SAVi Sustainable Asset Valuation Database:

A primer

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IISD has developed a database of available knowledge on the valuation of infrastructure project externalities, costs and climate risks.

The Purpose of the Database

This database is designed to help estimate the financial performance of infrastructure assets. It includes the value of externalities and climate risks that are typically unaccounted for in conventional project assessments. It also provides some capital and operation & maintenance costs of infrastructure or technologies that would reduce externalities.

The database is one of the central pillars for infrastructure project assessments with the Sustainable Asset Valuation (SAVi) methodology. It provides informed estimates of the systemic costs and benefits related to infrastructure projects when project-specific information is unavailable.

Building the Database

This database was built by conducting a thorough literature review and compiling its findings. It contains pre-existing data drawn from peer-reviewed journals, case studies and other publicly available resources. Some of the data was also drawn from the in-depth sectoral reviews for SAVi assessments.

The database currently contains 2,057 entries—1,059 related to environmental externalities, 291 related to social externalities, 4 related to governance externalities, 192 related to direct costs of infrastructure projects, and 511 related to climate risks.

Content of the Database

The database is organized into five distinct sheets, each representing the type of impact identified. Specifically, the database provides indicators that correspond to environmental externalities, social externalities, governance externalities, direct costs of infrastructure projects, and climate risks.

EXTERNALITIES

The environmental, social, and governance-related externalities in the database assign monetary values to impacts that are typically unaccounted for in project assessments. The research for the database was primarily focused on identifying the economic impact of environmental externalities, so this section of the database is the most developed.

DIRECT COSTS

The direct cost values represent costs for implementing, operating or maintaining different infrastructures or technologies that would reduce externalities. These values were identified during the literature review process but are distinct from externalities; thus, they were kept in a separate sheet.

CLIMATE RISK

The climate risk sheet contains information on the physical impacts of climate on infrastructure. Most of the values are presented as percent changes in infrastructure performance, durability or efficiency in response to climatic changes.

Beira Lake in Colombo, Sri Lanka

Figure 1. The five infrastructure-related impacts included in the database

Environmental Externalities	Social Externalities	Governance Externalities	Direct Costs	Climate Risks
Air pollution	Child labour	Bribery and corruption	Building materials	Flood risk
Biodiversity and habitat	Community development	Vision and monitoring	Flood control	Heat wave/ cold spells
Erosion risk	Customer satisfaction		Erosion control	Precipitation
Flood risk	Health and safety; citizens		Road construction	Runoff
Ecosystem services	Health and safety: employees		Vehicle construction	Sea level rise
Temperature increases	Labour demand created		Vehicle operation	Solar exposure
Waste and waste management	Marketability changes		Irrigation	Severe weather
Water discharge and pollution				Streamflow
Sea level rise				Temperature
				Water availability
				Wind speed

The background colour of each impact corresponds to the type of values included. Blue refers to the valuations of externalities, red refers to direct costs, and green refers to impacts of climatic changes.

Organization

All sheets are organized in the same way. The Externality, Cost, and Risk Types are identified in Column A, while supplementary information is included in Column B. The parameter being considered is identified in Column C, the unit of measure is in Column D, and the value itself can be found in Column E.

Information on how the value was estimated is contained in Column F and the source(s) where the value was found are located in Columns G and H. If the study or the value itself is region-specific, the region is identified in Column I.

