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Sustainable Energy Access in Remote Communities: Lessons from the Arctic and Southeast Asia

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SYNOPSIS

The Arctic and Southeast Asia are two geographically distant and highly contrasting regions, both of which are undergoing energy transitions as part of the global energy transformation. Despite many differences, the respective governments are motivated by a common underlying objective—to facilitate sustainable energy access for their respective populations. This is especially true when it comes to the remote communities present in both regions. This brief examines the evolving energy landscapes of the two regions and the common lessons to draw from them.

KEY POINTS

- Both the Arctic and Southeast Asia have remote communities, including indigenous populations in isolated areas. These communities have traditionally faced difficulty in securing affordable and reliable energy supplies.
- The recognition of the importance of universal energy access, efforts to curb greenhouse gas (GHG) emissions and the growing commercial availability of renewable technologies present similar opportunities in facilitating low carbon energy transitions for the remote communities in these two regions, which are rich in renewable energy potential.
- Generally, new technologies can help to achieve sustainable energy production and consumption. However, the sub-national experiences in both regions indicate that the adoption of these technologies is based on different configurations and develops at varying paces due to specific local conditions and differing policy priorities.
- Efforts to facilitate sustainable energy access should be based on the prevailing local conditions, with sustained local community engagement and by recognising these communities as key participating stakeholders.
- Collaboration is a key aspect for the successful development and deployment of new energy projects. Instead of relying primarily on governments to enable energy access, the relevant community stakeholders can themselves be more proactive in engaging with the wider pool of energy experts for networking, training and collaboration purposes.

INTRODUCTION

On first impression, there are hardly any similarities between the Arctic and Southeast Asia. The Arctic and Southeast Asia are thousands of kilometres apart, with countries of varying political, economic and social profiles with diverse energy landscapes. The Arctic region encompasses eight states, namely, Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States, all of which are members of the Arctic Council. Southeast Asia here refers to the ten Southeast Asian states, namely Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam that collectively form the Association of Southeast Asian Nations (ASEAN). The two regions have contrasting climate and weather conditions, with the Arctic dominated by harsh winters and cool summers while Southeast Asia enjoys a tropical climate with near constant warm temperatures and humid weather all year round. The Arctic is much less populated compared to Southeast Asia, with an estimated population of 4 million people, compared to the 650 million inhabitants in Southeast Asia. Finally, the countries that make up each region are at different stages of economic development. All Arctic countries except Russia are high-income economies. In Southeast Asia, none of the countries except Singapore is a high-income economy.

The differences in geographical and economic profiles are substantial, but there are also notable similarities between the two regions in other aspects. Both regions are highly vulnerable to climate change and face extreme weather events. Both have remote communities, including indigenous populations living in isolated areas. These communities have traditionally faced difficulty in securing affordable and reliable energy supplies. Furthermore, efforts to curb greenhouse gas (GHG) emissions and the growing commercial availability of renewable technologies present similar opportunities in facilitating low carbon energy transitions for the remote communities in these two regions.

As is typical in other parts of the world, the remote areas in both the Arctic and Southeast Asia are underdeveloped compared to the urban areas in terms of infrastructure development, access to facilities and economic opportunities. Significantly, both regions are rich in renewable energy potential, which remain largely untapped. In this regard, the remote communities of both regions stand to benefit from a distributed energy approach, based on local power generation and microgrid systems, harnessing local renewable resources.

ANALYSIS

Contextualising Sustainable Energy Access in Energy Transition Trends

Energy access is equated with improved quality of life, increased productivity, and amplified economic gains. The World Bank has pointed out that access to energy is at the heart of development and that universal access to affordable, reliable and sustainable energy is crucial in eradicating extreme poverty and shared prosperity. In 2015, the importance of energy access was reiterated in the United Nations 2030 Agenda for Sustainable Development, which put forward 17 Sustainable Development Goals (SDGs). SDG 7 states the need for affordable and clean energy, to "ensure access to affordable, reliable, sustainable and modern energy for all." At the national level, governments are moving to incorporate these principles into their respective energy policies. On a global scale, these national efforts are expected to help facilitate universal energy access, improve energy efficiency, offset the negative effects of fossil-fuel dominated electricity and transportation systems, and reduce harmful CO_2 and other GHG emissions.

Vaclav Smil in his book *Energy Transitions: History, Requirements, Prospects* (2010) noted that energy transition is a complex long-term process taking decades to unfold. He described this historical process as "the change in the composition (structure) of primary energy supply, the gradual shift from a specific pattern of energy provision to a new state of an energy system." Today's emphasis on sustainability has created new impetus for the current energy transition narrative focusing on low carbon energy systems. The International Renewable Energy Agency (IRENA) describes the energy transition underway as "a pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century."

While technological advancement is an indispensable component of energy transition, a range of non-technical factors—namely economic, political and social conditions—play a critical role in constraining or facilitating its adoption. The prevailing economic structures may benefit established players and ways of doing business, while preventing new startups and entrepreneurial ideas from entering the mainstream. Political decisions may further support the status quo due to limitations in the policy-makers' agenda or through policy instruments like subsidies. Both economic and political considerations may impede financial investments in promising but untested technological solutions. In the social context, the public may be unaware of the potential benefits of new technologies, and communities may resist such changes due to fear of the unknown and potential adjustment costs.

