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Value Factors

Version 1.0

September 2024

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About

This document makes public, for the first time, a framework, methodology summary and collection of coefficients (so-called 'value factors') that together allow for the location-specific valuation of business impacts across 25 countries.

The goal of this document, then, is to accelerate the transition towards an impact economy - where financial return is not the sole measure of economic performance. An impact economy values financial return as well as positive and negative changes in well-being (so-called 'impacts') across the environment and society. It is only by valuing the impacts of a business alongside its financial returns that it becomes possible to remedy the existing market failures that continue to contribute to the growing systemic environmental and social pressures threatening humankind.

This document is aimed above all at the private sector, without the support of which the transition to an impact economy can be neither complete nor timely. At the same time, we recognise the valuable roles played by the public sector (including governments, academia and ordinary citizens) as well as the 'third sector' (charities, NGOs, and so on). We therefore make this information available to all - for the greater good.

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Background

In February this year, several providers of impact valuation methodology participated in a 'sprint' to publish notes on their respective methodologies under the auspices of the Value Commission, supported and governed by the Capitals Coalition, the Value Balancing Alliance (VBA) and the International Foundational for Valuing Impacts (IFVI).

In response to a significant surge in interest after the above 'sprint' from companies large and small, some of the sprint participants now wish to take this initiative to its next logical step and publish alongside a set of value factors, for an agreed framework of impacts, applied to companies operating in 25 diverse countries. This will provide further encouragement and support to companies who are interested in learning more about their positive and negative impacts on the environment, on human health and on society at large.

Many of these companies are SMEs and would not have the budgets to explore their impacts without such additional support. Others may have staff and some budgets, but not quite enough to afford consulting advice and support to get their pilot study done. The value factor website conceived by some participants will enable all such interested companies to explore, understand, measure and economically size their impacts using these freely available numbers for 25 countries.

In summary, this initiative is a successor to the February sprint. Its purpose is to enable interested companies to measure and value their impacts through pilot projects appropriately, holistically, quickly, and at low or no cost.

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Purpose Statement

We inhabit a world of increasing volatility, risks and uncertainties. And we exacerbate these challenges by using macro- and micro-economic management models that neither account for the economic invisibility of nature's life-sustaining and economy-generating benefits, nor adequately reflect changes in human or social capital.

Today is the time for the most significant institution of our globalised society – the private sector, which delivers the lion's share of employment, economic output and environmental impacts – to step forward proactively with effective solutions.

A necessary component for this is a fair and standardised institutional framework to measure and value corporate impacts (i.e. GHG-driven climate costs, air pollution-driven health costs, etc.) – collectively the largest drivers of today's unmanaged social and environmental costs. Valuing impacts across all capitals (natural, human, social and financial), in order to assess materiality and set priorities that look beyond shareholders' financial capital, is clearly the way forward.

Admirable corporate and investor leadership has already emerged in this space, and institutional initiatives such as those of the Capitals Coalition, the Value Commission, the EU Transparent Project, the Value Balancing Alliance and the International Foundation for Valuing Impacts are signalling the way forward. Now, the wider business community seeks guidance for accessible impact valuation and accounting, and they should be encouraged and enabled to do so in the public interest.

As leading providers of impact data and impact valuation, and in the interest of promoting and supporting all institutional initiatives towards impact transparency, GIST Impact and WifOR Institute are collaborating to provide you this this framework, summarised methodology and collection of value factors for 25 countries. This information, made public for the first time, enables corporate and financial services stakeholders to calculate the impacts of their companies and portfolios in a standardised and science-based way.

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Alignment Statement

Value factors are indispensable to calculating impacts in a comprehensive, standardised and (above all) science-based way.

Governance is needed in this space.

To this end, the Capitals Coalition has brought the global community – including GIST Impact, WifOR Institute, the Value Balancing Alliance (VBA) and the International Foundation for Valuing Impacts (IFVI) – to form the Value Commission, which will be delivering a draft of the Value Accountability Framework this year. These efforts are also aligned with the progress and development of organizations like the International Foundation for Valuing Impacts (IFVI) and the Value Balancing Alliance (VBA), which are developing a comprehensive, independently governed, public good impact accounting methodology involving representatives from Capitals Coalition, GIST Impact, and WifOR on its Valuation and Technical Practitioner Committee.

Whilst there are a growing number of organisations developing their own value factors, we should be competing over delivery (transparency, confidence and accessibility) and not ownership or market share.

This is why it is so important that GIST Impact and WifOR Institute are showing leadership in making their value factors publicly available.

And this is why it is heartening to note that, as this first version of this document is made public, other organisations – such as the IFVI – have affirmed their support of these transparency efforts and interest in utilising them to inform the development of their official methodologies through its Due Process Protocol and independent oversight.

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Definitions

Impact

Impact is the change in one or more dimensions of people's individual or collective well-being arising from the activities of an enterprise and its value chain, either directly or through a change in the condition of the natural environment. An impact can be actual or potential, direct or indirect, intended or unintended, and positive or negative. Impacts are valued using monetary valuation techniques, by applying impact coefficients or 'value factors'. However, this anthropocentric approach has potential to be expanded to include other perspectives as well.

Input

The resources and business relationships that the entity draws upon for its activities.

Activities

Everything that an entity does, including operations, the procurement of inputs, the sale and provision of products and/or services, as well as any supporting activities. Activities span a large number of different actions that altogether contribute to outputs and ultimately, outcomes and impact.

Output

The direct result of an entity's activities, including an entity's products, services, and any by-products.

Outcomes

The changes in conditions or states (physical, biological, psychological, etc.) of systems caused by impact drivers, which may lead to material impacts on third parties or on the impact drivers and their transactional counterparts.

Impact Drivers

Activities and transactions of agents (governments, corporations, individuals, etc.) which result in significant outcomes leading to material impacts on human well-being.

Valuation Framework

A valuation framework is any description and classification of relevant capital stocks, flows, impact drivers, outcomes and impacts that enables assessment and underpins analysis of changes in human well-being. A framework establishes what should be valued - and why.

Value Factor

Any ratio of an impact or an outcome to its respective impact driver (be it an input or an output of business activity) for a location or country.

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Note: the definitions of **impact**, **input**, **activities**, and **output** are taken and/or adapted from the IFVI-VBA *General Methodology 1 – The Conceptual Framework for Impact Accounting*, paragraphs 49-56 (pp.17-18). Accessible here.

