

2022

Total Impact Measurement and Management Report

UN Sustainable Development Goals and
Sustainable Values Assessment

Contents

Disclaimer 3

01

ASEH's Total Impact Measurement and Management 4

1.1 Why We Measure Our Impact Value 5

1.2 Definition of Impact Value 7

1.3 Valuation Milestones 8

02

The Scope of Impact Valuation 9

2.1 Period and Scope 10

2.2 Four Dimensions of Impacts 11

2.3 Responding to UN Sustainable Development Goals 12

03

ASEH's Contributed Value 13

3.1 ASEH's TIMM Results 14

3.1.1 Economic Impact 16

3.1.2 Tax Impact 18

3.1.3 Environmental Impact 19

3.1.4 Social Impact 25

3.2 ASEH's SDGs and Impact 32

04

Conclusion 34

Appendix

Appendix 1: Methodology and Data Collection 37

Appendix 2: Reference for Value Transfer Methodology 40

Appendix 3: References 41



Disclaimer

ASEH's Total Impact Measurement and Management Report assesses the transformation of the impact of ASE Technology Holding Co., Ltd. and its subsidiary companies' (hereinafter referred to as "ASEH") sustainable development into monetary value from a stakeholder's perspective. As this report has a different basis from ASEH's past, present, and future financial statement compilation and financial performance assessment, it cannot and should not be compared, analyzed, or forecast in conjunction with financial statements and financial performance. This report is therefore not a suitable basis for the assessment and determination of ASEH's past, present, or future stock trading value.

ASEH's Total Impact Measurement & Management Report was published in accordance with PwC's Total Impact Measurement & Management (TIMM) framework and the monetization framework in the Natural Capital Protocol and Social Capital Protocol, through data collection and identification of financial proxies, with the results expressed in monetary terms.