Energy Access in the Arctic and Southeast Asia

From an energy perspective, the Arctic can be categorised as three distinct sub-regions, namely the North American Arctic, the Russian Arctic, and the Nordic Arctic; each with their different perceptions of sustainability, policy priorities and approaches to energy transitions. At present, there is no intergovernmental strategy for energy cooperation in the Arctic. The North American Arctic comprises the US and Canada. In the US state of Alaska, where fossil fuels are the dominant source of energy, there is a gradual transition to hybrid solutions to complement diesel generated power with renewable options such as solar PVs and biomass. In Canada's northern areas, diesel is replaced by hydro resources, but oil remains the leading transportation fuel. The Russian Arctic is somewhat similar to the North American Arctic, but with the added layer of complexity brought about by the nomadic population which requires portable and mobile systems. The Nordic Arctic is furthest ahead in the low carbon energy transition process. Finland, Iceland, Sweden, Norway and Greenland, are much less dependent on non-renewable energy resources. Instead, they widely employ hydro, wind, solar, and geothermal energy and, as a result, reap the benefits of clean energy production. The electricity sectors of Finland, Sweden and Norway are closely linked through financial market integration as well as physical interconnectors.

According to the 2017 International Energy Agency (IEA) Southeast Asia Energy Outlook, the number of people without access to electricity is currently at an estimated 65 million, or about 10 per cent of the population. Geographically, the ASEAN region consists of two sub-regions: mainland and maritime. In the mainland sub-region, countries such as Cambodia, Laos and Myanmar have remote rural communities. In the maritime sub-region, Indonesia and the Philippines are archipelagic states with remote communities that are "islanded" in the literal sense; as they are isolated rural communities on small islands without access to centralised energy systems. In both sub-regions, many remote communities either lack access to electricity, or rely on suboptimal systems.

There is a trend to adopt decentralised energy systems, which would enable them to harness local hydro, wind, solar and tidal resources. Such communities are looking towards microgrids and off-grid solutions by combining conventional and clean energy technologies, such as diesel-solar hybrid. Despite country-specific differences in energy policies, the common energy challenges are recognised collectively at the ASEAN regional level. The latest ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–2025 calls for enhanced regional connectivity for electricity trade and gas pipelines access, promotion of clean coal technologies (CCT), and an ambitious renewable energy target of 23 per cent by 2025 for the entire region among others. These energy transition targets are aimed at moving the ASEAN region towards a more sustainable energy future.

Common Energy Transition Challenges

The energy transitions process is unfolding differently for both the Arctic and Southeast Asia at the national level due to a variety of technological and non-technological factors. Generally, new technologies can help to achieve sustainable energy production and consumption. However, the sub-national experience from both regions in the adoption of these technologies is based on different configurations and develops at varying paces according to specific local political, economic, and social conditions. While there is a common goal towards universal and sustainable energy access, there is no one-size-fits-all solution due to specific local conditions and differing priorities. For example, in Alaska, the northernmost territory of the United States, and in isolated communities of Myanmar and the Philippines in Southeast Asia, combining diesel generators with solar PV to create hybrid energy systems is a gradual but progressive step towards low carbon energy transition. However, in the remote Arctic settlements of Norway, the use of coal, oil and petroleum products is minimised in favour of natural gas as a transition fuel to achieve a 100 per cent renewables-based energy future. In these contrasting examples, suitable technological solutions are selected based on prevailing national energy policies, availability of funds and local socio-economic conditions.

Thus, the energy landscapes of the Arctic and Southeast Asia are very diverse. Both regions are on their distinct energy transition paths, which nevertheless have a number of intersections. First, existing sustainable energy solutions need to be fine-tuned to meet the requirements of remote communities in both regions, taking into account the extreme weather conditions, ease of on-site maintenance and operation, and the durability and resilience of equipment. Second, the experience of the two regions demonstrates that the deployment and operation of the energy systems are not driven primarily by the availability of latest "cutting-edge" or most expensive technology available in the market. Rather, the systems adopted would largely depend on the suitability of its function in the context of the community's specific requirements, as well as its profile, including the capacity to manage the system and their ability and willingness to pay.

Third, energy governance is multidimensional and plays a crucial role in the adoption of new technologies. To ensure the successful implementation of a project, local community engagement is integral to the planning process. This enables the locals to understand the value of the system installed, establish trust with the new service providers, and receive training on how to maintain the new energy systems. At the implementation stage, communities should be recognised as a key participating stakeholder. At the evaluation stage, positive and negative feedback of the project's beneficiaries has to be incorporated in the appraisal and future improvements.

Fourth, collaboration is a key aspect of the successful development and deployment of new energy projects. Instead of relying primarily on governments to enable energy access, the relevant community stakeholders can themselves be more proactive in engaging with the wider pool of energy experts for networking, training and collaboration purposes. There are immense synergies to harness through greater engagement with regional and international organisations, academia, policy think tanks, corporations, financial institutions, non-government organisations and other like-minded communities.

CONCLUSION

Efforts to facilitate sustainable energy access should be based on prevailing local conditions. To overcome the limits of local experience and knowledge, remote communities should be encouraged to engage in more external networking, training and collaboration activities. In a wider context, pooling relevant expertise from different regions and communities to support collaboration on energy-related science and technology research, exchange best practices of energy governance, as well as sharing of energy-related information will further facilitate the agenda on universal energy access.

WHAT TO LOOK OUT FOR

- Growing momentum for international cooperation on facilitating sustainable energy access for remote communities.
- Growing engagement between the Arctic and Southeast Asian energy communities in terms of networking and research.
- Ability of remote communities to stem the brain drain and develop capacity to operate and maintain the local energy systems.

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