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ISAP 2022 Thematic Session

How can Asia Achieve a Net-zero Future?

Session Overview and Energy Transition in Asia

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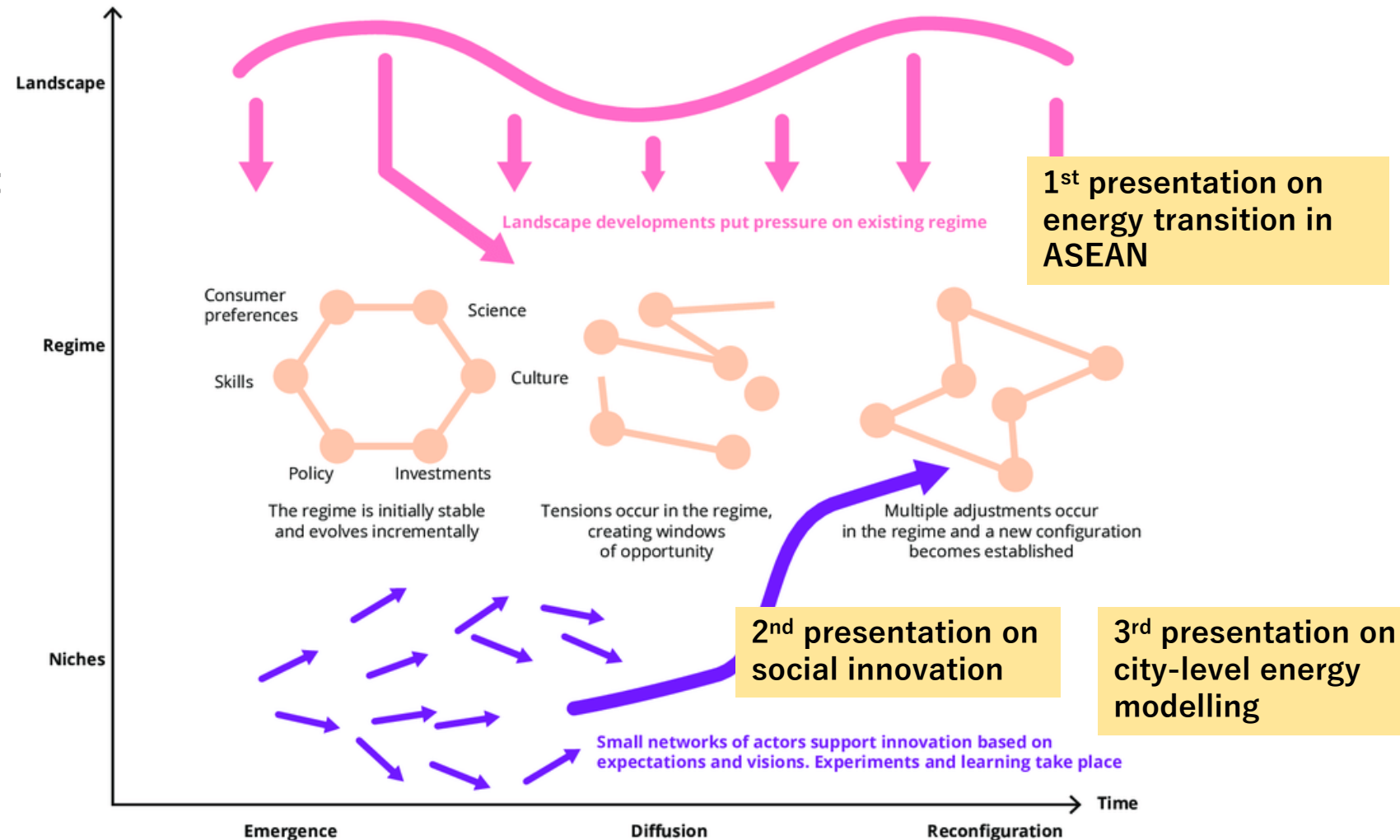
Climate and Energy Area

Institute for Global Environmental Strategies (IGES)

A Session Overview: How can Asia achieve a net zero future? = How can transformative changes occur?