Framework

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Framework

The Drivers – Outcomes – Impacts (DOI) Approach

Capital	Capital Definitions	Drivers (Input, Processes, Outputs)	Outcomes (Changes in bio-physical and socio-economic conditions)		Impacts (Changes in human well-being due to Outcomes)	
			GIST Impact	WifOR Institute	GIST Impact	WifOR Institute
Natural Capital	Natural Capital consists of the limited stocks of physical and biological resources found on earth, and of the limited capacity of ecosystems to provide ecosystem services. Natural Capital impact values the positive and negative societal impacts associated with the physical and biological resources consumed as part of business activities.	Air Pollution	Changes in concentration of pollutants	Changes in concentration of pollutants	Human health costs of company's air pollutions	Economic, ecological and health costs of company's air pollutions
		Biodiversity and Ecosystem Services	Changes in ecosystems services stock and flows	Changes in ecosystems services stock & flows	Ecosystem and species impacts of company's business operations	Ecosystem and species impacts of company's business operations
		GHG Emissions	Changes in global GHG concentration	Changes in global GHG concentration	Attributable social cost of company's GHG emissions	Attributable social cost of company's GHG emissions
		Plastic Waste and Pollution	Changes in marine pollution	Changes in marine pollution	Ecosystem and animal health impacts of marine plastic particles	Ecosystem and animal health impacts of marine plastic particles
		Waste Generation	Changes in volume of waste material	Changes in volume of waste material	Air, water, land pollution costs of waste incineration/disposal	Air, water, land pollution costs of waste incineration/disposal
		Water and Land Pollution	Changes in concentration of pollutants	Changes in concentration of pollutants	Eutrophication, health costs of company's land and water pollution	Eutrophication, health costs of company's water pollution
		Water Use	Changes in local water scarcity	Changes in local water scarcity	Costs to residence, farming, industry of water scarcity caused	Costs to residence, farming, industry of water scarcity caused

Framework

The Drivers – Outcomes – Impacts (DOI) Approach

Capital	Capital Definitions	Drivers (Input, Processes, Outputs)	Outcomes (Changes in bio-physical and socio-economic conditions)		Impacts (Changes in human well-being due to Outcomes)	
			GIST Impact	WifOR Institute	GIST Impact	WifOR Institute
Human Capital	Human Capital includes the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being. Human Capital impact values the contribution of a company towards human capital development, and the physical and mental well-being of its employees.	Fair Wages	Changes in level of wealth, comforts, necessities and material welfare	Changes in living standard	Health utility of income	Health utility of income
		Health and Safety	Enhanced / safer working environment	Enhanced working environment related to Injuries and illnesses	Negative impacts on employees' well-being of company EHS standards	Impacts on employees' well-being of company OHS standards
		Training	Increase in employee skills and productivity	Increase in employee skills & productivity	Value of skills training / HRD to employees' future incomes	Impact of skills training / HRD on employees' future incomes

Framework

The Drivers – Outcomes – Impacts (DOI) Approach

Capital	Capital Definitions	Drivers (Input, Processes, Outputs)	Outcomes (Changes in bio-physical and socio-economic conditions)		Impacts (Changes in human well-being due to Outcomes)	
			GIST Impact	WifOR Institute	GIST Impact	WifOR Institute
Social Capital	Social Capital consists of the productive value of social connections, where 'productive' is understood in terms of the production of a broad range of well-being outcomes. Social Capital impact values the contribution of the company towards the positive impacts on stakeholder well-being.	Child Labour	Lower educational attainment	Changes in education	Lower income and well-being for children	Costs in forms of well-being and income
		Community Investment / CSR	Direct and indirect contributions to CSR / local communities	Direct and indirect contributions to CSR / local communities	Attributable socio-economic value of impacts for material stakeholders	Attributable economic value of impacts for material stakeholders
		Diversity, Equity and Inclusion	Unequal distribution of income to gender and ethnic groups	Unequal income distribution for women	Impact on household expenditure on Health, Education and Nutrition	Impact on life expectancy (measured in monetary units)
		Forced Labour	Loss of rights at workplace, freedom to collective bargaining and well-being	Loss of freedom, work opportunities and well-being	Impact on health, quality of life, income and well-being	Costs in form of health, quality of life and income
		Inclusive Green Economy Business Model Features	Relative social value / cost of unique business model / supply chain features	Relative social value / cost of unique business model / supply chain features	Attributable socio-economic value of impacts for material stakeholders	Attributable economic value of impacts for material stakeholders

Framework

The Drivers – Outcomes – Impacts (DOI) Approach

Capital	Capital Definitions	Drivers (Input, Processes, Outputs)	Outcomes (Changes in bio-physical and socio-economic conditions)		Impacts (Changes in human well-being due to Outcomes)	
			GIST Impact	WifOR Institute	GIST Impact	WifOR Institute
Financial Capital	Financial Capital is defined as the man-made goods as well as all financial assets (including embedded intellectual capital) that are used to produce goods and services consumed by society. Financial value addition impact values the total contribution of a company to its direct non-shareholder stakeholders (i.e. GDP contribution).	Depreciation and Net Rent	Contribution to asset owners via current year depreciation charge and lease payments	Contribution to asset owners via current year depreciation charge and lease payments	Direct contribution to GDP	Direct contribution to GDP
		Employee Compensation	Contribution to employees via current year salaries, benefits and bonuses	Contribution to employees via current year salaries, benefits and bonuses	Direct contribution to GDP	Direct contribution to GDP
		Net Interest	Contribution to credit owners via current year net interest payable	Contribution to credit owners via current year net interest payable	Direct contribution to GDP	Direct contribution to GDP
		Profits	Contribution to shareholders via current year profits and loss	Contribution to shareholders via current year profits and loss	Direct contribution to GDP	Direct contribution to GDP
		Tax	Contribution to government via current year tax charge minus subsidies receivable	Contribution to government via current year tax charge minus subsidies receivable	Direct contribution to GDP	Direct contribution to GDP

Methodology and Approach

For a detailed analysis of the methodology and approach – including sources, assumptions, and valuation techniques used – please consult the *Impact Valuation Sprint 2024* report, published by the Value Balancing Alliance.