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01

ASEH's Total Impact Measurement and Management

1.1 Why We Measure Our Impact Value	5
1.2 Definition of Impact Value	7
1.3 Valuation Milestones	8

01 ASEH's Total Impact Measurement and Management

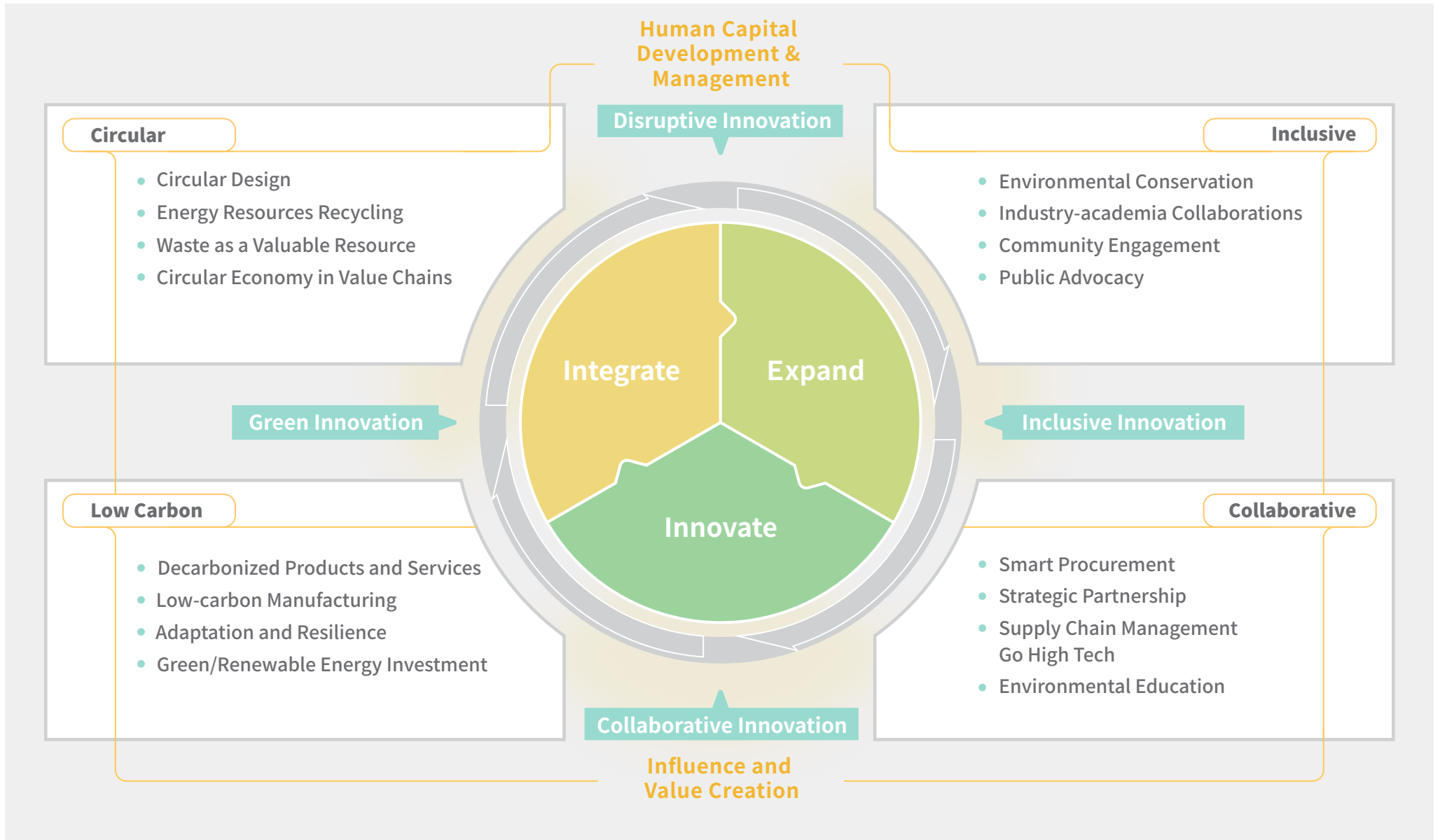
1.1 Why We Measure Our Impact Value

In an aim to develop a “Better Business, Better World”, the UN Global Compact initiative and the Business and Sustainable Development Commission have rallied enterprises worldwide together to undertake responsibility in sustainability and help resolve social problems, so as to achieve the UN's 17 Sustainable Development Goals (SDGs). On top of the company's obligation to maintain financial performance, we will incorporate holistic thinking in our business practice to set the pace for ASEH's sustainable development and value creation.

As a semiconductor industry leader on a growth trajectory, ASEH has formulated strategies to achieve long-term sustainability goals, and established clear sustainability management mechanisms, that promote sustainability and value creation for the industry. In response to various risks and challenges ranging from climate, energy, raw material and water supply, ASEH has drawn up four pillars of sustainability strategies: Circular, Low Carbon, Inclusive, and Collaborative. The Company hopes to find opportunities and growth momentum through the implementation of these strategies.

The Total Impact Measurement and Management (TIMM) framework developed by PwC was adopted to measure the sustainability impact of ASEH's operations to stakeholders in monetized values and also examine the effects of operations on stakeholders during decision making. The TIMM framework puts a value on impacts across the economic, tax, environment and social dimensions, and also references the monetization framework of the Natural Capital Protocol and Social Capital Protocol as a tool to analyze the source and results of sustainable value. We believe that sustainable value reporting that applies holistic thinking will facilitate corporate decision-making, performance assessment, and stakeholder communication. To that end, we have adopted a unified unit of measurement to express the combined corporate financial and ESG values in monetary terms. We hope to make use of resources that are limited to maximize sustainability value for stakeholders and reduce the negative impacts.

○ ASEH' s Four Sustainability Strategy Pillars ○



1.2 Definition of Impact Value

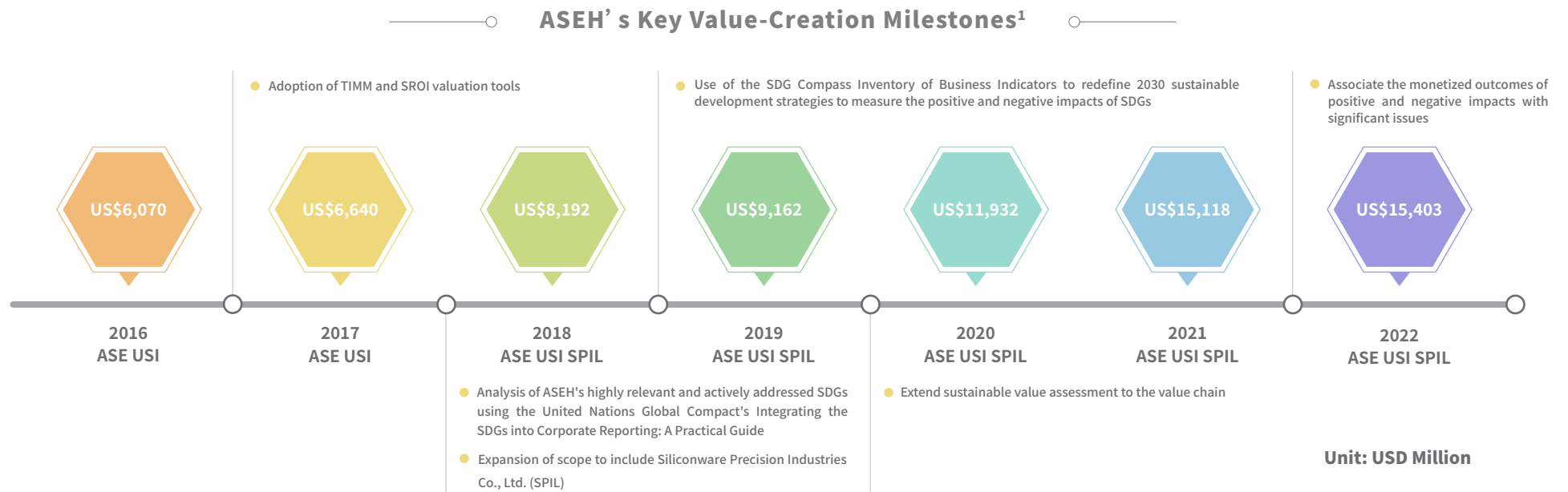
TIMM assesses the value of corporate operations from four dimensions - the economic impact, tax impact, social impact and environmental impact, and quantifies the impacts in monetary values. The TIMM framework is based on the perspective of the stakeholders involved in corporate operation, and not solely from the shareholders' viewpoint. It is therefore able to comprehensively portray the complete process of an enterprise's operations from resource input to the value of its production output. This has enabled the company to apply holistic thinking and tools to express the total impact and value of corporate operations to society on a timely basis. ASEH's sustainable value is hence measured by its total impact value from a stakeholder's perspective.