Multilevel Perspective Framework:

To unlock the complementing factors of the current regime, **pressures from landscape developments** as well as **new technological and social innovation at the niche level** are required.

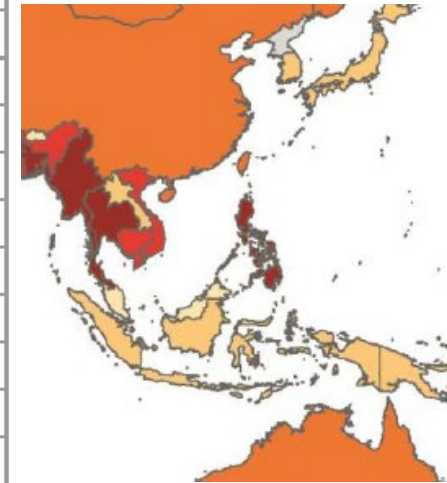


Landscape Developments

- Manifestation of adverse effects of climate change
- Advance in climate science:
 - ✓ To halt global warming, global CO₂ emissions need to be net-zero. For 2°C goal, by around 2070. For 1.5°C goal, by around 2050.
- Paris Agreement:
 - ✓ Every country is obliged to formulate and communicate more ambitious emission reduction target (or nationally determined contribution: NDC) every five years.
 - ✓ Every country is also requested to formulate and communicate mid-century, long-term strategy toward net zero emissions
- Energy crisis
 - ✓ Soaring fossil fuel prices
 - ✓ Energy security

Countries most affected by extreme weather events (2000-2019)

1	<u>Puerto Rico</u>
2	<u>Myanmar</u>
3	Haiti
4	<u>Philippines</u>
4	Mozambique
6	The Bahamas
7	<u>Bangladesh</u>
8	Pakistan
9	<u>Thailand</u>
10	<u>Nepal</u>



Climate Risk Index: Ranking 2000 - 2019



Source: Germanwatch (2022) *Global Climate Risk Index 2021*

➔ **Creating windows of opportunities**

Response to the Landscape Developments: Net Zero Goals by Asian Countries

Country	Net-zero: CO2 only or GHGs	Year to achieve goal	Formality	Notes
Bhutan	GHGs	Achieved (self-declared)	In policy document	Stated in its NDC
Brunei Darussalam	Not specified	2050	Declaration/pledge	Announced by Minister of Developmente at COP26
Cambodia	GHGs	2050	In policy document	Stated in its LT-LEDS
China	CO2 only	2060	In policy document	Stated in its LT-LEDS
India	Not specified	2070	In policy document	Stated in its LT-LEDS
Indonesia	GHGs	2060	In policy document	Stated in its LT-LEDS
Japan	GHGs	2050	In law	Stated in its LT-LEDS
Kazakhstan	Not specified	2060	In law	Issued as the doctrine of achieving carbon neutrality
Lao PDR	Not specified	2050	Declaration/pledge	Announced by PM at UN Climate Summit 2020
	GHGs	2050	In policy document	Stated in its NDC as an ambitious scenario
Malaysia	CO2 only	2050	Declaration/pledge	Announced by Prime Minister in Parliament
Nepal	CO2 only	2045	In policy document	Stated in its LT-LEDS
Saudi Arabia	Not specified	2060	Declaration/pledge	Announced by Crown Prince at the Saudi Green Initiative Forum
Singapore	GHGs	2050	In policy document	Stated in its LT-LEDS
South Korea	GHGs	2050	In law	Stated in its LT-LEDS
Sri Lanka	GHGs	2060	In policy document	Stated in its updated NDC
Thailand	CO2 only	2050	In policy document	Stated in its LT-LEDS
	GHGs	2065	In policy document	Stated in its LT-LEDS
Turkey	Not specified	2053	Declaration/pledge	Announced by Prime Minister at a press statement after the Presidential Cabinet Meeting
UAE	Not specified	2050	Declaration/pledge	Declared as a national initiative
Viet Nam	Not specified	2050	Declaration/pledge	Announced by Prime Minister at COP26

Opening the window of opportunities: International partnership for accelerating power sector transformation in Asia

- Various initiatives: Renewable energy-centred approach or hydrogen/ammonia-centred approach

