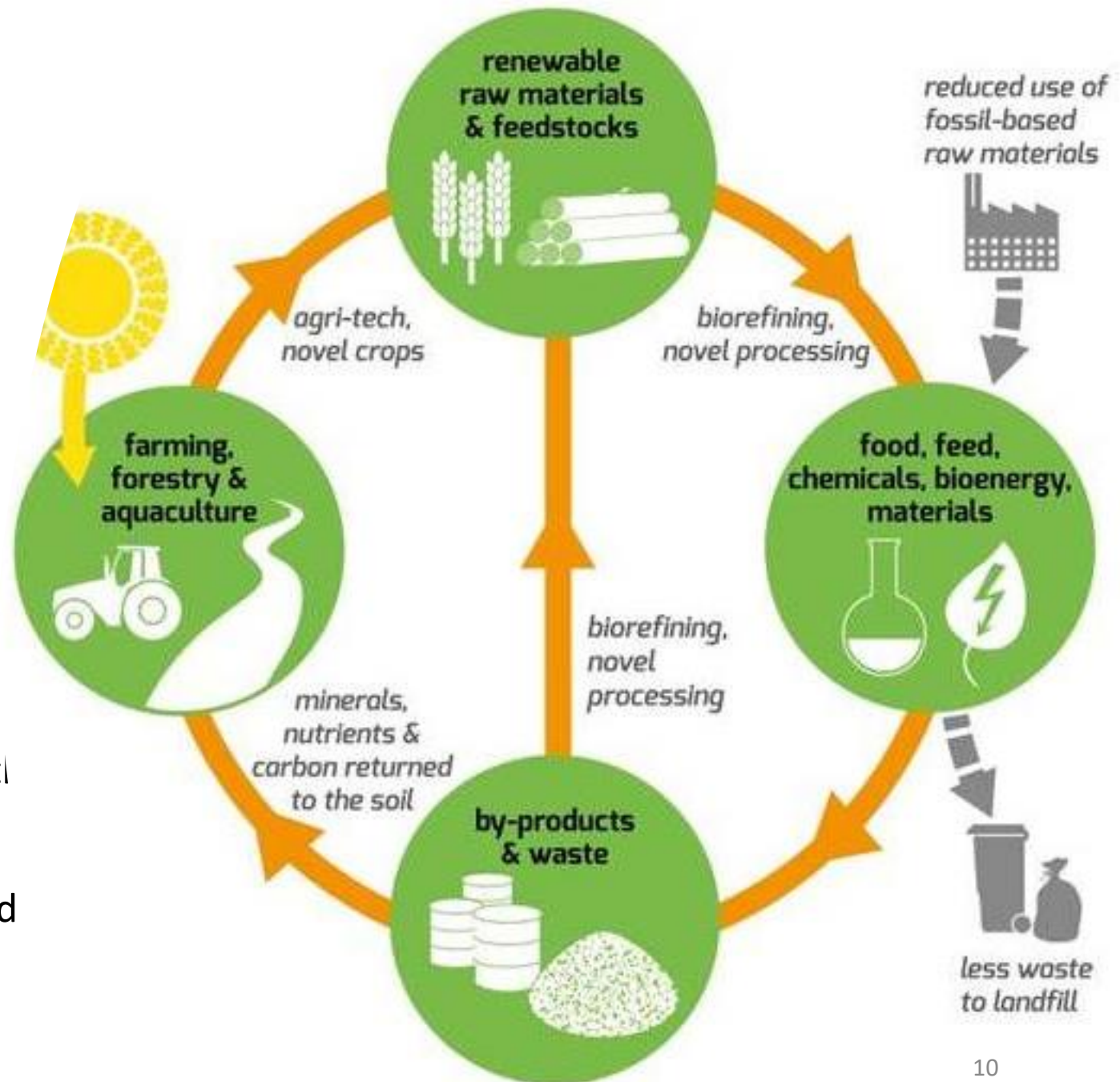
- 85%-90% of materials of wind turbines are recyclable, challenges remain for wind blades¹
- Estimated 43M tonnes of blade waste by 2050²
- Vestas targets zero waste turbines by 2040³
- Orsted: "Clear responsibility to help find solutions towards the challenge of recycling blades"⁴
- Applying strategies for CE from the design stage; new and fewer materials, identifying use/recycling/disposal of materials after end-of-life⁵

