


# STRATEGIC ENVIRONMENTAL ASSESSMENTS FOR POWER SECTOR PLANNING IN THE GREATER MEKONG SUBREGION



▲ **Reducing energy.** Viet Nam's Ho Chi Minh City is aiming to cut energy consumption by encouraging households and businesses to use renewable energy and apply energy saving solutions.

Over the past decade, strategic environmental assessment (SEA) has emerged as an increasingly important planning tool in the Greater Mekong Subregion (GMS). SEAs help policy makers better understand and integrate the environmental, social, and economic dimensions of strategies, plans, and programs. They are particularly important for power sector planning because the social and environmental impacts of such plans can be very significant and are often a major concern for governments and communities. Experience in the GMS, as well as further afield, shows that more sustainable and successful planning choices are made when these impacts are properly considered.

The further uptake of SEAs in power sector planning in the subregion is needed to help seize opportunities that are emerging in the evolving energy landscape. Technological and economic transformations are making renewable energy an increasingly attractive and viable energy option for the GMS countries as elsewhere in the world. This trend aligns well with the national development policy priorities of all six countries as they increasingly emphasize green growth, climate change mitigation, and sustainable development.

Using an SEA to support the preparation of power development plans can guide decisions on which energy generation options are optimal. It can ensure that these

decisions are based on an understanding of the full economic costs and benefits to a country, rather than just shorter-term financial ones, as has traditionally been the case. An SEA enables planners to identify the potential negative impacts of different generation options. These impacts can lead to significant increases in costs and delays if not identified before the planning stage of projects.

The integration of an SEA in power development planning enables energy sector investments to be quicker, more transparent, and more closely aligned to national development priorities. An SEA can also guide decisions on the most economical locations to invest in and help to ensure minimal impacts on communities and the environment.

Since 2006, the Asian Development Bank (ADB) has been providing technical assistance through the GMS Core Environment Program (CEP) to help mainstream the use of SEAs in the GMS countries, including for power development planning. This publication outlines the key characteristics of SEA, discusses global trends in energy technologies and markets, and looks at how Viet Nam, with support from the CEP, has integrated SEAs into its power development planning process. It also identifies priority steps for further mainstreaming SEAs in power sector planning in the GMS countries.

# CHARACTERISTICS OF STRATEGIC ENVIRONMENTAL ASSESSMENT

An SEA is a process that applies an evidence-based analysis of social and environmental issues within a strategic planning context. SEAs are decision-oriented as they also aim to provide the evidence needed to build consensus among stakeholders on the best options to achieve planning goals. Applied to “upstream” strategic planning processes, SEAs both precede and complement environmental impact assessments, which focus on individual projects.