○ Total Impact Value Model ○



1.3 Valuation Milestones

ASEH believes that the continued implementation of sustainable development as a long-term strategy not only enables the strategic creation of sustainable value and gives back to society, but more importantly contributes to the attainment of the UN SDGs for 2030. We began implementing TIMM and Social Return on Investment (SROI) in 2017, and applied monetization assessment tools to track the social impact and operational risks brought by the company's business activities. In 2018, we referenced Integrating the SDGs into Corporate Reporting: A Practical Guide, to examine SDGs and sub-goals, and issues of concern related to the company's operations. We then set and track key performance indicators on this basis. In 2019, we used the SDG Compass Inventory of Business Indicators to examine the positive and negative impacts of our four major SDGs and the outcomes of our actions. In 2020, we further applied sustainable value assessment used internally to the value chain so as to understand and analyze the impact of value chain activities on the environment and society. In 2022, we associate the monetized outcomes of positive and negative impacts with significant issues. This information will then be provided to the CSC to serve as references for the performing of weighing and comparisons in the value creation decision-making process. By examining and analyzing the sustainability outcomes of actions by ASEH subsidiaries, we have been able to develop action plans and policies for improvements and reduce the impact of potential risks. Moreover, through this report, ASEH impact assessment results will be disclosed comprehensively to ASEH stakeholders.



[1] For more details on ASEH' s sustainable values, please refer to ASEH' s corporate sustainability report.

02

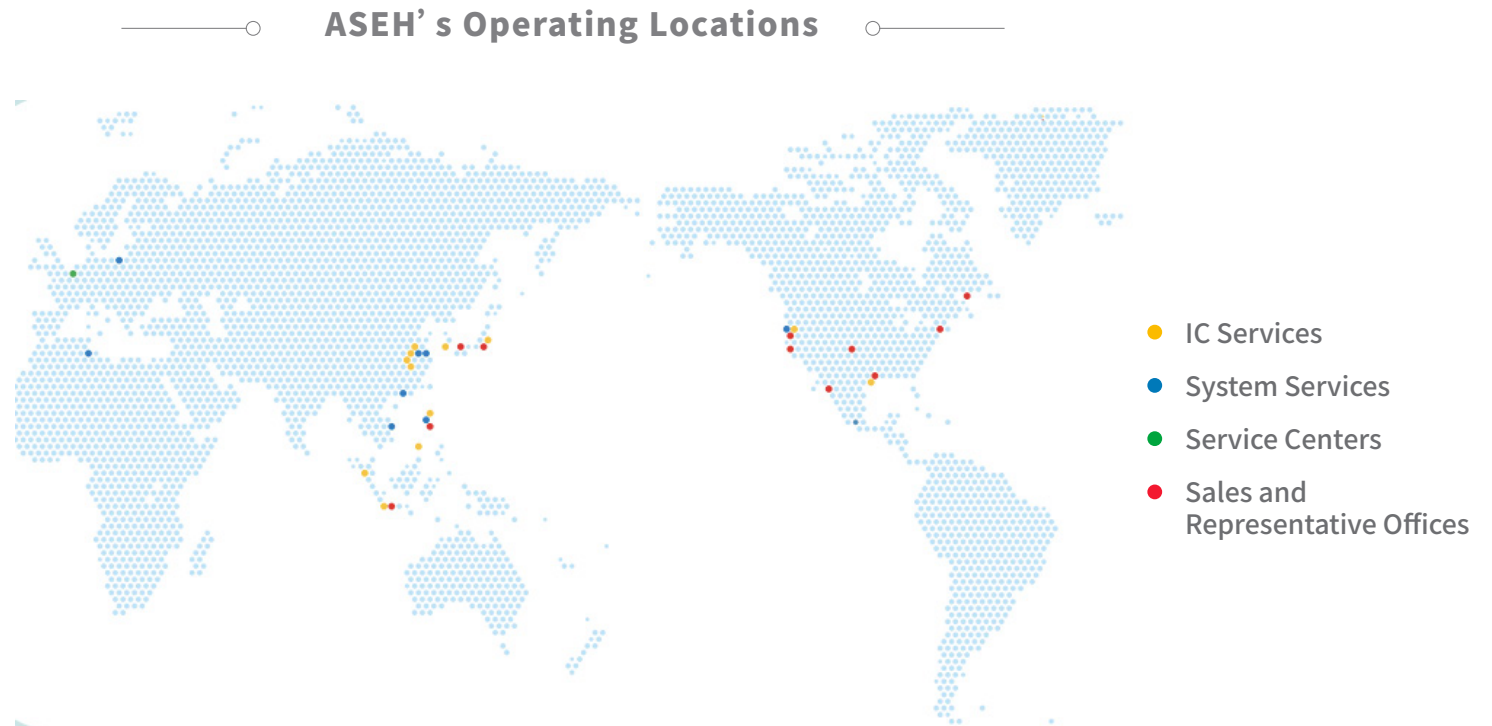
The Scope of Impact Valuation

2.1 Period and Scope	10
2.2 Four Dimensions of Impacts	11
2.3 Responding to UN Sustainable Development Goals	12

02 The Scope of Impact Valuation

2.1 Period and Scope

The report discloses ASEH's 2022 (January 1, 2022, to December 31, 2022) information according to the economic, tax, environment, and social impacts based on the TIMM framework. The report takes into consideration financial materiality, industry relevance and place of operation, and thereby includes ASEH entities - Advanced Semiconductor Engineering, Inc. and its subsidiary (hereinafter referred to as "ASE"), Siliconware Precision Industries Co., Ltd. and its subsidiary (hereinafter referred to as "SPIL"), and Universal Scientific Industrial Co., Ltd. and its subsidiary (hereinafter referred to as "USI"). ASEH's scope of operation includes Taiwan, China, Hong Kong, South Korea, Japan, Malaysia, Singapore, Vietnam, Mexico, U.S.A., Tunisia and selected European countries.