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Methodology Summary

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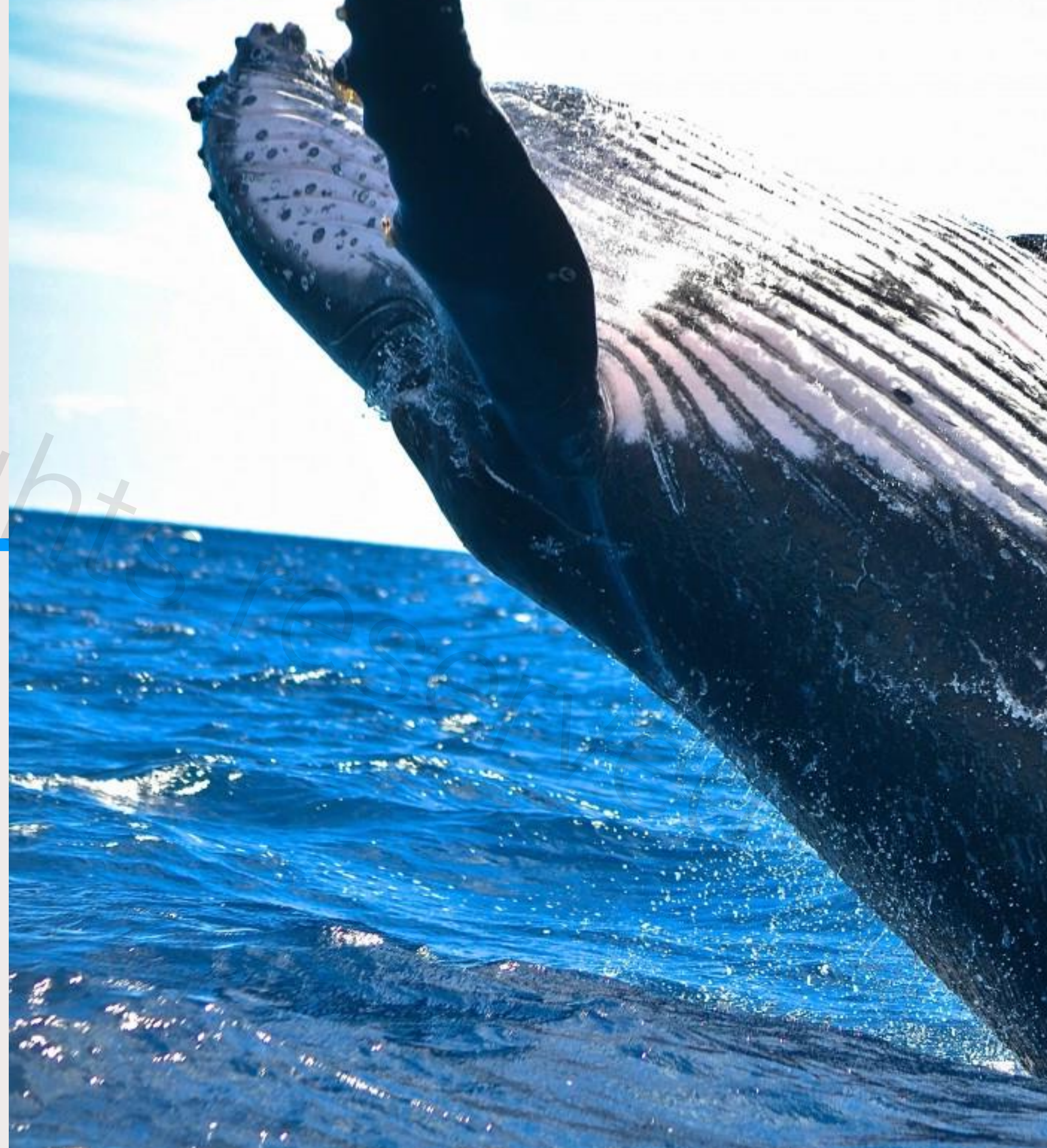

Methodology Summary

Overview

Distributor	Outcomes and Impacts	Location specificity and error margins
GIST Impact	Source: Value Balancing Alliance, Impact Valuation Sprint Report 2024 Link	This sample set of Value Factors for 25 Countries is part of a set of 190 country-level factors. Value Factors at a resolution of 50km^2 and error margins (per impact driver) are also provided by GIST Impact to paid users.
WifOR Institute	Source: Value Balancing Alliance, Impact Valuation Sprint Report 2024 Link	This sample set of Value Factors for 25 Countries is part of a set of 190 country-level factors. https://www.wifor.com/en/impact-valuation-factors/

Methodology Summary

GHG Emissions

Distributor	Outcomes	Impacts
GIST Impact	GIST Impact looks into the future economic damages from the increased global temperatures and its associated impacts on the agricultural productivity, tourism, exposure to floods in coastal areas, human health impacts from increased incidences of diseases, etc.	Impacts are calculated in terms of 2% discount rates of the average damage cost from two Social Cost of Carbon models (2023 release) – the Data-driven Spatial Climate Model (DSCIM) and the Greenhouse Gas Impact Value Estimator model (GIVE).
WifOR Institute	WifOR Institute evaluates the costs of GHG emissions using the Social Cost of Carbon. The damages include lost benefits like the loss of agricultural yield, a reduction of recreational benefits or a reduction in the quality of life due to chronic health damages.	Impacts are calculated using the FUND model with a 2.5% social discount rate (where pure discount rate = 1%, 1.5% is growth rate of per capita consumption, and elasticity of marginal utility of consumption equals 1).
Key Differences	GIST Impact's estimates are derived from averaging the median estimates of two Social Cost of Carbon models: the Data-driven Spatial Climate Model (DSCIM) and the Greenhouse Gas Impact Value Estimator model (GIVE). In contrast, WifOR Institute's value factors are based solely on the median estimate of the FUND model. Another significant distinction in the value factors arises from their discounting rate: GIST Impact employs a 3% discount rate for calculating the net present value of future damages, whereas WifOR Institute utilises a 1% pure discount rate and interpolates to estimate the Social Cost of Carbon (SCC) for specific years. As a result, WifOR Institute's value factors tend to be higher than those used by GIST Impact	

Methodology Summary

Air Pollution

Distributor	Outcomes	Impacts
GIST Impact	Outcomes are measured in terms of DALYs due to change in air pollution concentration associated with respiratory, COPD, cardiovascular diseases, lung cancer, stroke, and type II diabetes.	Impacts are measured using a hybrid Human Capital Approach (HCA). This method assesses lost economic productivity by valuing lost Disability-Adjusted Life Years (DALYs) using GDP per capita as a proxy. Additionally, it calculates the cost of illness per case by considering treatment costs.
WifOR Institute	Outcomes are measured in terms of health harms, economic losses in agriculture, man-made materials, as well as losses to other ecosystem services. The main impact is the health effect, which is measured in DALYs.	The valuation of DALYs is based on the Value of a Statistical Life Year (VSLY). WifOR Institute uses a VSLY value of $200,000.
Key Differences	GIST Impact employs a hybrid Human Capital Approach (HCA) to gauge the impact of air pollution, relying on two main indicators to economically value lost Disability Adjusted Life Years (DALYs) due to morbidity and reduced life expectancy. These indicators are: 1) lost productivity measured by per capita income losses, and 2) the economic burden of diseases, estimated through the costs of illness and access to medical care. In contrast, WifOR Institute adopts a Value of Statistical Life Years (VSLY) approach to assess the economic value of lost DALYs. The VSLY approach uses a standardized value of $200,000 across different geographic regions, whereas GIST Impact considers varying economic values for the same lost DALYs depending on local and regional contexts. Economic proxies are also employed in both methodologies to evaluate impacts such as lost agricultural productivity, preservation costs related to biodiversity losses, and damage to building facades.	