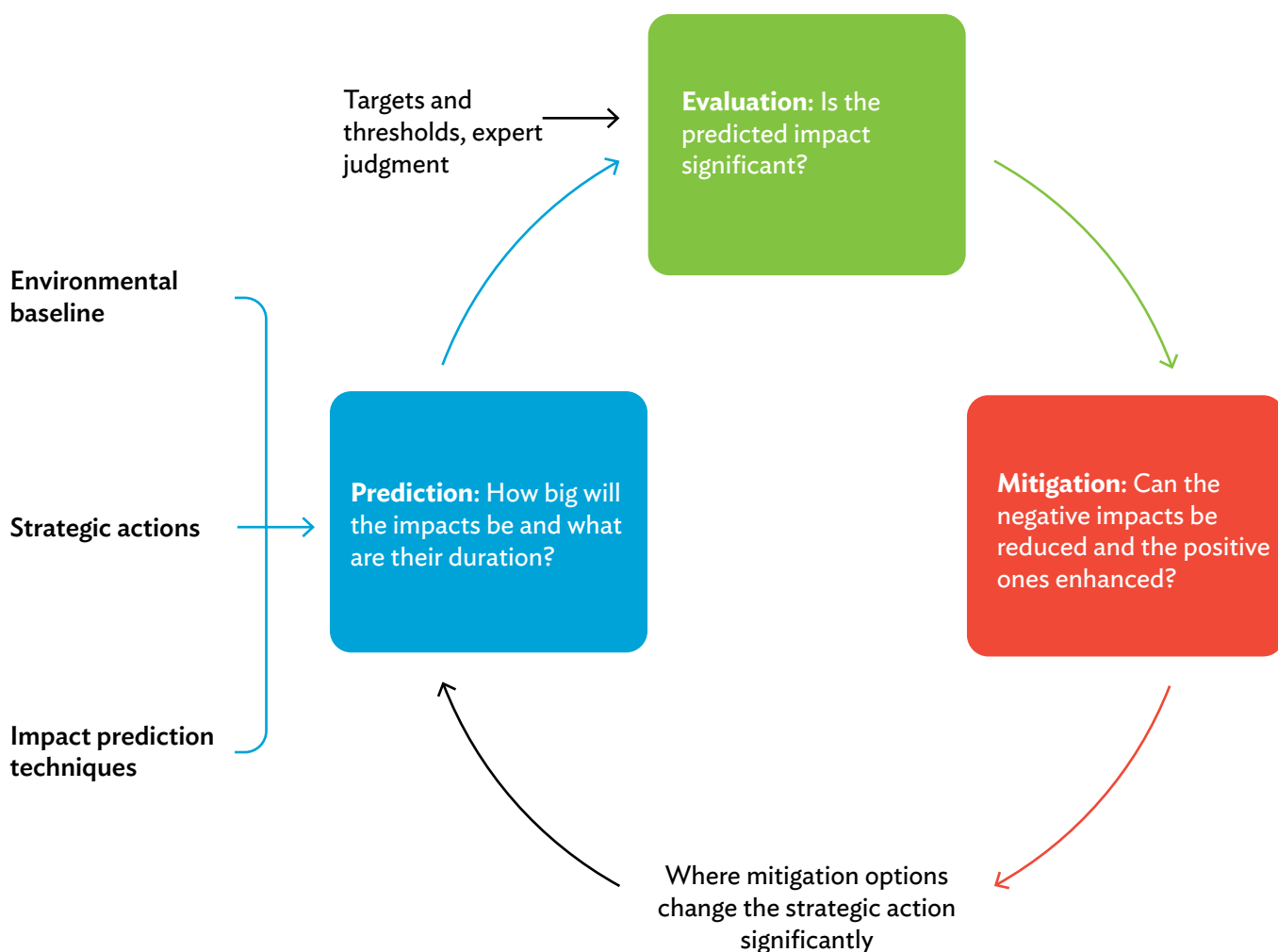
SEAs use varying methodologies and process steps, but all SEAs have some common characteristics (Figure 1). SEAs predict the potential impacts (both positive and negative) of different strategic planning options. They also evaluate

if these impacts are significant enough to need actions to mitigate them, to reduce the negative impacts and enhance the positive ones. A good SEA strikes a balance between technical analysis and structured consultations.

Scenarios are an important element of SEAs as they provide alternative development options for achieving the desired planning outcomes, and examine the costs and benefits these options entail. In power sector planning, for example, scenarios will be based on potential mixes of different energy generation types (e.g., thermal, hydropower, solar power), and levels of future demand such as for electricity. Scenarios aid planners in understanding a more complete picture, especially when there is uncertainty over future variables, such as the cost of generating electricity from different sources. These scenarios are used to “internalize” social and environmental impacts such as greenhouse gas emissions and the loss of forest cover, meaning they can be included in cost calculations.

Figure 1: Key Characteristics of a Strategic Environmental Assessment

## Links between prediction, evaluation, and mitigation





▲ **Diversifying energy.** The GMS countries are looking to diversify their energy sources to reduce their reliance on fossil fuels.

Assessing social and environmental impacts is at the heart of all SEAs. A high-quality SEA will not just identify these impacts, but quantify and, as far as possible, calculate an economic value for them. The valuation enables planners to compare the significance of different impacts; for example, greenhouse gas emissions from coal compared with resettlement and forest loss from hydropower. And if the valuation also calculates economic values for the scenarios, the full economic cost to society of the different planning options will be known and can inform decision-making.

Box 1 lists the major impacts on people and the environment that are caused by power generation. Some impacts, such as greenhouse gas emissions are global, while others are more regional; for example, changes to water flows in river basins. Meanwhile, impacts such as resettlement and forest cover loss are more local in character. An SEA, as part of the preparation of a power development plan, can assess these different impacts, compare them to each other, and identify mitigation measures early in the planning process.

## Box 1: Major Social and Environmental Impacts of Power Generation Options

### Thermal Power (Coal, Oil, and Gas)

- (i) Climate change from the emission of carbon dioxide and other greenhouse gases
- (ii) Acidification of water resources from sulfur dioxide emissions
- (iii) Human health impacts from the emission of particulates and noxious gases such as sulfur dioxide and nitrogen oxide
- (iv) The impact of cooling waters on biodiversity and water resources
- (v) Disposal of solid wastes from generation

### Hydropower

- (i) Resettlement of people displaced by dam construction
- (ii) Social and livelihood impacts on communities
- (iii) Forest cover, biodiversity, and habitat loss
- (iv) Hydrological impacts, including changed seasonal water flows and reduced flooding and drought risks
- (v) Impacts, positive and negative, on agriculture

### Renewable Energy

- (i) Visual and noise pollution
- (ii) Land area for generation sites

### Transmission Lines

- (i) Habitat and forest cover loss
- (ii) Ecosystem fragmentation

Source: Author.