2.2 Four Dimensions of Impacts

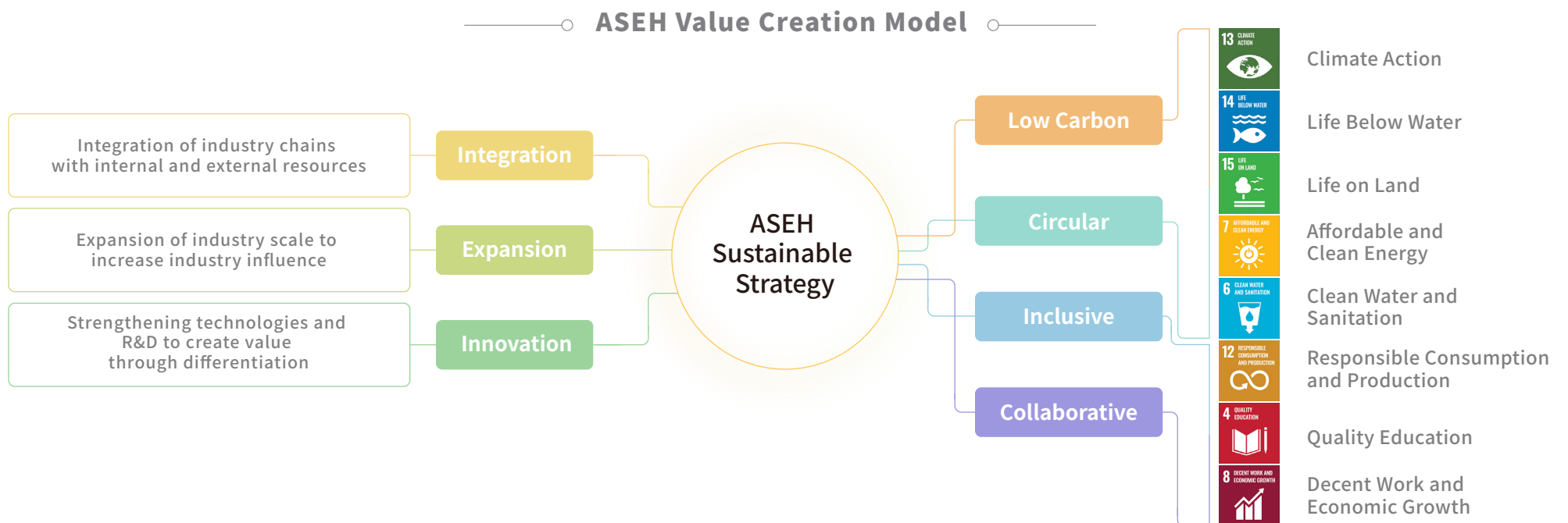
ASEH's sustainable value is measured by the impact value affecting stakeholder changes. Based on the UN's sustainability objectives, results of stakeholder engagement over the years and major sustainability-related issues, we measure ASEH's total impact value from four dimensions:

Dimensions	Stakeholders	Impact drivers ²	Explanation of the production of impact value
Economic	Shareholders Suppliers Customers Employees	Profits Payroll Investment Intangible assets Regulatory compliance	Economic value mainly consists of the creation of financial value for stakeholders and maintenance of their livelihoods through the five impact drivers.
Tax	Government Local residents	Profit taxes Other taxes	The various types of taxes incurred from operations are directly paid to the local government to support the government's fiscal policies, and the government's investments in public infrastructure to enhance the welfare of local residents.
Environment	Employees General public Local community	Greenhouse gases Other emissions Waste Water use Water pollution and recycle water Afforestation Biodiversity	The pollutant discharges and resource extrapolations from operating activities that affect the general public. Measuring the impact on the general public and the natural ecological environment through seven related environmental impact factors.
Social	Employees Suppliers Local community	Partnerships Employee engagement and development Employee and contractor health and safety Education Social cohesion	The different impacts that our operations have on employees, suppliers, and local communities, demonstrate ASE's value to the society.

[2] Impact factors are the chief factors and sources of influence on stakeholders. Corporate operations involve multiple issues and therefore, we must first consolidate the activities and domains exerting the most important impact on stakeholders before we can effectively inventorize the changes and influence of various impact factors on stakeholders.

2.3 Responding to UN Sustainable Development Goals

As a global leader in semiconductor assembly and testing, ASEH's approach to the UN SDGs is to closely align the goals with its core business. Since 2018, the company outlined five steps - Understanding SDGs, Defining Priorities, Goal Setting, Integration, and, Disclosure and Communication, to incorporate the SDGs into ASEH's core business strategy. ASEH re-examined the SDGs that are relevant to our industry and business operations, and took stock of SDGs and sub-goals that required our active involvement. We identified 6 Tier 1 SDGs: Quality Education (SDG 4), Clean Water and Sanitation (SDG 6), Affordable and Clean Energy (SDG 7), Decent Work and Economic Growth (SDG 8), Responsible Consumption and Production (SDG 12), and Climate Action (SDG 13). In response to the results of international standards and norms, sustainable investment assessments, and issues of concerns to stakeholder, “biodiversity” is included in important evaluation items related to the company’s long-term sustainability goals. Therefore, Life Below Water (SDG 14) and Life on Land (SDG 15) are added in our focus. On those SDGs that require active responses, we examined the correlation between our four sustainability strategies, KPI, and Tier 1 SDGs this year, then made adjustments and included SDGs into the long-term goals of our sustainability management. We are leveraging on our strengths to work together with both upstream and downstream partners to bring change and innovation to the industry and society.