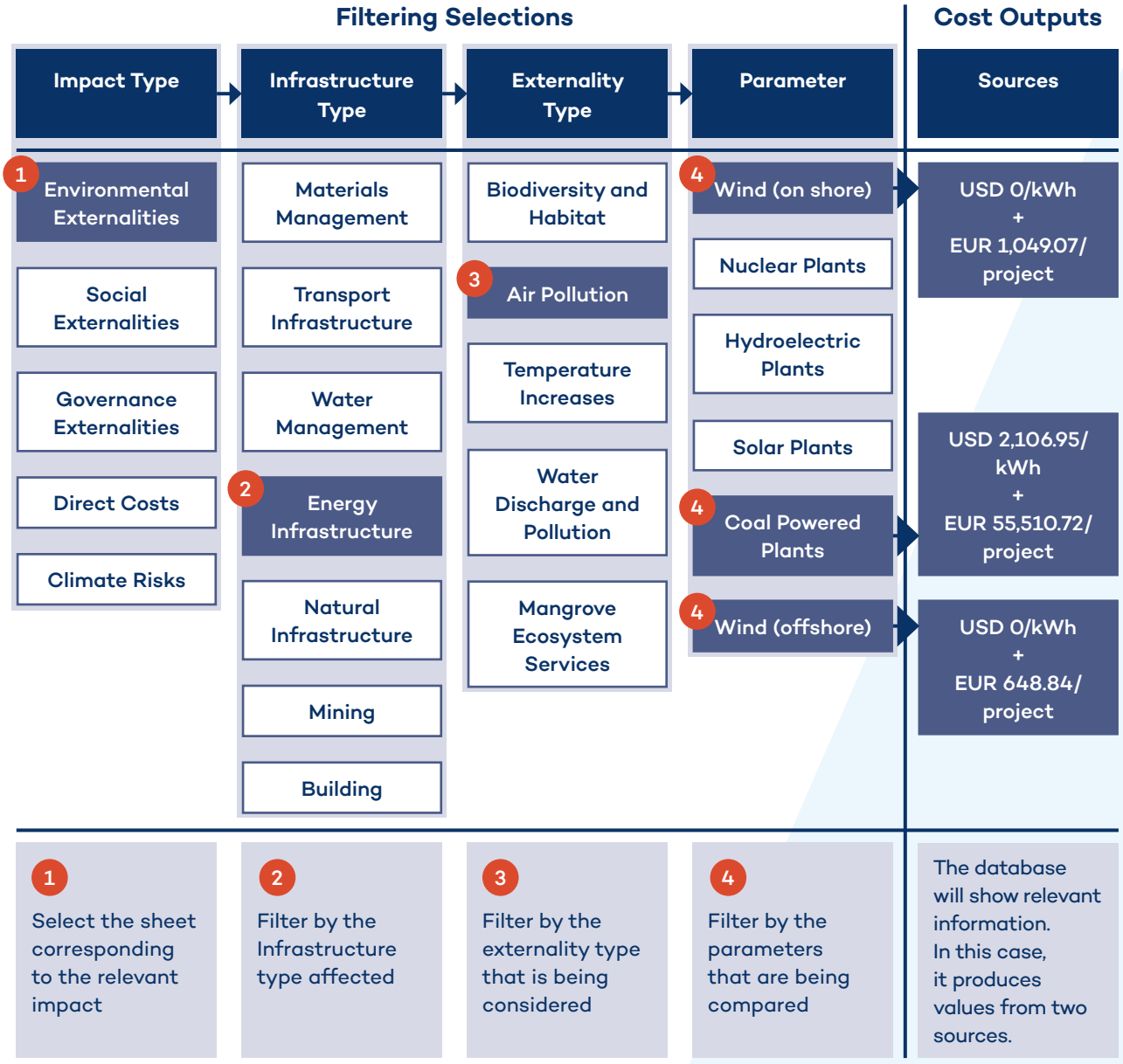
Figure 2. A representation of the structure of one database sheet. This example is drawn from the Environmental Externality sheet.

A	B	C	D	E	F	G
Externality type	**Subset**	**Parameter**	**Unit**	**Value**	**About**	**Sources**
Air pollution	Valuation of mortality and morbidity costs	PM 2.5	EUR/kg	28	The value is given in 2010 Euro values. The source considered the mortality and morbidity costs of vehicle emissions by emission type.	Korzhenevych et al. (2014)- "Update of the Handbook on External Costs of Transportation
Biodiversity and habitat	Valuation of wildlife casualty	Deer	USD/head	500	The values per animal killed are based on game hunting fees from several sources. The approach used is to multiply the number of animals killed per year by the respective cost multiplier.	https://www.wilderness-air-escapes.com/hunting/hunting-rates/
Air pollution	Valuation of the cost of carbon emissions due to mining	Iron and Steel	USD/ton	0.07	A summary of the production of carbon emissions per sector was given by applying emissions factors for fuel combustion (DCC, 2010). This value was then multiplied by the tax on carbon.	B. C. McLellan (2012)- "Renewable energy in the minerals industry: a review of global potential" Susan Subak et al. (1993) - "National Greenhouse Accounts (NGA) Factors"

Within Columns J-P, the impacted infrastructure type(s) are identified. The infrastructure types currently included in the database are transport, energy, water management, materials management, building, mining and nature-based infrastructures. Finally, the phase(s) of the project's life affected by the cost—either the construction, operation and maintenance, or decommissioning phase—are indicated in Columns Q through S.

Example

Consider comparing the financial impact of air pollution and the resulting health costs caused by wind power and coal. To retrieve relevant information from the database, the following steps would be taken.



This filtering process returns two different types of costs that can be attributed to the air pollution caused by energy generation [specifically for wind and coal]. Source 1 considers air pollution generated during the operation phase of each plant. It estimates the costs of the resulting health effects per kilowatt hour of energy generated. Source 2 values the lifecycle cost of air pollution per plant type and, in this specific case, provides estimates for two competing projects at the country level. Considering that wind farms are not responsible for air pollution during their operation phase, wind generates fewer costs related to air pollution throughout the plant's lifecycle when compared to coal. This example highlights as well that externalities and climate risks are presented with different units of measure in different studies.

Moving Forward

The database contains a considerable amount of information that can be used to estimate the economic costs of infrastructure projects and potential risks for infrastructure, yet it is not exhaustive. IISD will keep expanding the database and improving its functionality.

The database will also become an integral part of the SAVi Academy. It will be used in training workshops to familiarize participants with the use of environmental externalities, social externalities, governance externalities and climate risks in the valuation of infrastructure projects.

About SAVi

SAVi is a simulation service that helps governments and investors value the many risks and externalities that affect the performance of infrastructure projects.

The distinctive features of SAVi are:

- Valuation: SAVi values, in financial terms, the material environmental, social and economic risks and externalities of infrastructure projects. These variables are ignored in traditional financial analyses.
- Simulation: SAVi combines the results of systems thinking and system dynamics simulation with project finance modelling. We engage with asset owners to identify the risks material to their infrastructure projects and then design appropriate simulation scenarios.
- Customization: SAVi is customized to individual infrastructure projects.

For more information on SAVi: www.iisd.org/savi

SAVi Sustainable Asset Valuation

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