Methodology Summary

Water Consumption

Distributor	Outcomes	Impacts
GIST Impact	Outcomes are measured as the location-specific energy required for provisioning amount of water consumed and increase in infectious diseases as well as malnutrition incidences due to rise in water scarcity.	The impacts are measured in following ways: 1. Water provisioning from a centralized facility related to energy externality costs; 2. Impact on human health in terms of DALYs lost due to infectious diseases resulting from limited availability of fresh water for human consumption; and 3. Impact on human health due to malnutrition in terms of DALYs lost due to lack of fresh water for agriculture.
WifOR Institute	Outcomes are measured in terms of water scarcity-related burden of disease, as well as economic costs, such as reduced agriculture output	The health costs of water deprivation are measured in DALYs and valued using VSLY. Economic damages are based on LCA studies linking water scarcity to agriculture output.
Key Differences	GIST Impact employs three distinct methods to assess the impacts of increased water scarcity. The first two methods focus on outcomes related to reduced water access, including heightened incidences of malnutrition and waterborne diseases. The third approach examines externalities associated with water provisioning, such as increased energy demand and related impacts, thereby capturing the water-energy nexus. Economic valuation of Disability Adjusted Life Years (DALYs) considers lost productivity measured by per capita income losses, alongside estimating the economic burden of diseases in terms of healthcare costs and access. In contrast, WifOR Institute's approach to water consumption valuation primarily involves two methods: assessing damage to human health and economic impacts. Human health damages, quantified in DALYs, utilize the Value of Statistical Life Years (VSLY) approach with a standard value of $200,000. Economic damages are evaluated based on the foregone impacts from reduced agricultural productivity, adjusted across different regions using the Available Water Remaining (AWARE) metric, which reflects water stress levels per region or country.	

Methodology Summary

Water Pollution

Distributor	Outcomes	Impacts
GIST Impact	Nutrient pollutants such as biodegradable organic matter, nitrogen, and phosphorus are conventional pollutants that, while not inherently carcinogenic or toxic, degrade water quality upon entering water bodies, necessitating treatment. In contrast, toxic pollutants pose significant environmental contamination risks, potentially leading to severe health impacts like death, diseases, or birth defects in organisms exposed to them. These outcomes are gauged by increased human exposure to these pollutants and the heightened demand for wastewater treatment, measured in terms of pollutant removal and the resulting burden of disease, encompassing both cancer-related and non-cancer health conditions.	The impacts are assessed through economic losses from human health conditions and the heightened external costs associated with wastewater treatment. For nutrient pollutants, the total removal costs are quantified by calculating the electricity expenditure required for pollutant extraction and assessing the impact of fugitive emissions in terms of equivalent CO2 emissions. To estimate the external costs of toxic pollutants (both organic and inorganic) discharged into water and land from various sources, characterization factors published in the USEtox model are used.
WifOR Institute	Outcomes include both environmental and social impacts. The environmental impacts contain oxygen deficiency in water and its follow-up effects on fish production capacity and biodiversity. The social impacts are health diseases (measured in DALYs) due to exposure to polluted water.	Health impacts are valued using VSLY. Biodiversity impacts receive a share of global biodiversity costs, according to the share of threatened species attributable to each water pollutant.
Key Differences	Both GIST Impact and WifOR Institute distinguish between the impacts of nutrient pollutants like Nitrogen and Phosphorus versus toxic pollutants such as Arsenic, Cadmium, Chromium, and Mercury. GIST Impact employs an abatement cost methodology to assess the impacts of released nutrient pollutants such as Nitrogen, Phosphorus, and Chemical Oxygen Demand (COD), while valuing the economic impact of lost Disability Adjusted Life Years (DALYs) through productivity losses and the economic burden of diseases. In contrast, WifOR Institute examines the effects on biodiversity and fish production due to nutrient pollutants. For toxic pollutants, WifOR Institute estimates human health damage costs based on lost DALYs using the Value of Statistical Life Years (VSLY) approach. A notable distinction is that WifOR Institute focuses solely on water pollution and does not consider soil pollution, which results in higher value factors per kilogram of pollutant released.	

Methodology Summary

Waste Generation

Distributor	Outcomes	Impacts
GIST Impact	The outcomes are assessed individually for disposal methods such as recycling, incineration, and composting, where each offer avoided impacts through material or energy recovery. These impacts are evaluated in terms of GHG emissions, as well as air, water, and land pollutants, along with the resources consumed during waste treatment. When specific disposal methods are unknown, country-specific percentages for disposal methods are utilized to estimate these impacts accurately.	Impacts of waste generated by a company is calculated based on the type of disposal method used. Databases for the calculations are sourced from the LCA databases. The social cost of carbon is calculated for different gases, using the amount of carbon equivalent.
WifOR Institute	Outcomes are measured for each waste type in terms of GHG emissions, other air emissions, leachate (for landfill), and experienced disamenity.	GHG emissions from different waste types are valued using the social cost of carbon. The social costs of leachate are estimated from the Hazard Rating System (HARAS) leachate risk model. Disamenities are valued using a hedonic pricing approach.
Key Differences	Both GIST Impact and WifOR Institute's methodologies are based on the final treatment or disposal of waste. GIST Impact considers several end treatment methods including hazardous waste landfilling or incineration, non-hazardous waste landfilling or incineration, composting, hazardous waste recycling, and non-hazardous waste recycling. Economic proxies for waste disposal methods are determined based on the environmental impacts associated with each disposal approach, such as greenhouse gas emissions and air pollution, assessed through cause-effect pathways. In contrast, WifOR Institute focuses on two primary disposal methods: landfilling and incineration. The environmental impacts per unit of waste disposed are quantified and valued using specific methodologies for each impact driver. Additionally, WifOR Institute's methodology accounts for the disamenity value associated with landfilling and incineration infrastructure, using a hedonic pricing model to assess these impacts.	

Methodology Summary

Biodiversity and Ecosystem Services

Distributor	Outcomes	Impacts
GIST Impact	The outcome is measured as the change in the original biome or natural vegetation type. The change in the net present value of any future losses is estimated based on the difference in yearly flows from the original state to the new state.	The impact pathway of land use change is assessed by evaluating changes in the original land parcel and the resulting ecosystem degradation. The loss of ecosystem is assessed through the conversion of land into arable land, permanent cropland, agricultural land, urban areas, industrial areas, mineral extraction sites, dump sites, construction sites, traffic areas and barren areas.
WifOR Institute	Outcomes of different types of land use include impacts on drinking water treatment costs, reduced crop harvest, biodiversity costs. Additionally, urban paved land use has a negative impact on working capacity due to the formation of urban heat islands.	Impacts are valued using the Environmental Priority Strategies (EPS) model.
Key Differences	GIST Impact's Biodiversity and Ecosystem Services metric evaluates impacts on two levels: ecosystem and species diversity. Ecosystem services impacts are assessed based on transformations between different land use types. The economic valuation of differences in ecosystem service losses incorporates proxies like the social cost of carbon for reduced carbon sequestration and water valuation methods for diminished water regeneration potential, considering net present value. In contrast, WifOR Institute employs three distinct methodologies to assess land use impacts. Firstly, it addresses productivity losses due to the Urban Heat Island effect, valuing lost productivity based on GDP per hour worked, corrected for share of manual labor. Secondly, it evaluates impacts from biodiversity loss and reduced water production potential. Lastly, WifOR Institute considers losses in ecosystem services resulting from changes in land use types and their effects on the flow of ecosystem services. Biodiversity impacts are quantified in terms of preservation costs.	