# THE GLOBAL RISE OF RENEWABLE ENERGY

The global environment in which power sector plans are made has changed radically and rapidly in recent years. This transformation has led to the convergence of several trends that need to be reflected in power development planning, as follows:

- (i) Governments increasingly require the power sector to align itself more closely with national policies on green growth, climate change mitigation, and sustainable development.
- (ii) Growing concerns about water and air pollution from power generation have increased political pressure to reduce the sector's impacts on human health and the natural environment.
- (iii) Technological innovations in regard to renewable energy, energy storage, and energy efficiency are creating more sustainable options for power generation.
- (iv) Global growth in renewable energy is accelerating and it is becoming the preferred generation option in many countries in Asia and beyond. For example, the People's Republic of China exceeded its 2020 target for renewable energy growth by the middle of 2017.
- (v) The cost of power from renewable energy is falling fast; renewable energy is now often cheaper than conventional power generation. This is true even without considering subsidies or the cost of pollution and greenhouse gas emissions.
- (vi) Requiring an SEA in power development plan preparation means that the cost of social and environmental impacts can more readily and accurately be included in the selection of power generation options. This is a move from financial costing (considering only direct investment, fuel, and operational costs) to full economic costing (where the costs of externalities such as pollution are included).

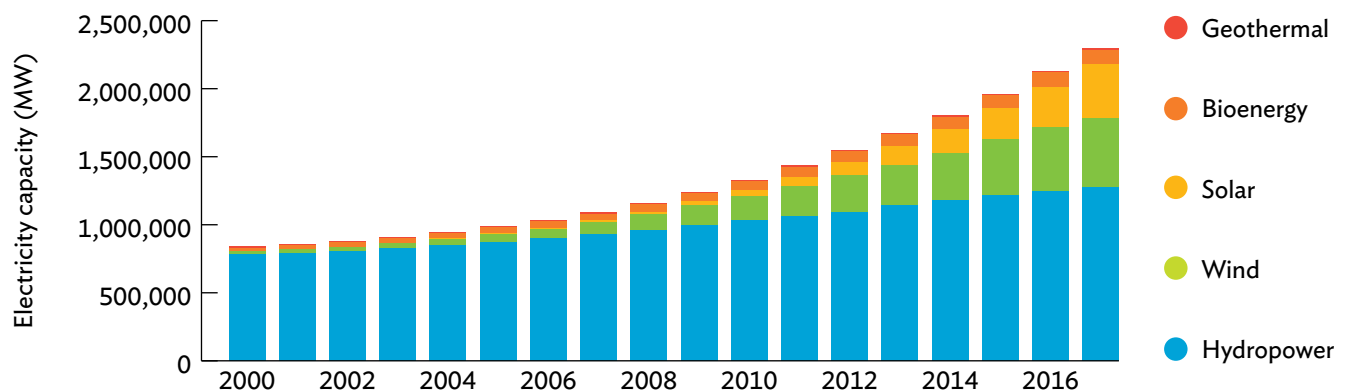
## Wind and Solar Energy: Powering the Future

A global shift in the power sector is underway due to the decreasing price of wind and solar power generation. Technological innovations such as new types of solar panels and larger wind turbines, and greater economies of scale from mass production, are making renewable energy much cheaper. For example, in 1975, the cost of a solar panel per watt was over \$100. In 2015, it was \$0.61 and, a year later, it had dropped to less than \$0.50 for the first time.

As a result of lowering costs, installed capacity for renewable energy, especially solar and wind power, has skyrocketed (Figure 2). Indeed, the old argument that renewable energy is not affordable is no longer valid. The much lower social and environmental impacts of renewable energy make this form of power generation even more attractive for countries. This global shift in the power sector needs to be reflected in the way power development plans are prepared in the GMS countries. This means moving toward a planning approach that integrates the preparation of an SEA into the process, which is increasingly the international standard practice and is becoming more mainstreamed in the GMS.

