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Policy Brief

Sustainable and Inclusive Solutions to Air Pollution and Climate Change in Southeast Asia

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Sustainable and Inclusive Solutions to Air Pollution and Climate Change in Southeast Asia: Participatory Governance, Social Co-benefits and Co-Innovation

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The Integrated Programme for Better Air Quality in Asia (IBAQ) aims to improve air quality and contribute to more liveable and healthy cities in Asia. Its work focuses on cities with high impact potential and potential for leveraging wider change. The IBAQ aims to meet the objective by addressing key leverage points for better air quality, including research, development of policy, best practice tools and frameworks, providing support for implementation, strengthening public participation and using capacity building, knowledge sharing and e-learning as powerful and efficient tools for change.

Stockholm Environment Institute (SEI) is an international non-profit research and policy organization that tackles environment and development challenges. We connect science and decision-making to develop solutions for a sustainable future for all. Our approach is highly collaborative: stakeholder involvement is at the heart of our efforts to build capacity, strengthen institutions, and equip partners for the long term. Our work spans climate, water, air, and land-use issues, and integrates evidence and perspectives on governance, the economy, gender and human health. Across our eight centres in Europe, Asia, Africa and the Americas, we engage with policy processes, development action and business practice throughout the world.

The Asian Co-benefits Partnership is an inter-institutional platform involving various stakeholders working on co-benefits in Asia, including government agencies, international development organizations, academe, civil society and the private sector. The platform supports the mainstreaming of co-benefits into sectoral development plans, policies and projects in Asia.

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Table of Contents

Introduction 1

Setting the Context: Using an Intersectional Lens in Southeast Asia 1

From Integrated to Inclusive and Sustainable Solutions 2

- Promote Participatory Governance: Regulating Industry in Rayong, Thailand 3
- Recognize Social Co-benefits: Household Air Pollution and Targeted Subsidies in Indonesia 4
- Enable Co-innovation: Transitioning Away from Beehive Stoves in Hanoi, Viet Nam 6

Conclusion 7

Bibliography 9

Sustainable and Inclusive Solutions to Air Pollution and Climate Change in Southeast Asia: Participatory Governance, Social Co-benefits and Co-Innovation

Introduction

Southeast Asia–home to nearly 10 percent of the world's population–has registered impressive levels of socioeconomic development in the more than two decades that have passed since the region's financial crisis. Though the COVID-19 pandemic has caused considerable suffering and loss in recent years, Southeast Asia may leverage the opportunity that lies in this current crisis to build back better and transition to more sustainable development models (Yap, 2020). Part of the key to a robust and sustainable pandemic recovery will be addressing a question that sits at the centre of several interrelated development concerns: namely, how can policymakers, civil society, and researchers address air pollution, climate change, and socioeconomic equity with inclusive solutions (Janardhanan et al., 2021)?

This policy brief, which draws upon a four-day regional learning event entitled "Sustainable and Inclusive Solutions for Air Quality and Climate Change," aims to answer that question. It argues that much of the answer will involve reframing how policymakers, civil society groups, and researchers perceive the interrelationship between air pollution, climate change, and social equity concerns. That reframing will involve not only using an intersectional lens to more clearly identify interrelationships between these issues. It will also involve more attention to 1) new modes of participatory governance; 2) a recognition of the social co-benefits of action, and 3) adopting learning models based on co-innovation.

Setting the Context: Using an Intersectional Lens in Southeast Asia

Air pollution poses a serious threat to the health and well-being of 660 million people living in Southeast Asia (ASEAN Secretariat, 2021). This threat is particularly acute for women, children, the poor, and many other disadvantaged groups. This is implied in government monitoring data that shows that no city in Southeast Asia achieved the 2005 annual WHO air quality guideline values for PM2.5 (10 ug/m3)—and was even further behind new WHO guidelines (5 ug/m3) (WHO, 2021). Perhaps most pertinent for this brief is that the impacts of air pollution vary across different social groups. To illustrate, air pollution contributed to 14% of all deaths among women in the region, while making up slightly less than 12% of deaths for men in Southeast Asia in 2019 (Health Effects Institute, 2020). To demonstrate with another illustrative figure, lives lost to indoor air pollution that tends to affect women and

children more are comparable to those lost to outdoor ambient air pollution (UNEP ROAP, UNICEF EAPRO, & AIT, 2021).