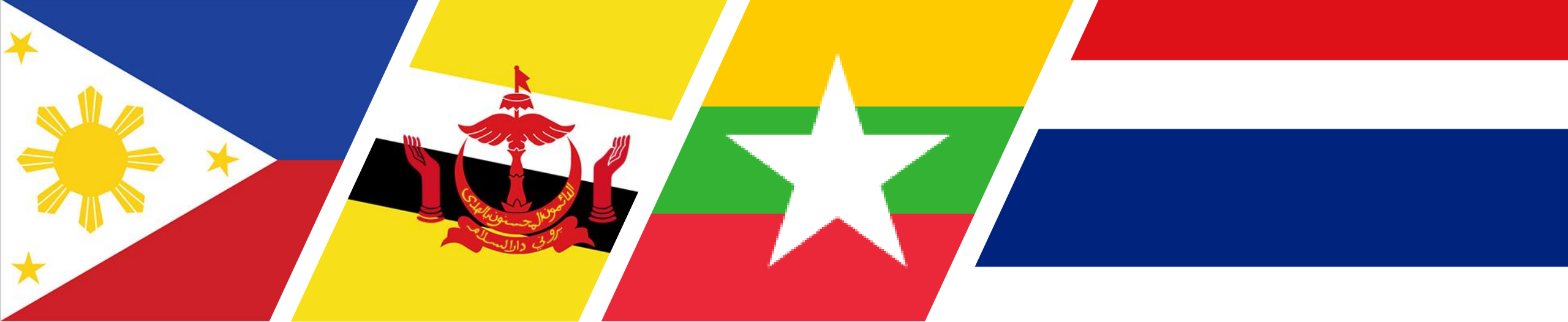


Bioenergy (Biomass, Biogas, Waste to Energy)

Applicability/Advantages/Disadvantages

- Bioenergy – the primary renewable energy sources (existing biomass & new biomass (via nano technology))
- In ASEAN, energy from biomass represent around 40% of total energy consumption – wood & agricultural residues
- Opportunities to expand to other industries with circular business design (e.g., packaging, automotive, coatings, construction, cosmetics, energy, fertilizer, homecare, pharmaceutical and textiles industries)
- Require strong policy and incentives to support sustainable management of resources



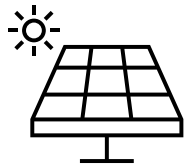


Initiatives and Challenges per Country

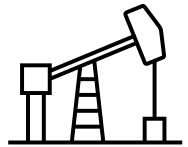
Initiatives and Challenges for Circular Economy in Brunei



Policies



30% RE capacity by 2035 [approx. 300+MW] under Climate Policy



Decommissioning & Restoration Guidelines for Oil & Gas industries

***No specific policy on CE.**

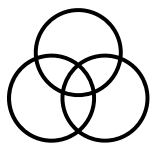
Circular Economy Initiatives



- RFP preparation for solar PV plants: proposed to include end-of-life in evaluation
- EOI for WTE plant
- Decommissioning & Restoration Opportunity Framing by O&G industries



Opportunities



CE policies for Power Sector can follow the footsteps of D&R guidelines for O&G sector

Challenges

- RE in fledgling state – how will CE requirements affect investment prospects?
- Buy-in and alignment with other stakeholders

Initiatives and Challenges for Circular Economy in Indonesia



Policies

- Based on National Energy Policy, the target of New Renewable Energy is **23%** of national energy mix by **2025**.
- Government Regulation No. 101 of 2014 are policies issued by the Government of Indonesia to manage waste.