ASEAN members' participation in international coal phase-out initiatives

Country	Coal Power Plants (MW)				Status
	Announced, pre-permit, permitted	Under construction	Operation	Total	
Indonesia	10,840	15,419	40,162	66,421	<ul style="list-style-type: none"> • Signed GCCET • Signed ETM • Signed JETP
Viet Nam	20,130	6,840	22,717	49,687	<ul style="list-style-type: none"> • Signed GCCET • Considering ETM • Considering JETP
Philippines	2,670	1,621	10,557	14,848	<ul style="list-style-type: none"> • Signed GCCET • Signed ETM
Brunei	0	0	220	220	<ul style="list-style-type: none"> • Signed GCCET
Singapore	0	0	0	0	<ul style="list-style-type: none"> • Signed PPCA • Signed GCCET

- **Powering Past Coal Alliance (PPCA)** : Early phase-out of the existing coal power plants, Halting unabated coal power plants until CCS becomes ready (Singapore)
- **Global Coal to Clean Energy Transition Statement (GCCET)**: a transition away from unabated coal power generation in the 2030s for major economies and in the 2040s (Brunei, Kazakhstan, Maldives, Indonesia, Philippines, Singapore, Sri Lanka and Viet Nam signed.)
- **ADB Energy Transition Mechanism (ETM)**: **Decommissioning of about half of coal-fired installed capacity** in the next 10-15 years, and increasing **investment in renewable energy** (Indonesia and Philippines signed. Viet Nam is also expected to join.)
- **Just Energy Transition Partnership (JETP)**: Accelerate **early retirement of high emission infrastructure** in partner countries and support donor countries to **invest in renewable energy** and related infrastructure in coordination (Indonesia signed; India and Vietnam agreed to start consultation).

Asian Energy Transition Initiative (AETI) (welcomed by ASEAN-Japan Summit Chair's Statement, etc.)
 In addition to renewable energy, utilize all technologies such as **hydrogen, ammonia**, biomass, zero-emission thermal power including **CCUS**, support for roadmap development, promotion of Asian version of transition finance, support for \$10 billion finance, capacity development

Asia Zero Emission Community (AZEC) concept (joint statement by Japan and Indonesia at the G20 Bali Summit)

Zero-emission technology development and **hydrogen** infrastructure, co-financing, technology standardisation, Asian emission rights market, etc.