Climate change is also a significant threat to socioeconomic development in Southeast Asia (ASEAN Secretariat, 2021). This is partially due to the region's growing vulnerability to rising temperatures, intense storms, and other adverse impacts (Overland et al., 2021). The Global Climate Risk Index 2021 suggests that three among the top ten most vulnerable countries between 2000 to 2019 are in Southeast Asia (Myanmar, Philippines and Thailand) (Eckstein, Künzel, & Schäfer, 2021). In addition, as many of these losses are felt in vulnerable industries, climate change can also widen equity gaps in the region. These impacts often persist because they can be worsened and be perpetuated by structural inequalities. This is made worse by the fact that the main causes of climate itself are embedded within often unequal "institutions, cultural beliefs, values, and social practices" (Islam & Kieu, 2021).

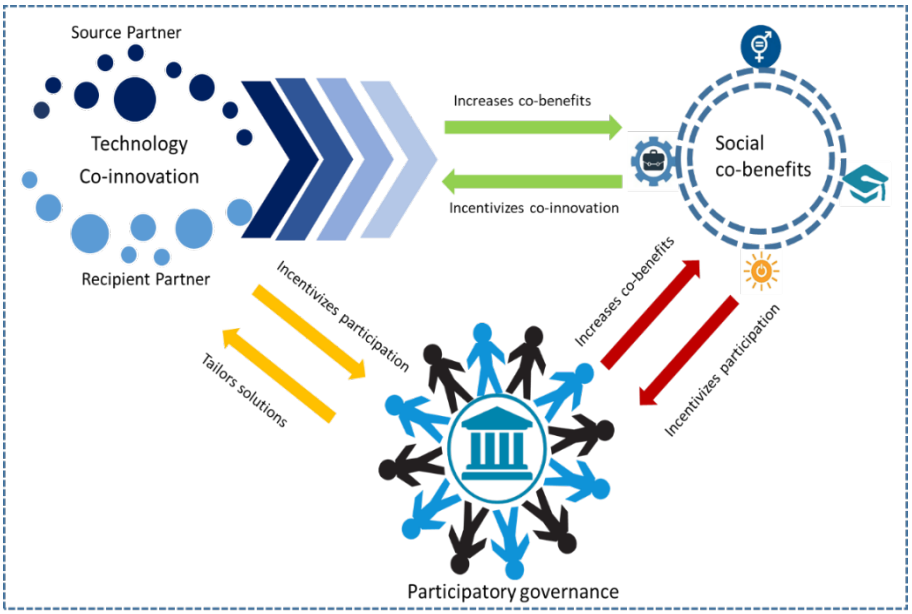
Another critical piece of the climate change puzzle goes beyond adapting to climate impacts to mitigating emissions. Greenhouse gas (GHG) emissions have tracked growth levels and are projected to increase substantially in the region for the foreseeable future (ASEAN Secretariat, 2021; Overland et al., 2021). Yet there is also an important social dimension to mitigation too. That dimension involves recognizing that many of the most sustainable solutions to climate change could come from women and different social groups that are often overlooked in the climate change decision-making calculus (Adams, Harms, Sorkin, & Zusman, 2014; ADB, 2015). For example, in Viet Nam women have helped to manufacture and run businesses that construct biodigesters that have a range of climate and other development benefits (Lee & Zusman, 2019). In addition, many of these inclusive solutions would not only help address climate change but improve air quality, health, and, completing the circle, address socioeconomic inequality. The bottom line is that many of the most sustainable solutions to air pollution and climate change are inclusive.

From Integrated to Inclusive and Sustainable Solutions

Over the past two decades, extensive literature has emerged on the multiple benefits or co-benefits of integrated solutions to air pollution and climate change (ACP, 2018; Miyatsuka & Zusman, 2010; Nemet, Holloway, & Meier, 2010). These studies also underline the importance of sectoral integration or working across government agencies with air pollution, climate, and other portfolios (Zusman, Unger, Borgford-Parnell, & Mar, 2021). Though some of the key co-benefits from integration have a social dimension, especially health and new jobs, much of the work on sectoral integration across agencies do not reflect the inclusion of key segments of society. More attention to social inclusion–the bottom-up participation of women, youth and disadvantaged populations as opposed to the horizontal interaction between government agencies—is needed to make integrated air pollution and climate solutions truly sustainable. The brief will focus on three areas that help policymakers, civil society, and researchers working in Southeast Asia make the transition from sectoral

integration to social inclusion: 1) participatory governance; 2) social co-benefits; and 3) co-innovation.