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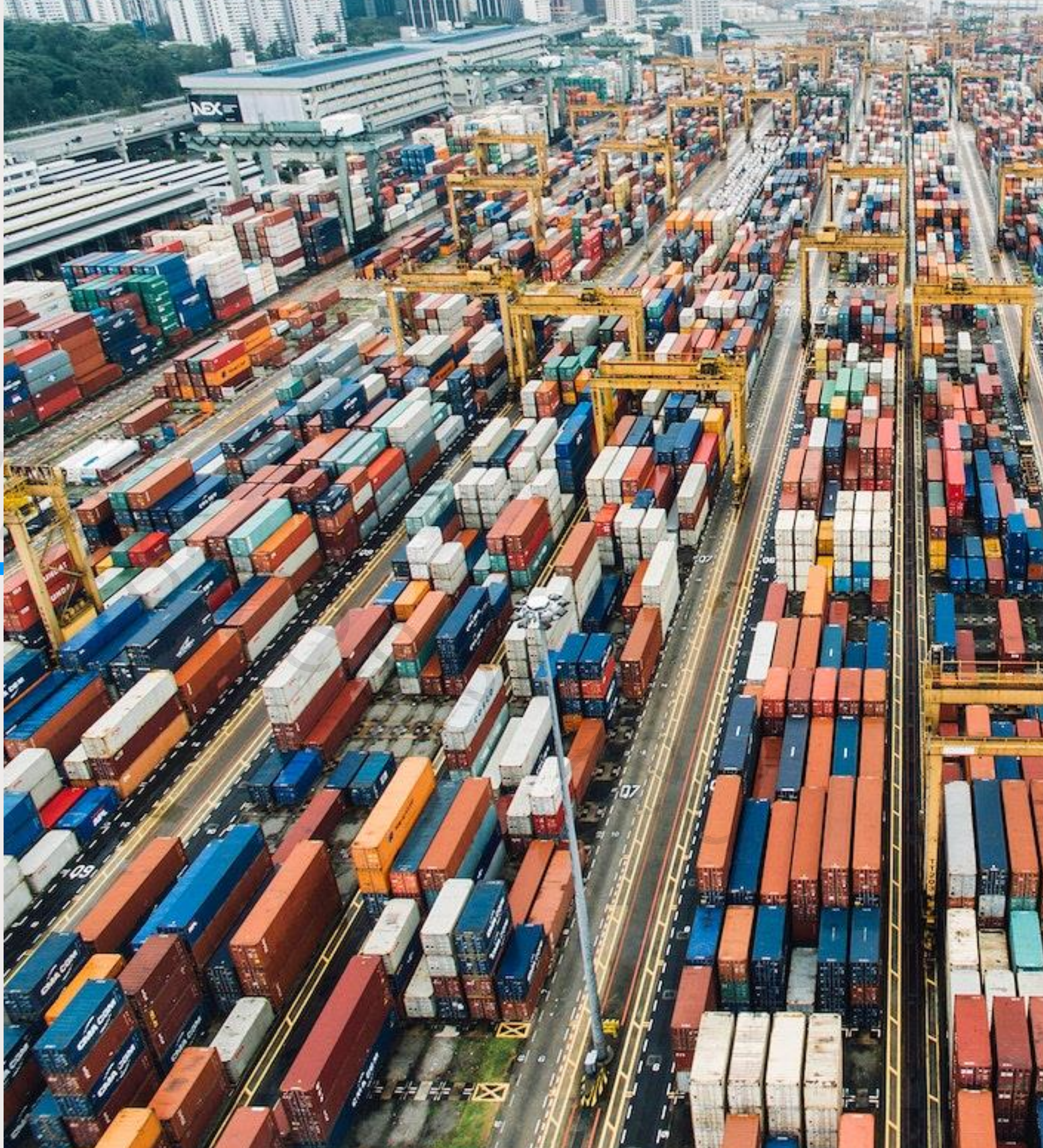

Value Factors

GIST Impact – GHG Emissions, Air Pollution and Water Consumption

	GHG Emissions			Air Pollution					Water Consumption
Country	CO_2e Emissions (USD/Tonne)	CH_4 Emissions (USD/Tonne)	N_2O Emissions (USD/Tonne)	Particulate Matter (USD/Tonne)	Oxides of Nitrogen (USD/Tonne)	Oxides of Sulphur (USD/Tonne)	Non-Methane Volatile Organic Compounds (USD/Tonne)	Ammonia (USD/Tonne)	Water Consumption (USD/m^3)
Australia	-236.69	-2,021.11	-66,396.00	-22.99	-9.25	-11.99			-0.10
Belgium	-236.69	-2,021.11	-66,396.00	-5,264.96	-1,161.27	-1,711.09			-0.03
Botswana	-236.69	-2,021.11	-66,396.00	-8.88	-3.58	-4.49			-0.41
Canada	-236.69	-2,021.11	-66,396.00	-11.96	-4.72	-6.07			-0.04
Chile	-236.69	-2,021.11	-66,396.00	-49.08	-19.51	-25.09			-0.36
China	-236.69	-2,021.11	-66,396.00	-198.03	-866.47	-441.14			-0.48
Colombia	-236.69	-2,021.11	-66,396.00	-37.64	-14.76	-18.68			-0.05
Costa Rica	-236.69	-2,021.11	-66,396.00	-61.91	-23.68	-30.18			-0.08
Denmark	-236.69	-2,021.11	-66,396.00	-1,475.55	-325.44	-479.74			-0.17
Ecuador	-236.69	-2,021.11	-66,396.00	-54.13	-21.27	-27.16			-0.12
Finland	-236.69	-2,021.11	-66,396.00	-68.12	-15.03	-22.16			-0.01
France	-236.69	-2,021.11	-66,396.00	-1,131.60	-249.65	-367.78			-0.02
Germany	-236.69	-2,021.11	-66,396.00	-1,629.66	-359.54	-529.87			-0.04
Guyana	-236.69	-2,021.11	-66,396.00	-4.44	-1.74	-2.21			-0.07
India	-236.69	-2,021.11	-66,396.00	-150.60	-62.89	-77.37			-0.31
Indonesia	-236.69	-2,021.11	-66,396.00	-22.79	-93.93	-47.31			-0.18
Ireland	-236.69	-2,021.11	-66,396.00	-989.79	-218.39	-322.15			-0.05
Italy	-236.69	-2,021.11	-66,396.00	-1,125.79	-248.31	-365.58			-0.32
Japan	-236.69	-2,021.11	-66,396.00	-478.95	-2,110.69	-1,075.65			-0.04
Kenya	-236.69	-2,021.11	-66,396.00	-24.28	-9.49	-9.52			-0.08
Mexico	-236.69	-2,021.11	-66,396.00	-91.27	-34.21	-42.62			-0.47
New Zealand	-236.69	-2,021.11	-66,396.00	-41.58	-183.29	-93.42			-0.01
Norway	-236.69	-2,021.11	-66,396.00	-129.91	-28.65	-42.26			-0.00
Peru	-236.69	-2,021.11	-66,396.00	-34.23	-13.45	-17.06			-0.25
Philippines	-236.69	-2,021.11	-66,396.00	-46.86	-191.21	-96.08			-0.27