The outlook for renewable energy is highly encouraging, but it is important to note that power development plans are concerned with sector development over a horizon of 10–20 years. Anticipating how the prices of renewable energy technologies, as well as fossil fuel prices for thermal power, are likely to develop over the plan duration is essential for effective decision-making. Projections to 2025 estimate that the costs of solar and wind power will continue to decline significantly due to technology improvements and economies of scale. For solar, investment costs as well as final costs of generating electricity may be less than half the current price. For onshore wind, investment costs are predicted to drop 12% and production costs by 26%.<sup>1</sup> It is almost certain that renewable energy sources such as these will become increasingly attractive and more viable for the GMS countries, where the resource potential for both sources is plentiful. Consequently, solar and wind power should be core options for future power development plans in all six countries.

**Figure 2: The Growth of Renewable Energy, 2000–2017**



Source: International Renewable Energy Agency (2018). *Renewable Energy Statistics 2018*. Abu Dhabi.

<sup>1</sup> International Renewable Energy Agency. 2016. *The Power to Change: Solar and Wind Cost Reduction Potentials to 2025*.

# STRATEGIC ENVIRONMENTAL ASSESSMENT FOR POWER DEVELOPMENT PLANNING IN VIET NAM

SEAs first became a legal requirement for strategic planning in Viet Nam under the 2005 Law on Environmental Protection. In 2006, the Ministry of Industry and Trade approached the CEP for technical assistance to apply SEA in power development planning. Since then, the CEP has led international support to establish Viet Nam's SEA capacity and mainstream the approach in energy planning, as well as in other sectors.

The CEP initially worked with Ministry of Industry and Trade to conduct a pilot assessment of hydropower for Viet Nam's sixth National Power Development Plan, 2006–2015. This was followed, in 2012, by lead support for an SEA of the country's seventh National Power Development Plan, 2011–2020 (PDP7), and then, in 2014, by technical advice for an SEA of the revised PDP7.

The CEP support helped build capacity to a level where SEAs are now integrated into Viet Nam's PDP process, and these assessments have a major influence on the scope and outcomes of this process. The social and environmental impacts of planned power projects are now analyzed and given an economic value that is included in the calculation of the costs and benefits of different power generation options. This has led to major changes in the plans and stimulated wider participation in the PDP process.

The SEA of the PDP7 in 2012 found that by far the largest potential social and environmental impact was atmospheric pollution from thermal power stations, especially coal. Some of the key findings of the SEA were as follows:

- (i) **Greenhouse gas emissions.** Carbon dioxide (CO<sub>2</sub>) impacts were valued at \$1.2 billion in 2011 and would increase to over \$9 billion by 2030.
- (ii) **Acidification.** Sulfur dioxide impacts were valued at \$94 million in 2011 and would increase to over \$728 million by 2030.
- (iii) **Health.** Particulate matter and nitrous oxide impacts were valued at \$330 million in 2011 and would increase to \$1.35 billion by 2030.

Awareness of these impacts and concern that the demand projections were too high informed the revision of PDP7. Among the major changes were new targets to increase the proportion of renewable energy in the plan. Box 2 shows the changes between the original PDP7 and the revised plan, which was approved in 2016. The new plan called for a major reduction in the coal-fired power generation and a sevenfold increase in the amount of renewable energy. It is expected that these changes will reduce greenhouse gas emissions by 100 million tons of CO<sub>2</sub> equivalent a year by 2030. In economic value terms, this represents a saving of about \$1 billion a year, based on a price estimate of \$10 a ton of CO<sub>2</sub>.



▲ **Wind energy.** In Viet Nam as elsewhere in the GMS, wind energy capacity is rapidly expanding as it becomes more cost-efficient.

## Box 2: Generation Mix of Viet Nam's Seventh Power Development Plan (Megawatts)

	PDP 7	Revised PDP 7
Generation capacity 2030	137,388	129,508
Coal	77,160	55,252
Natural gas and oil	17,465	19,078
Hydropower and pumped storage	21,125	21,871
Other renewable energy (including small hydro)	4,829	27,199
Nuclear	10,700	4,600
Imported	6,109	1,508

PDP = power development plan.

Source: Author.



▲ **Rural energy solutions.** Access to electricity is still limited in rural Myanmar, but small-scale solar solutions can help overcome this challenge.

## PRIORITIES TO MAINSTREAM STRATEGIC ENVIRONMENTAL ASSESSMENT INTO POWER SECTOR PLANNING

Including an SEA in preparing power development plans will become standard practice in all GMS countries in the next few years. Legislation to require this is either already in place or being prepared (Box 3). There is a clear opportunity to further advance power sector planning by taking advantage of the new opportunities being created by emerging and improving technologies as well as changes in global energy markets. Expanding access to electricity is vital to national development and using SEAs in power sector planning can help achieve this as well as other development goals of the GMS countries, such as green growth and climate change mitigation.