Figure 1: From Integrated to Inclusive and Sustainable Solutions: Co-innovation. Co-benefits and Participatory Governance



Source: Authors

Promote Participatory Governance: Regulating Industry in Rayong, Thailand

Participatory forms of governance (Reed, 2008; Stringer et al., 2006) are critical to advancing inclusive and sustainable solutions to climate changes and air pollution. This is, in part, because mechanisms that encourage participation can bring inputs into the formulation of solutions. For instance, public fora that meaningfully captures the voices of women or the poor can ensure that strategies target emissions sources that may be particularly harmful to these segments such as residential cooking (see also sections 3.2 and 3.3). In addition to bringing in more representative inputs, participatory forms of governance can also be empowering (Fischer, 2017). To offer yet another example, efforts to engage youth in air pollution and climate solutions through awareness-raising campaigns and outreach events can inject much-needed energy into implementation strategies. This wave of energy may motivate politicians to devote more resources to enforcement and compliance or may help fill capacity and outreach gaps for the government.

Ecological Alert and Recovery Thailand (EARTH) is a non-governmental organization based in Thailand. EARTH focuses on mitigating the negative impacts of industrial pollution on people and the environment. From 2001 through 2007, the organization worked to improve the

environment in the petrochemical industrial area of the Rayong Province. Its first goal was to understand relevant environmental conditions by characterizing the chemical composition of the emissions coming from the industries as well as determining levels of regulatory compliance of said industries. Once this information was obtained, it employed a series of and engagement of stakeholders affected by the emissions. That strategy both used and expanded the power of participation and included the following narrower interventions:

- Dissemination of the information through a multi-stakeholder press conference
- Informing the public about the issue including the negative health impacts of the specific pollutants identified from the emissions
- Initiating a dialogue with the government and regulatory agencies to share the information collected and discuss solutions
- Launching a campaign emphasizing the importance of transparency and taking a legal advocacy stance

In response to the growing public pressure, Thailand's Pollution Control Department (PCD) performed its investigation of air quality monitoring in 2005 to validate EARTH's findings. Several policies were then enacted from 2006 until 2008 focusing on monitoring and regulation of volatile organic compounds (VOCs) within the area. The experience demonstrated not simply the impacts but the resourcefulness of civil society and media in generating and then maintaining public attention on vitally important issues. In the process, it was able to hold the private sector and regulatory agencies accountable for their resolution – solutions that themselves were identified together with the participation of affected stakeholders.

In creating these initial channels for participation, other avenues for collaboration also opened. For example, EARTH would continue lobbying and advocacy building by capturing grassroots level concerns from the grassroots level, linking experts with communities, using data to inform policymaking and solutions and bridging citizens and policymakers on other air pollution and climate issues.

Recognize Social Co-benefits: Household Air Pollution and Targeted Subsidies in Indonesia

Beyond making governance within countries more participatory, it is critical to account for the **social co-benefits** of air pollution and climate policies (Lee, 2021). As noted previously, much of the discussion of co-benefits has focused on measuring and monetizing air pollution, climate change and some health impacts (ACP, 2018; Miyatsuka & Zusman, 2010; Nemet, Holloway, & Meier, 2010; Zusman, Unger, Borgford-Parnell, & Mar, 2021). However, efforts to carefully account for the social dimensions of activities have tended to lag behind. These benefits can be featured by not only bringing more social-related concerns into the design

and review of interventions but ensuring that existing metrics are examined with equity considerations in mind. For instance, rather than simply reflecting on aggregate health or employment impacts, disaggregated analysis across gender, age groups, and income levels will help reveal important insights into how interventions affect equity. It can also open eyes to possible dislocations such as lost jobs or forced migration that may come from otherwise well-intentioned investments in climate and air pollution solutions. Such insights project to be particularly useful for designing interventions to ameliorate the effects of the next case study featured in this brief: household air pollution (See Box 1).