03

ASEH's Contributed Value

3.1 ASEH' s TIMM Results	14
3.1.1 Economic Impact	16
3.1.2 Tax Impact	18
3.1.3 Environmental Impact	19
3.1.4 Social Impact	25
3.2 ASEH' s SDGs and Impact	32

03 ASEH's Contributed Value

3.1 ASEH's TIMM Results

ASEH adopted the TIMM framework for sustainability valuation to quantify the sustainable value of the company's impacts in the economic, tax, environmental and social dimensions. In 2022, ASEH generated US\$15,403 million worth of sustainable value for stakeholders, which is 1.9% higher than 2021. The sustainable value of positive impacts increased by US\$285 million.



Economic and tax dimensions

The semiconductor industry has continued to remain resilient post-pandemic, largely due to strategic investments in meeting ‘work-from-home’ electronics needs, business expansions and digital transformation. Overall, semiconductor applications in the internet, computing, industrial, healthcare and transportation sectors continued to perform well in 2022. In addition, developments in AI, IoT, automotive and high-performance computing (HPC) electronics have not only boosted the total output value of Taiwan’s semiconductor industry but also accelerated ASEH’s growth. The rise of the vehicle electrification market has further derived a profitable revenue growth in ASEH’s assembly and testing business. However, due to the impact of appreciation of the US dollar, the overall economic value decreased by 5% as compared to the previous year. On the other hand, due to the significant growth in profits in 2021, ASEH's tax paid during 2022 increased by 52% as compared to the previous year.

Environmental dimension

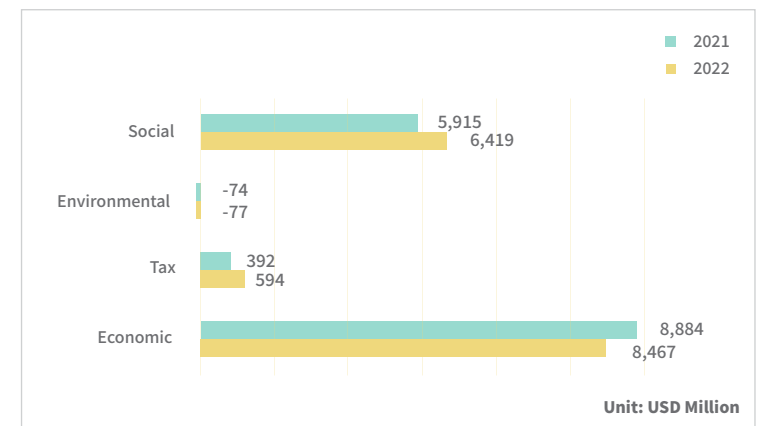
Two main sources of environmental impacts were water resource consumption during the production process and greenhouse gasses emitted from the use of electricity. Our renewable energy usage reached 19% of the total electricity consumption in 2022. On the other hand, we adopted the three major strategies of reduction, reuse, and recycling in the consumption of water resources. Investments were made in every plant to improve water recycling, thereby reducing environmental impacts caused by water consumption and increasing economic benefits. Negative effects of water consumption and wastewater pollution reduced by 31% compared to 2021, and the overall environmental impact of our operations decreased by 12% compared to 2021. In the future, we will actively invest in environmental protection and fulfill our pledge to use the proceeds raised through our green bonds to construct commercial used green facilities and establish water recycling plants, water treatment plants, and a real-time waste water monitoring system that would mitigate environmental impacts and promote human health.

Social dimension

The primary outcomes are the establishment of supplier partnerships, and employee development and support. The value of social impacts in 2022 increased by 9% compared to 2021. The difference in value stemmed from an increase in local procurement by 15% in 2022, which increased the assessed value of local employment and economic prosperity. The investment amount in social cohesion activities³ decreased by 28% compared to the previous year due to a significant increase of 62% in funds transferred into environmental and vocational education training. We have been participating in social welfare through various ways to improve the well-being of the community and the people and maintain environmental resources.

Explanations and management strategies for the various areas can be found in relevant sections of ASEH’s 2022 ESG report, along with key dimensions of our ESG performance in conjunction with assessment and management.

○ 2021-2022 ASEH Sustainable Values ○



[3] In 2022, the impact of afforestation and biodiversity activities will be adjusted into the total environmental impact. Therefore, the impact of afforestation and biodiversity activities was also excluded from the base year 2021.

3.1.1 Economic Impact

ASEH's export-oriented business operations is a major contributor to the country's GDP and economy. Within the TIMM framework, the economic dimension creates major positive impacts to ASEH's stakeholders. Based on stakeholders' (employees, shareholders, suppliers, and customers) perspective, economic dimensions include four main impact factors: profit, payroll, investment, intangible assets, and regulatory compliance.