Value Factors

WifOR Institute – GHG Emissions, Air Pollution and Water Consumption

	GHG Emissions			Air Pollution					Water Consumption
Country	CO_2e Emissions (USD/Tonne)	CH_4 Emissions (USD/Tonne)	N_2O Emissions (USD/Tonne)	Particulate Matter (USD/Tonne)	Oxides of Nitrogen (USD/Tonne)	Oxides of Sulphur (USD/Tonne)	Non-Methane Volatile Organic Compounds (USD/Tonne)	Ammonia (USD/Tonne)	Water Consumption (USD/m^3)
Australia	-224.71			-58,828.70	-15,838.00	-13,422.70	-2,185.16	-25,820.00	-9.38
Belgium	-224.71			-87,878.10	-22,940.10	-20,078.00	-2,647.43	-37,837.40	-0.28
Botswana	-224.71			-58,890.90	-16,109.00	-13,539.70	-2,177.23	-26,899.60	-3.73
Canada	-224.71			-58,898.10	-17,246.00	-13,988.80	-2,155.52	-31,519.80	-1.08
Chile	-224.71			-60,548.30	-18,419.70	-14,636.70	-2,235.33	-35,097.30	-10.72
China	-224.71			-70,079.60	-18,461.30	-15,900.70	-2,467.07	-29,607.60	-8.94
Colombia	-224.71			-62,097.30	-16,639.30	-14,133.90	-2,315.34	-26,909.40	-0.78
Costa Rica	-224.71			-66,240.90	-21,653.40	-16,636.10	-2,352.78	-44,726.80	-0.37
Denmark	-224.71			-69,778.30	-18,937.20	-16,100.40	-2,345.71	-32,086.20	-0.26
Ecuador	-224.71			-64,032.60	-17,130.60	-14,557.70	-2,400.10	-27,595.10	-1.28
Finland	-224.71			-59,970.50	-16,575.10	-13,860.40	-2,203.36	-28,124.00	-0.20
France	-224.71			-68,031.10	-20,938.10	-16,629.20	-2,327.58	-41,042.10	-1.22
Germany	-224.71			-76,868.60	-21,518.40	-18,050.00	-2,460.27	-38,404.30	-0.23
Guyana	-224.71			-58,879.10	-17,323.10	-13,838.00	-2,516.40	-30,584.10	-0.24
India	-224.71			-94,250.50	-24,079.90	-21,231.80	-3,043.99	-37,776.00	-20.60
Indonesia	-224.71			-69,770.50	-18,490.50	-15,815.40	-2,573.33	-29,512.80	-6.30
Ireland									-0.21
Italy	-224.71			-73,920.80	-23,178.20	-18,279.90	-2,434.41	-46,633.80	-5.98
Japan	-224.71			-85,109.20	-26,238.00	-20,967.70	-2,612.92	-52,558.40	-0.08
Kenya	-224.71			-65,834.40	-22,822.50	-16,749.60	-2,917.57	-47,648.30	-8.69
Mexico	-224.71			-63,670.30	-16,953.70	-14,494.00	-2,286.02	-27,468.10	-51.24
New Zealand	-224.71			-60,056.20	-18,348.80	-14,473.00	-2,369.67	-34,597.30	-1.07
Norway	-224.71			-59,704.60	-16,952.20	-13,974.50	-2,189.07	-29,817.40	-0.09
Peru	-224.71			-60,552.10	-23,600.10	-16,597.60	-2,300.52	-55,590.40	-9.87
Philippines	-224.71			-86,822.10	-22,302.10	-19,604.10	-2,805.05	-35,275.30	-2.35