Box 1: Indoor Air Pollution and Residential Energy

In many low-income countries, indoor air pollution from residential cooking is a major cause of serious health problems while widening equity gaps and contributing to climate change. This is chiefly because large numbers of people lack access to cleaner fuels and technologies and therefore rely upon traditional biomass-based cookstoves that release high levels of fine particulates into living spaces. The health impacts on the cardiovascular and respiratory functions can be particularly high for women as they tend to spend more time in near the stoves (SNV, 2016; WHO, 2016).

Household air pollution poses a significant threat to the environment and health, affecting an estimated 2.5 billion of the world's population. To help identify effective interventions to this challenge, the World Health Organization (WHO) developed a set of tools for assessing the impacts of household air pollution and clean energy adoption. Importantly, these tools highlight the gendered impacts of HAP. This recognition is essential since women and children are typically responsible for collecting fuel and cooking food, resulting in 60% of HAP-related deaths. For instance, the core questions used by the WHO involving household energy use are intended to be incorporated into national surveys to collect information on household energy used for cooking, heating, and lighting including questions on gender-based exposures and injuries suffered while gathering cooking fuel. Many countries in Southeast Asia and other regions have incorporated the kinds of questions posed in this tool in national surveys, shedding light on the gendered impacts on the household at the national and local levels and informing solutions.

Another WHO tool that has the potential to identify social co-benefits and develop socially beneficial interventions is the Benefits of Action to Reduce Household Air Pollution (BAR-HAP). The BAR-HAP has already been piloted in Nepal—where exchanges with stakeholders led to refinements and trial applications. Based on this piloting, the tool allows the user to create scenarios that identified the costs and benefits of different types of policies and interventions. Notably, when it comes to social co-benefits, the tool also looks as well as its potential health and environmental benefits at the total cost of implementing both governments as well as *individuals*. The individual cost calculations are critical because for

transitions in residential energy technology, it is the costs facing individuals that determine if cleaner stoves or fuels are adopted.

Another useful feature of the tool involving social co-benefits is it puts a considerable emphasis on a variety of subsidies for cleaner stoves, fuels, and fuel refills. The inclusion of the varied set of subsides is helpful because it demonstrates possible impacts on poorer segments of the population—precisely those segments with limited resources to transition to cleaner cooking fuels or stoves without price supports. This kind of information could be helpful in countries in Southeast Asia like Indonesia where the government has engineered an impressive transition away from pollution-intensive kerosene to cleaner liquefied petroleum gas (LPG) by re-allocating subsidies (Permadi, Sofyan, & Oanh, 2017). However, the programme did not reach arguably the lowest-income and most vulnerable segments of the Indonesian population because it lacked a focus on those users. A finer-grained analysis of the benefits of an income-adjusted subsidy programme could not only improve health but narrow equity gaps in Indonesia (Thoday, Benjamin, Gan, & Puzzolo, 2018).

Enable Co-innovation: Transitioning Away from Beehive Stoves in Hanoi, Viet Nam

A third building block for inclusive solutions is **co-innovation**. Technology transfer is critical to addressing climate change and air pollution. In consequence, much of the discussion on controlling climate change and air pollution revolves around importing and exporting efficient and clean transportation, industrial, and energy *hardware*. Less discussed but perhaps more relevant is the collaborative *learning* processes that are needed to create the *software* that makes solutions socially feasible and locally appropriate. The iterative and mutually beneficial learning processes that can help contextualize and tailor appropriate technologies are referred to as co-innovation. Co-innovation is important because it ensures that technologies meet the needs of key social groups (acceptability) as well as identify ways to lower costs (affordability), including local production. Acceptability and affordability should take a front seat in the discussion of inclusive forms of technology and knowledge transfer (Janardhanan, 2019).

A case study that illustrates co-innovation involves the elimination of the use of dirty coal briquettes in Hanoi. While it was initiated by the Hanoi People's Committee and led by environmental agencies (Hanoi Environmental Protection Agency and Hanoi Department of Natural Resources and Environment), its success is grounded in a multi-stakeholder cooperation learning process that involved government people's organizations, youth groups, non-government organizations, media, and international research institutions. These groups learned together about the health impacts of coal briquettes and identified locally appropriate solutions based on that collaborative learning.