Profit

ASEH is a public company in Taiwan, Shanghai and the United States. Shareholders include financial institutions, corporations, individuals and foreign investors. ASEH's profitability and earnings distribution bring financial satisfaction and livelihood maintenance to our shareholders. Hence, we use the net profit reported to the United States Securities and Exchange Commission (the "SEC") as a financial proxy for meeting shareholders' financial satisfaction and livelihood maintenance.

Payroll

ASEH employees are the main payroll stakeholder. Employees gain financial satisfaction and maintain their livelihood through salaries, and drive economic development through daily consumption. Adhering to the SROI⁴ principle of not over-claiming, we use annual personnel costs, salary expenses, withheld labor and health insurance premiums, retirement pension and so on as our financial proxy.

Investment

ASEH plays a key role in the global semiconductor industry, and procures a sizable number of machinery and equipment, expands facilities and leases assets every year to maintain technology leadership and sufficient production capacity. Hence, the main stakeholders of our capital expenditure and operating leases are the suppliers of our property, plant and equipment, and the lessor of business assets. These stakeholders are financially supported by our capital expenditures and leasing activities, that further drive economic prosperity. To attribute the long-term impacts of machinery and equipment purchases and facility expansion over the span of each year, the annual real estate, plant and equipment depreciation expenses, depreciation expense charged on right-of-use assets, operating lease expenses and repair expenses are used as the financial proxy for the financial support received by our suppliers each year.

[4] Social Return on Investment Guide, 2012.

Intangible Assets

ASEH maintains a high standard of research and development to continue its innovation and leadership in the industry. Investments in research and development affect our supply chains, employees and customers, and the impact on each is as follows: acquire the latest technologies, increase workplace competitiveness, and acquire products with leading technologies. The amortization expense of intangible assets and, research and development expenses are used as the financial proxy for the contribution of intangible assets.

Regulatory Compliance

We conduct all our business activities in strict compliance with applicable laws and regulations. To ensure legal compliance, ASEH maintains regular updates on domestic and foreign laws and policies that affect its operations, and prioritizes regulatory compliance at all of its business locations. Requiring our subsidiary companies to report immediately all incidences of non-compliance that resulted in penalties has become the key focus of risk management within company's internal control. Attorney fees for legal cases (excluding annual consulting fees), litigation costs and the amount of fines are identified as financial proxy for negative impacts.

Economic Impact Path Diagram

Impact Driver	Activity/Output	Outcome/Impact	Monetary Valuation
Profits	Profit distribution	Stakeholders' financial satisfaction and livelihood maintenance	Net profit reported on US Securities & Exchange Commission Form 20-F
Payroll	Payroll and welfare given		Yearly personnel costs, salary expenses, withheld labor and health insurance premiums, and so on
Investment	Capital expenditure		Yearly real estate, plant, and equipment depreciation expenses, depreciation expense charged on right-of-use assets, operating lease expenses, repair expenses, and so on
Intangible Assets	Research and development activities, and intellectual property purchase	Improve quality of intellectual property and intangible assets	Yearly intangible asset amortization expenses and research and development expenses
Regulatory Compliance	Attorney fees for legal cases, litigation costs, and the amount of fines	Cause financial or reputational damage	Litigation costs, legal consulting fees, fines, penalty and so on

3.1.2 Tax Impact

ASEH's global business operations are located in Taiwan, China/Hong Kong, South Korea, Japan, Singapore, Malaysia, Vietnam, Mexico, U.S.A., Tunisia and selected European countries. We believe that it is our duty to pay taxes that contribute to promoting local economic growth and corporate sustainable development. The local government is the stakeholder indirectly influenced by our tax payment while local residents receive the ultimate impact. Our taxes enable the local government to build the infrastructure that contributes to social development and meeting local residents' needs. Hence, the tax payment is identified as a financial proxy for impacts and benefits that local residents derive from us. Since different types of taxes are associated with different operating activities, we classify taxes on the business activities into 2 categories – profit taxes and other taxes.

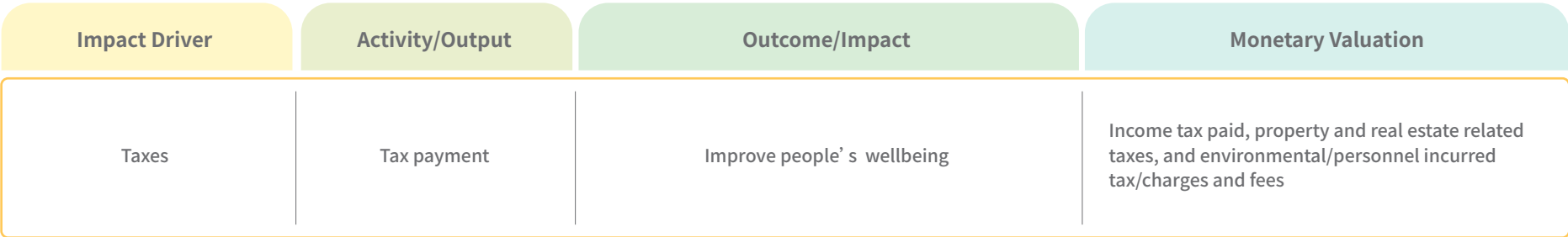
Profit Taxes

Profit taxes are incurred when the company's business activities generate profits, and are mainly income tax, the main tax used to support the expenditures of local governments, and contributes to the well-being of local residents. Hence, we include profit taxes as an influencing factor based on ASEH's ESG policy and management.