Viet Nam and the People's Republic of China are leading the way in showing how integrating SEAs into PDPs can be a positive engine of change. However, this does not happen automatically, and even in these two countries, more needs to be done to fully realize the opportunities that are being created. The following are some priority actions to enhance power sector planning in the GMS in the coming years:

- (i) Provide clearer guidance for planners and decision-makers on how to implement SEA regulations and further develop institutional and technical capacity to undertake SEAs.
- (ii) Increase the role of provincial and district governments as well as private sector investors (who are increasingly looking for investment opportunities in renewable energy) in power development planning. Preparing power development plans should not be the exclusive responsibility of one central technical agency.

- (iii) Increase the focus on renewable energy and energy efficiency in power development plans. This can be achieved by planning for more smaller, dispersed generating facilities, which are necessary for renewable energy and also help to create more flexible and responsive power systems.
- (iv) Ensure that social and environmental costs for all power generation options are calculated for power development plans. This will provide a much clearer picture of the real costs of the plans and provide a basis from which to strengthen policies for polluter pays and payments for ecosystem service schemes.
- (v) Improve the computer models used for preparing power development plans, so that they can more fully integrate externalities into decision-making, which will strengthen the case for more renewable energy and energy efficiency initiatives.
- (vi) Use SEAs as a means to promote better institutional coordination between energy and other sectors in power development planning. SEAs can help clarify the linkages between sectors as well as establish stronger connectivity to wider development policies.

Achieving the better integration of SEA power planning in the GMS by tackling these issues will require sustained efforts in the analysis of energy development options, policy development, and strengthening institutional capacity. Getting there will be a gradual process as experience is gained and capacities develop. High-level policy support will be essential. The signs are positive that this will be the case, as power sector planning in the GMS changes to reflect new realities.



▲ **Hydropower growing.** The GMS countries are scaling up hydropower as a key renewable energy source, but need to carefully manage the environmental and social impacts.

### Box 3: The Legal Status of Strategic Environmental Assessments in the Greater Mekong Subregion Countries

Including a strategic environmental assessment (SEA) in the preparation of strategic plans is either a legal requirement—or soon will be—in all Greater Mekong Subregion countries.

- **Cambodia.** The draft Environment and Natural Resources Code 2017 makes SEA a requirement for strategic planning in many sectors, including the power sector.
- **People's Republic of China.** Provisions for including the equivalent of SEAs at the planning level were made under the Environmental Impact Assessment Law, 2003.
- **Lao People's Democratic Republic.** The Environmental Protection Law (revised, 2013) requires that SEAs are conducted while policies, strategic plans, and programs are being developed, particularly for energy and mining.
- **Myanmar.** The Environmental Conservation Law 2012 refers to SEAs in strategic planning. The Environmental Impact Assessment Procedure 2015 states that an SEA may be required for strategic plans if deemed necessary.
- **Thailand.** In 2018, the Prime Minister initiated the development of new SEA Guidelines and Regulations under the remit of the National Economic and Social Development Board.
- **Viet Nam.** The requirement to conduct an SEA in strategic planning was included in the Law on Environmental Protection 2005 and reaffirmed in the law's update in 2014.

Source: Author.

## ABOUT THE ASIAN DEVELOPMENT BANK

ADB is committed to achieving a prosperous, inclusive, resilient, and sustainable Asia and the Pacific, while sustaining its efforts to eradicate extreme poverty. Established in 1966, it is owned by 67 members—48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

## ABOUT THE CORE ENVIRONMENT PROGRAM

The Core Environment Program (CEP) supports the Greater Mekong Subregion (GMS) in delivering environmentally friendly economic growth. Anchored on the ADB-supported GMS Economic Cooperation Program, the CEP promotes regional cooperation to improve development planning, safeguards, biodiversity conservation, and resilience to climate change—all of which are underpinned by building capacity. The CEP is overseen by the environment ministries of the six GMS countries and implemented by the ADB-administered Environment Operations Center. Cofinancing is provided by ADB, the Global Environment Facility, the Government of Sweden, and the Nordic Development Fund.



GREATER MEKONG  
SUBREGION  
CORE ENVIRONMENT  
PROGRAM

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▲ **Solar energy.** The GMS countries, and especially the People's Republic of China and Thailand, are rapidly expanding their solar energy capacity as a key energy strategy.

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