Box 2: Co-innovation and Composting

Southeast Asia is home to several examples of co-innovation wherein local and international partners jointly develop and tailor solutions to the local context. For instance, policymakers and researchers from Japan worked with counterparts in Surabaya, Indonesia to translate a composting method for organic waste into the local context. The project delivered significant reductions in methane emissions–a powerful climate pollutant and a precursor of tropospheric ozone, while also creating jobs and new revenue streams from fertilizer sales for local communities. In addition, because the project was implemented through a mutually beneficial co-innovation process associated equipment costs were lower and locally available resources for production contributed to the local economy (Maeda, 2009).

The intervention grew out of an evidence-based approach that facilitated the iterative learning process that lies at the core of co-innovation. To support that learning, an emissions inventory was developed as a baseline to understand the extent of the beehive cookstove usage. The inventory revealed that around 56,000 beehive cook stoves in use, with 63% coming from the inner districts and 37% from the outer districts) and the resulting emissions (528 tons of coal consumed daily produced 1,870 tons of carbon dioxide. The baseline data was useful in terms of monitoring the progress and success of the intervention—not to mention generating estimates of the multiple benefits from the shift to cleaner stoves. The data also was employed to monitor the elimination and replacement of the beehive stoves at the district level; this made targeting and outreach to individual households easier.

To enable additional learning, policymakers and researchers working with the Stockholm Environment Institute (SEI) to employ the Low Emissions Analysis Platform – Integrated Benefits Calculator (LEAP-IBC) to demonstrate the significant reduction of emissions of particulate matter (specifically $PM_{2.5}$), volatile organic compounds, nitrogen dioxide, sulphur dioxide, and carbon dioxide. Those co-benefits included reducing the exposure of 160,000 people in Hanoi to harmful air pollutants as well as reducing the threats of cardiovascular and respiratory diseases, cancer, and stroke. Highlighting these benefits and working together to

promote the uptake of cleaner cookstoves as an alternative to beehive cookstoves gained momentum because of the learning and contextualization that supported this effort.

Conclusion

Southeast Asia faces multi-dimensional air pollution and climate challenge. These problems threaten to impair the public health, agriculture, employment and the local economy. They are also significant enough to alter the socio-economic developmental trajectory of the region if left unaddressed. To some extent, the magnitude and interconnected nature of these problems make them more daunting and complicated to resolve. However, when viewed from a different perspective, the interactions between these problems also open opportunities for transitioning from integrated to inclusive and sustainable solutions.

This brief has argued that the key to unlocking this potential is to not only aim for integrated but inclusive and sustainable solutions. It then underlined three specific critical enablers that can help policymakers, civil society, and researchers move from integrated to inclusive solutions. First, promoting different forms of participatory governance is critical to elicit inputs and generate pressure from civil society, the general public, and the media, leading to more-informed resolutions and greater accountability for their implementation and enforcement. Second, recognizing social co-benefits helps to ensure a fuller accounting of impacts on individuals and different interventions (especially targeted subsidies and price supports) do not miss important segments of the population. Third, enabling co-innovation involves thinking beyond hardware to the iterative and collaborative learning process that builds the software for knowledge transfer across different national and international stakeholders (See Figure 1).

While the brief has treated these three enablers as largely independent thus far, they are, in fact, mutually reinforcing. Participatory forms or governance are likely to expand with a better accounting of benefits and multi-stakeholder learning processes. Similarly, collaborative learning and exchange is gaining more traction with a more complete understanding of benefits and a deepening and broadening of participation. The reinforcing nature of these three elements is also apparent in the brief's case studies. For illustrative purposes, the case studies focused on one of the key enablers but it is clear that issues like the transition away from the beehive stove were also facilitated by participation and a recognition of social co-benefits.

While the brief has shed important light on these enablers as well as relevant cases, the work in this space is in many ways still beginning. To move this work forward, there is arguably a need to think more broadly about how the three enablers affect larger-scale decision-making processes. For example, what are the role of more participation, recognition of social co-benefits, and co-innovation in the nationally determined contribution (NDC) processes? In addition, there is also scope for inquiry in examining how some smaller-scale cases such as industrial regulation or cleaner cooking interact with these larger government-led processes

such as the NDCs. Looking at the interactions across cases may lead to bigger, broader, and more transformational changes.

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