Other Taxes

In addition to profit taxes, we have also identified other taxes incurred by our business activities that affect local governments and residents. We included tax/charges and fees related to the holding and use of movable and immovable properties, and environment-related and human resources.

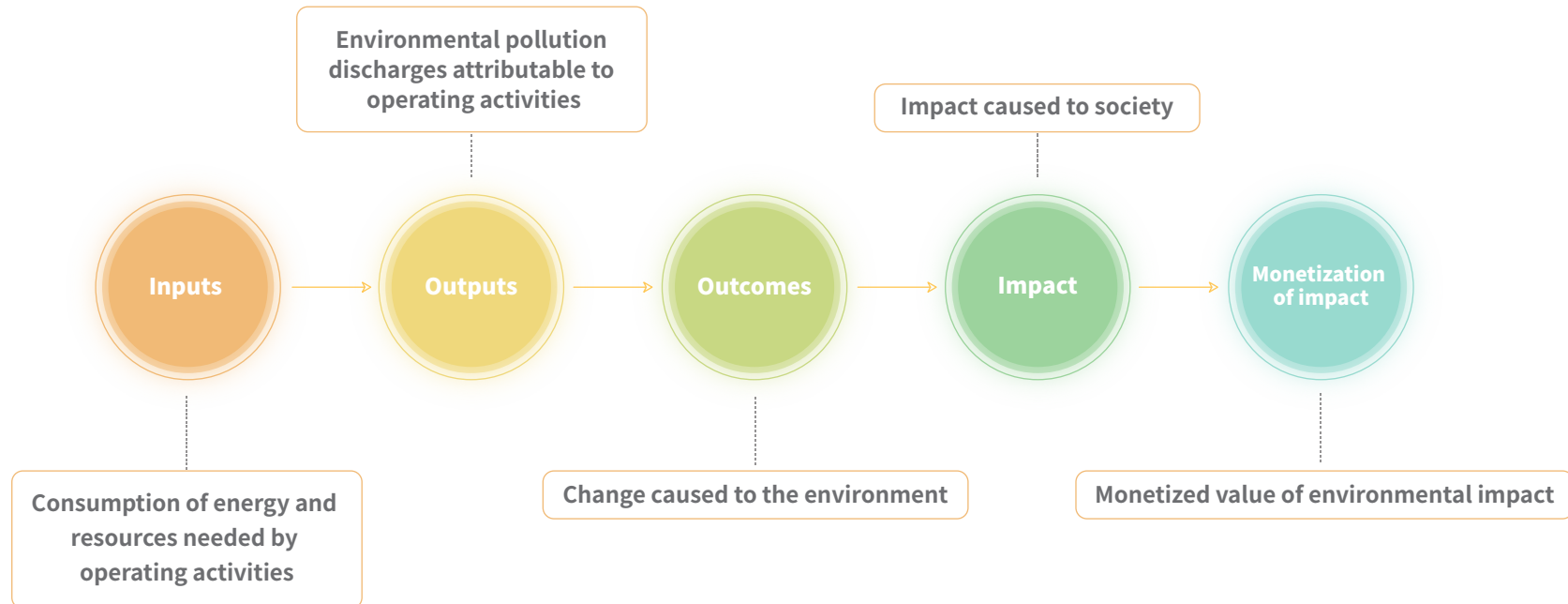
○ Tax Impact Path Diagram ○



3.1.3 Environmental Impact

Apart from striving to reduce environmental impact by boosting our resource efficiency, and reducing greenhouse gases and wastewater discharges, waste production and chemical use, we also mitigate the negative impacts of our operation and value chain activities on the ecosystem through biodiversity monitoring and restoration such as afforestation, Chinese Box Turtle conservation, and marine conservation. We seek to actively comply with stakeholder requirements and expectations by quantifying the impacts of our operating processes. We apply the methodology in the 2015 PwC TIMM framework on monetized corporate environmental impact. We conducted our analysis of the environment dimension according to the natural capital impact assessment procedures in the Natural Capital Protocol issued by the Natural Capital Coalition in 2016. In 2022, ASEH's overall environmental impact of US\$-77 million is mainly attributed to resource consumption and environmental emissions from its business activities. We further applied the sustainable value assessment method used internally to the value chain. In 2022, the monetized value of the environmental impact of our greenhouse gas emissions amounted to US\$-810 million. The main sources of impact included product and service procurement, upstream transportation and distribution, and external influence of capital goods.

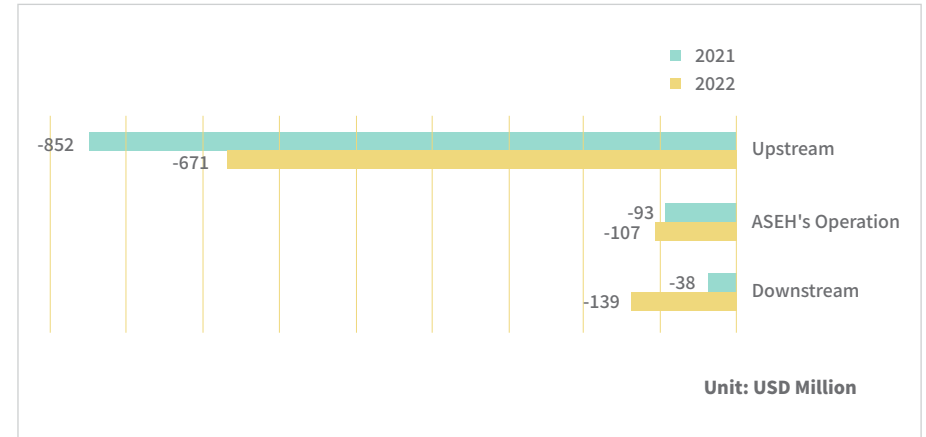
Monetized Environmental Impact Assessment Procedures