Hydrogen/Ammonia Power Generation

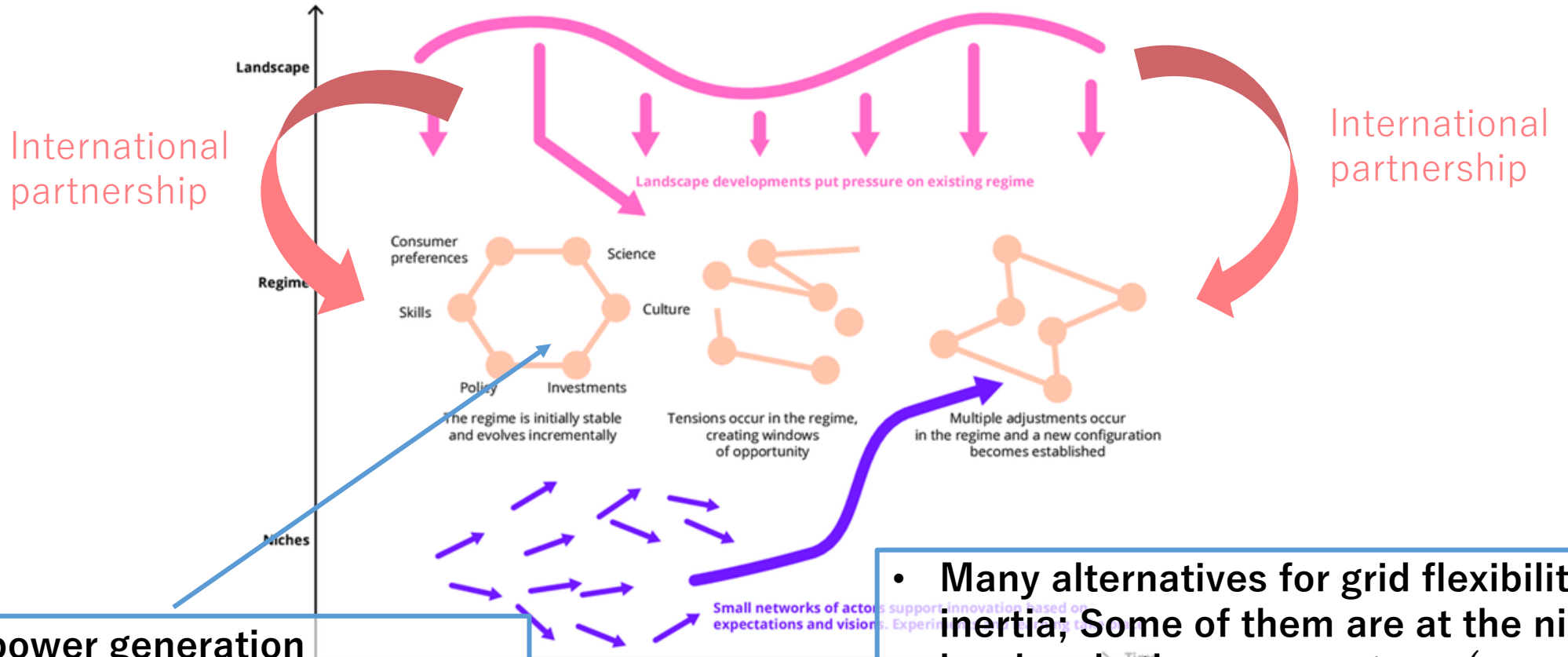
Rationale for promotion

- Zero CO₂ emissions during power generation
- Continued use of existing thermal power generation facilities as they are or can be retrofitted
- Ammonia: Infrastructure can be developed using existing production, transport and storage technologies. Transport and storage costs can be reduced compared to hydrogen
- Contributes to the stabilisation of grid operation by providing dispatchable power and inertia.
- High suitability for the Asian region, where economic growth continues and dependency on fossil fuels is high. Joint efforts to form a supply chain for hydrogen and ammonia in the Asian region, which is geographically close to Japan, are effective.

Caveats

- Aligned with the Paris Agreement?
 - ✓ Towards the 1.5° C target, "Global emissions are almost halved by 2030. Power generation sector to decarbonise ahead of other sectors" IPCC AR6
 - ✓ Fossil fuel-derived hydrogen and ammonia have limited emission reductions, including at the production stage → CCS is essential, but uncertainty in commercialization
- Can it be competitive in the power generation sector?
 - ✓ High cost: Substantial cost reduction in hydrogen production as well as CCS
 - ✓ In the long term, hydrogen and ammonia will be produced using renewable electricity → It will never be cheaper than renewable electricity
 - ✓ Relatively expensive option ⇒ Best to prioritise use where there are no alternatives
 - Many alternatives for grid flexibility and inertia
 - Limited role as long-term (seasonal) energy storage?

Hydrogen/Ammonia Power Generation in the Multilevel Perspective (MLP) Framework



International partnership

International partnership

Ammonia/H2 power generation = Easier to fit with the incumbent regime → Catch lots of attention, esp. in Japan

- Many alternatives for grid flexibility and inertia; Some of them are at the niche level and others are mature. (pumped hydro, batteries, V2G, next generation compressed air energy storage (CAES), liquid air energy storage (LAES), demand response, etc.)

Competition

Conclusion

To understand how transition can occur, it is important to see the three levels of niche, regime, and landscape, and their interaction comprehensively.

Hydrogen/ammonia power generation can more easily fit with the incumbent socio-technical regime due to its compatibility with fossil fuel asset. Because of this, it catches lots of attention, especially in Japan. But, there are competing alternatives, which also international partnerships provide support for shaping and re-configuring regimes for these alternatives.

The feasibility and competitiveness of hydrogen/ammonia power generation needs to be carefully and continuously assessed, as it is expected to face increasing competition from a variety of output-adjustable low-carbon power sources and flexibility and storage options.