Value Factors

GIST Impact – Water Pollution

	Water Pollution											
Country	Total Nitrogen Emissions (USD/Tonne)	Total Phosphorous Emissions (USD/Tonne)	Chemical Oxygen Demand (USD/Tonne)	Antimony (USD/Tonne)	Arsenic (USD/Tonne)	Cadmium (USD/Tonne)	Chromium (USD/Tonne)	Copper (USD/Tonne)	Lead (USD/Tonne)	Mercury (USD/Tonne)	Nickel (USD/Tonne)	Zinc (USD/Tonne)
Australia	-1,941.96	-2,470.74	-142.72	-1,096.99	-72,450.58	-201,690.60	-0.06	-86.37	-42,260.99	-2,759,533.00	-1,975.55	-15,387.32
Belgium	-765.42	-943.20	-61.45	-1,052.72	-83,348.63	-351,854.80	-0.05	-132.49	-72,608.54	-5,429,098.00	-2,151.33	-26,753.76
Botswana	-834.84	-1,033.33	-66.24	-148.54	-7,720.28	-4,396.20	-0.01	-3.45	-1,551.32	-52,508.69	-206.61	-240.04
Canada	-834.84	-1,033.33	-66.24	-857.28	-50,348.38	-103,036.30	-0.05	-27.99	-23,770.70	-1,823,834.00	-1,213.36	-7,209.61
Chile	-834.84	-1,033.33	-66.24	-313.70	-17,938.42	-26,864.89	-0.02	-9.37	-6,563.20	-432,533.90	-464.12	-1,761.67
China	-2,555.46	-3,267.27	-185.10	-370.74	-28,825.43	-66,409.86	-0.01	-24.31	-15,720.65	-1,365,644.00	-564.99	-5,107.23
Colombia	-834.84	-1,033.33	-66.24	-138.12	-7,149.99	-4,308.80	-0.01	-4.08	-1,650.35	-67,843.57	-190.54	-281.16
Costa Rica	-834.84	-1,033.33	-66.24	-243.15	-12,325.48	-6,953.04	-0.01	-6.01	-2,643.33	-103,258.10	-324.91	-420.01
Denmark	-254.91	-280.39	-26.18	-1,097.04	-52,486.88	-21,193.43	-0.06	-9.43	-7,887.59	-140,640.80	-1,272.44	-620.43
Ecuador	-834.84	-1,033.33	-66.24	-132.45	-6,780.30	-4,099.42	-0.01	-3.91	-1,582.09	-64,999.34	-177.86	-269.61
Finland	-274.91	-306.36	-27.56	-914.18	-43,672.76	-17,633.25	-0.05	-7.86	-6,572.65	-117,185.30	-1,056.58	-517.02
France	-424.95	-501.16	-37.93	-937.15	-74,082.18	-313,154.70	-0.04	-117.94	-64,632.52	-4,832,038.00	-1,902.21	-23,816.61
Germany	-1,652.45	-2,094.87	-122.72	-1,090.23	-86,445.69	-364,469.20	-0.05	-137.21	-75,200.51	-5,623,649.00	-2,242.20	-27,706.89
Guyana	-834.84	-1,033.33	-66.24	-110.68	-5,599.91	-3,160.47	-0.01	-2.74	-1,203.15	-46,994.85	-147.23	-191.18
India	-828.74	-1,025.42	-65.82	-50.41	-3,660.86	-8,285.67	-0.00	-4.46	-2,105.72	-174,489.50	-108.32	-624.24
Indonesia	-834.84	-1,033.33	-66.24	-73.38	-4,558.31	-5,818.86	-0.00	-2.60	-1,585.98	-120,032.30	-132.41	-379.94
Ireland	-1,668.87	-2,116.19	-123.85	-1,765.33	-144,374.00	-592,886.20	-0.08	-222.17	-121,946.10	-9,144,982.00	-4,120.79	-44,863.71
Italy	-841.97	-1,042.59	-66.73	-774.57	-60,929.56	-258,641.70	-0.04	-97.48	-53,407.71	-3,991,102.00	-1,538.70	-19,684.88
Japan	-762.38	-939.25	-61.24	-908.54	-61,225.84	-88,353.18	-0.04	-31.48	-22,505.85	-2,009,638.00	-1,253.83	-6,702.98
Kenya	-834.84	-1,033.33	-66.24	-30.50	-1,532.72	-880.39	-0.00	-0.71	-318.27	-10,753.23	-39.10	-49.29
Mexico	-834.84	-1,033.33	-66.24	-200.70	-9,913.31	-5,628.48	-0.01	-4.96	-2,180.38	-85,060.14	-251.81	-346.68
New Zealand	-198.82	-207.57	-22.31	-802.85	-53,082.04	-147,640.40	-0.04	-63.21	-30,930.59	-2,019,836.00	-1,450.74	-11,261.46
Norway	-65.07	-33.92	-13.07	-1,463.35	-70,715.64	-28,566.43	-0.09	-12.57	-10,523.92	-187,747.90	-1,737.65	-827.60
Peru	-834.84	-1,033.33	-66.24	-143.79	-7,592.75	-4,549.27	-0.01	-4.25	-1,719.02	-70,741.04	-207.90	-292.70
Philippines	-834.84	-1,033.33	-66.24	-58.32	-3,666.64	-4,644.58	-0.00	-2.07	-1,261.06	-95,514.48	-108.23	-301.98

Value Factors

WifOR Institute – Water Pollution

Country	Water Pollution											
	Total Nitrogen Emissions (USD/Tonne)	Total Phosphorous Emissions (USD/Tonne)	Chemical Oxygen Demand (USD/Tonne)	Antimony (USD/Tonne)	Arsenic (USD/Tonne)	Cadmium (USD/Tonne)	Chromium (USD/Tonne)	Copper (USD/Tonne)	Lead (USD/Tonne)	Mercury (USD/Tonne)	Nickel (USD/Tonne)	Zinc (USD/Tonne)
Australia	-1.98	-37.50		-63,325.60	-6,618,410.00	-22,000,000.00	-0.00	-21.72	-8,099.19	-358,532.00	-116,564.00	-54,172.40
Belgium	-2.31	-43.86		-74,066.70	-7,741,010.00	-25,000,000.00	-0.00	-25.41	-9,472.95	-419,345.00	-136,335.00	-63,361.00
Botswana	-1.97	-37.27		-62,935.40	-6,577,630.00	-21,000,000.00	-0.00	-21.59	-8,049.28	-356,322.00	-115,846.00	-53,838.60
Canada	-1.98	-37.48		-63,282.70	-6,613,930.00	-22,000,000.00	-0.00	-21.71	-8,093.71	-358,289.00	-116,485.00	-54,135.80
Chile	-2.10	-39.75		-67,114.90	-7,014,440.00	-23,000,000.00	-0.00	-23.02	-8,583.83	-379,985.00	-123,539.00	-57,414.00
China	-2.24	-42.49		-71,743.30	-7,498,180.00	-24,000,000.00	-0.00	-24.61	-9,175.79	-406,190.00	-132,058.00	-61,373.40
Colombia	-1.98	-37.53		-63,380.30	-6,624,140.00	-22,000,000.00	-0.00	-21.74	-8,106.19	-358,842.00	-116,665.00	-54,219.20
Costa Rica	-1.98	-37.53		-63,371.30	-6,623,190.00	-22,000,000.00	-0.00	-21.74	-8,105.03	-358,790.00	-116,648.00	-54,211.50
Denmark	-2.12	-40.17		-67,826.60	-7,088,830.00	-23,000,000.00	-0.00	-23.27	-8,674.85	-384,015.00	-124,849.00	-58,022.80
Ecuador	-2.00	-37.86		-63,936.00	-6,682,210.00	-22,000,000.00	-0.00	-21.93	-8,177.25	-361,987.00	-117,687.00	-54,694.60
Finland	-2.00	-37.91		-64,007.00	-6,689,630.00	-22,000,000.00	-0.00	-21.96	-8,186.34	-362,390.00	-117,818.00	-54,755.40
France	-2.11	-39.98		-67,518.90	-7,056,680.00	-23,000,000.00	-0.00	-23.16	-8,635.51	-382,273.00	-124,283.00	-57,759.60
Germany	-2.18	-41.25		-69,660.80	-7,280,530.00	-24,000,000.00	-0.00	-23.90	-8,909.44	-394,400.00	-128,225.00	-59,591.90
Guyana	-1.97	-37.42		-63,189.50	-6,604,190.00	-22,000,000.00	-0.00	-21.68	-8,081.78	-357,761.00	-116,313.00	-54,056.00
India	-2.40	-45.44		-76,729.10	-8,019,270.00	-26,000,000.00	-0.00	-26.32	-9,813.47	-434,419.00	-141,236.00	-65,638.60
Indonesia	-2.15	-40.77		-68,845.50	-7,195,320.00	-23,000,000.00	-0.00	-23.62	-8,805.17	-389,784.00	-126,724.00	-58,894.40
Ireland												
Italy	-2.15	-40.81		-68,910.20	-7,202,090.00	-23,000,000.00	-0.00	-23.64	-8,813.45	-390,150.00	-126,843.00	-58,949.80
Japan	-2.20	-41.62		-70,274.80	-7,344,710.00	-24,000,000.00	-0.00	-24.11	-8,987.98	-397,876.00	-129,355.00	-60,117.20
Kenya	-2.17	-41.22		-69,604.60	-7,274,660.00	-24,000,000.00	-0.00	-23.88	-8,902.26	-394,082.00	-128,122.00	-59,543.90
Mexico	-2.25	-42.68		-72,064.00	-7,531,700.00	-25,000,000.00	-0.00	-24.72	-9,216.81	-408,006.00	-132,649.00	-61,647.70
New Zealand	-2.01	-38.02		-64,207.10	-6,710,550.00	-22,000,000.00	-0.00	-22.03	-8,211.94	-363,523.00	-118,186.00	-54,926.50
Norway	-1.97	-37.26		-62,921.30	-6,576,160.00	-21,000,000.00	-0.00	-21.58	-8,047.48	-356,243.00	-115,820.00	-53,826.50
Peru	-2.00	-37.91		-64,021.50	-6,691,140.00	-22,000,000.00	-0.00	-21.96	-8,188.19	-362,472.00	-117,845.00	-54,767.70
Philippines	-2.13	-40.33		-68,107.20	-7,118,160.00	-23,000,000.00	-0.00	-23.36	-8,710.75	-385,604.00	-125,365.00	-58,262.90