Benowo WtE 11 MW Plant is built with eco-friendly concept

Circular Economy Initiatives

- The Government aims to have twelve WtE plants operational by 2022 and expects them to generate up to 234 megawatts of electricity using 16,000 tonnes of waste a day.
- Bali Eco Smart Grid to support Bali Clean and Green Bali Province Program.

Challenges

- Raise awareness about renewable energy waste
- Create regulations to govern renewable energy waste management
- Consider small-scale infrastructure to manage renewable energy waste

Initiatives and Challenges for Circular Economy in Myanmar



Policies

- ❑ Nationally Determined Contributions (Energy efficiency in Industry Sector, transition to renewable energy)
- ❑ National Waste Management Strategy & Master plan (2018-2030)
- ❑ National energy efficiency and conservation policy, strategy and roadmap (2016)
- ❑ Covid 19 economic relief plan (to promote renewables)



Yangon Waste to Energy Plant Project



Used Batteries (E-waste to E-cook Project)

Circular Economy Initiatives

- Waste to Energy (WtE) plant (Government)
- Husk to Power (Global Green Growth Institute GGGI)
- E-waste to E-cook (SWITCH BATTERY)
- Capacity Building to Industry Sector (Smart Myanmar)

Challenges

- Lack of strategic action plan and framework
- Lack of financial incentives to private sector
- Govt. needs financial and technological assistance
- Poor waste management, making it difficult for WtE plant to run efficiently

Initiatives and Challenges for Circular Economy in Thailand

- Thailand's 20-year National Strategy (2017-2036) → Environmental-friendly development and growth
- The 12th National Economic and Social Development Plan → Strategy 4: Environmental-friendly development



Focus: SDG 12: Sustainable Consumption and Production
In complimentary to SDG11+12+13+17

- Private sector: 5Rs (Reduce, Reuse, Recycle, Refuse, **Renewable (Bio Economy & Renewable Energy)**)



Thailand Renewable energy Target:
30% of RE in total energy production by 2036
(Alternative Energy Development Plan 2015-2036)

- 2022: expected 620,000-790,000 tons of solar cells waste
- 2018: Thailand's first recycling plant for PV
- **Challenges:** limited number of recycling plants → risks to landfill/exporting waste

- Power Development Plan 2018 (2018-2037): WTE target 400 MW (COD in 2021 onwards); Biomass target 3,376 MW; Biogas target 546 MW
- Waste to Energy: Industry (BKK x 2; Chonburi x1; Phuketx2) & community (Quick Win Projects: <10 MW)
- **Challenge:** pollution control, community acceptance

- Private sector initiatives – Synergy between heat and power generation
- **Challenge:** limited applications; unattractive incentives

Initiatives and Challenges for Circular Economy in Philippines



Policies

- Renewable Energy Act of 2008
- Ecological Solid Waste Management Act of 2000 (RA 9003)
- Philippine Green Jobs Act of 2016 (RA 10771)
- House Bill No. 7609, the proposed “Philippine Circular Economy Act of 2020,”



Circular Economy Initiatives in Energy Sector

- Net Metering to incentivize small-scale renewable energy generation (up to 100 kW)
- A feed-in tariff scheme for wind, solar, biomass and hydro
- Plans increase the solar PV installations to reach 3 GW of utility solar in 2022
- Energy from sugarcane residues and other bioenergy options

Challenges

- Currently no comprehensive policy framework for CE development
- Lack of data to establish economy wide material circularity rate
- Lack of capacity and resources on local level to implement CE solutions to plastic waste
- Policies that run counter to CE (e.g., coal-based energy¹⁶ generation)

Conclusion and Recommendation

- Circular economy – new paradigm shift for Renewable Energy development in ASEAN to assure sustainable resource management in all processes.
- Advantages of Circular Economy for ASEAN: boosting industry competitiveness & increase efficiency in resource consumption to promote green economy.
- Challenges for ASEAN Region:
 - There is no consolidate regulatory strategies for ASEAN.
 - Shifting towards circular economy will pose additional financial burdens for industries.
 - Technology for recycling renewable energy devices is still complicated and not financially efficient, making it unattractive for investment.