Value Factors

GIST Impact – Waste Generation and Biodiversity and Ecosystem Services

	Waste Generation							Biodiversity and Ecosystem Services
Country	Hazardous (Incinerated) (USD/kg)	Hazardous (Landfill) (USD/kg)	Hazardous (Recycling/Recovered) (USD/kg)	Non-Hazardous (Recycling/Recovered) (USD/kg)	Non-Hazardous (Incinerated) (USD/kg)	Non-Hazardous (Dumping) (USD/kg)	Non-Hazardous (Landfill) (USD/kg)	Land Use Change (USD/m^2)
Australia	-1.34			-0.06	-21.43	-0.00	-0.13	-33.89
Belgium	-1.66			-0.06	-36.56	-0.00	-0.21	-43.61
Botswana	-0.19			-0.06	-0.69	-0.00	-0.03	-23.15
Canada	-0.89			-0.06	-11.37	-0.00	-0.09	-7.44
Chile	-0.35			-0.06	-3.08	-0.00	-0.03	-31.31
China	-0.51			-0.06	-7.64	-0.00	-0.04	-59.07
Colombia	-0.18			-0.06	-0.73	-0.00	-0.01	-13.33
Costa Rica	-0.25			-0.06	-1.14	-0.00	-0.02	-16.63
Denmark	-0.79			-0.06	-3.17	-0.00	-0.05	-20.61
Ecuador	-0.17			-0.06	-0.70	-0.00	-0.02	-21.70
Finland	-0.67			-0.06	-2.64	-0.00	-0.04	-21.00
France	-1.48			-0.06	-32.55	-0.00	-0.19	-36.73
Germany	-1.71			-0.06	-37.87	-0.00	-0.22	-43.19
Guyana	-0.15			-0.06	-0.53	-0.00	-0.01	-12.44
India	-0.14			-0.06	-1.02	-0.00	-0.01	-22.41
Indonesia	-0.15			-0.06	-0.74	-0.00	-0.01	-29.86
Ireland	-2.85			-0.06	-61.43	-0.00	-0.36	-110.41
Italy	-1.23			-0.06	-26.90	-0.00	-0.17	-51.50
Japan	-0.96			-0.06	-10.80	-0.00	-0.05	-37.92
Kenya	-0.09			-0.06	-0.16	-0.00	-0.01	-9.96
Mexico	-0.21			-0.06	-0.94	-0.00	-0.02	-38.23
New Zealand	-1.00			-0.06	-15.69	-0.00	-0.10	-23.95
Norway	-1.05			-0.06	-4.23	-0.00	-0.05	-9.35
Peru	-0.19			-0.06	-0.76	-0.00	-0.02	-28.27
Philippines	-0.13			-0.06	-0.59	-0.00	-0.01	-33.17

GIST IMPACT

WifOR INSTITUTE

Value Factors

WifOR Institute – Waste Generation and Biodiversity and Ecosystem Services

	Waste Generation							Biodiversity and Ecosystem Services
Country	Hazardous (Incinerated) (USD/kg)	Hazardous (Landfill) (USD/kg)	Hazardous (Recycling/Recovered) (USD/kg)	Non-Hazardous (Recycling/Recovered) (USD/kg)	Non-Hazardous (Incinerated) (USD/kg)	Non-Hazardous (Dumping) (USD/kg)	Non-Hazardous (Landfill) (USD/kg)	Land Use Change (USD/m^2)
Australia	-0.52	-0.20			-0.28		-0.13	-0.28
Belgium	-0.58	-0.23			-0.33		-0.13	-0.96
Botswana	-0.52	-0.20			-0.28		-0.13	-0.54
Canada	-0.52	-0.20			-0.28		-0.13	-0.34
Chile	-0.53	-0.20			-0.28		-0.13	-0.63
China	-0.55	-0.21			-0.30		-0.13	-0.68
Colombia	-0.53	-0.20			-0.28		-0.13	-0.98
Costa Rica	-0.54	-0.21			-0.29		-0.13	-1.02
Denmark	-0.55	-0.21			-0.30		-0.13	-0.97
Ecuador	-0.53	-0.21			-0.29		-0.13	-0.83
Finland	-0.53	-0.20			-0.28		-0.13	-0.54
France	-0.54	-0.21			-0.30		-0.13	-0.96
Germany	-0.56	-0.22			-0.31		-0.13	-0.96
Guyana	-0.52	-0.20			-0.28		-0.13	-1.09
India	-0.60	-0.24			-0.35		-0.13	-0.65
Indonesia	-0.54	-0.21			-0.30		-0.13	-1.10
Ireland	-0.53	-0.20			-0.29		-0.13	
Italy	-0.55	-0.21			-0.31		-0.13	-0.90
Japan	-0.58	-0.23			-0.33		-0.13	-0.88
Kenya	-0.54	-0.21			-0.29		-0.13	-0.41
Mexico	-0.53	-0.21			-0.29		-0.13	-0.47
New Zealand	-0.53	-0.20			-0.28		-0.13	-0.95
Norway	-0.52	-0.20			-0.28		-0.13	-0.46
Peru	-0.53	-0.20			-0.28		-0.13	-0.76
Philippines	-0.59	-0.24			-0.34		-0.13	-1.07