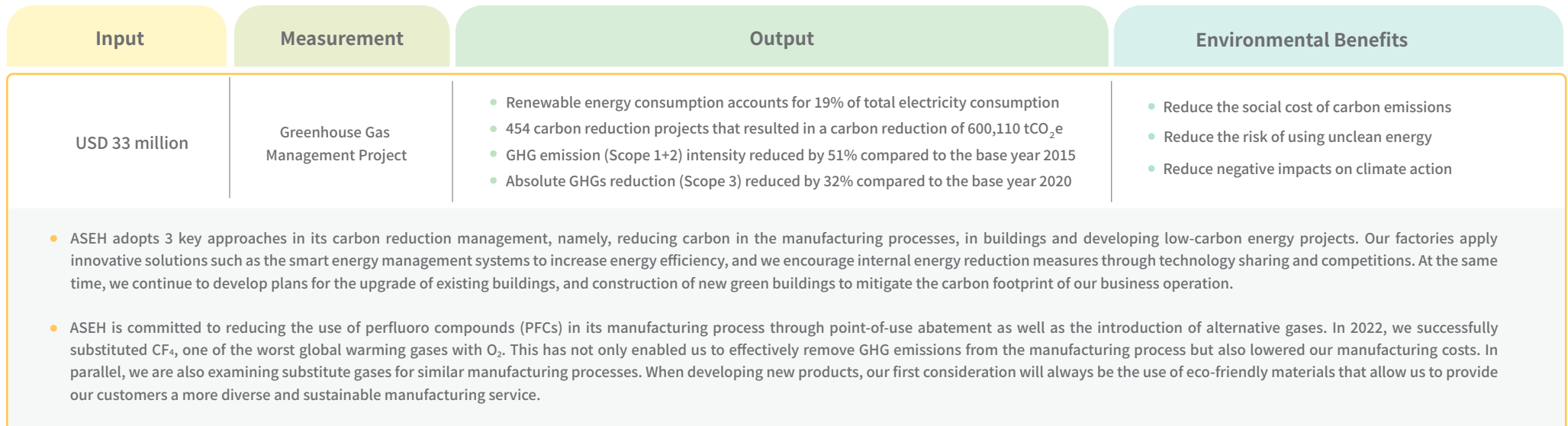
Greenhouse Gas Emissions

In 2022, ASEH's total GHG emissions (Scope 1+2) was 1,762,235 tCO₂e, of which renewable energy or certificate in Taiwan, China, Japan, Malaysia and Mexico were already deducted from the 2022 emissions. Besides conducting the inventory of Scope 1 and 2 GHG emissions, ASEH conducted a full inventory of Scope 3 GHG emissions for the first time, recording a total emission of 13,350,245 tons. We cited the quantified effect of the social cost of CO₂e in the Technical Support Document on the Social Cost of Carbon issued by the US EPA (Ahloth, 2009). Social cost of carbon (SCC) is the monetization of the social cost of carbon emissions, and assessment items include health, building deterioration, economic losses, agriculture and timber loss, desertification and other ecosystem services. We selected the scenario of a 3% social discount rate in the SCC as the basis for calculation. After adjusting for inflation and conversion into USD using 2022 rates, the social cost of one ton of CO₂e is determined at US\$60.67.

2021-2022 Greenhouse Gas Value Chain Outcomes



Greenhouse Gas Management Impact Pathway



Other Air Emissions

In 2022, ASEH's total SO_x, NO_x, VOCs and particulate matter emissions was 364 tons. We determined the social cost of these emissions after referencing assessment items in the natural resource costs issued by Trucost in 2016, including human health, agricultural crops, forests, materials and acidification of bodies of water.

Waste

ASEH used landfill, incineration, solidification and other methods to handle 6,893 tons of hazardous waste and 1,917 tons of non-hazardous waste in 2022. We referenced the natural resource costs issued by Trucost in 2016, in which assessment items include local and global pollution, noise and visual disturbances.

Water Use

Total water intake of ASEH factories was 23,399 megaliters in 2022. We referenced the natural resource costs issued by Trucost in 2016. In view of the possibility that the company's water consumption may indirectly cause displacement of other water consumption opportunities, the assessment items in this study consisted of direct non-consumer use and ecosystem services. The monetization coefficient of water resource consumption in 2022 was 1.72 (USD/ton), and the monetization coefficient of ASEH in each place of operation is adjusted based on the purchasing power in different countries. Furthermore, we also included malnutrition and water-borne diseases into assessment items. Since there were no figures for Taiwan, the monetization coefficient we used is the loss of lives caused by malnutrition determined using the life cycle assessment (LCA) methodology proposed by Pfister et al. (Pfister, S., Koehler, A., Hellweg, 2009). When assessing whether the use of water resources may cause poor nutrition, we included the scarcity of water resources in the geographical areas in question, the percentage of water used for agricultural purposes, and the human development index among our considerations. We also referenced the LCA model of Motoshita et al., 2010 (Motoshita, M., Itsubo, N., Inaba, A., 2010), which was used to determine the loss of lives in South Korea caused by water-borne diseases. The purchasing power of other regions is adjusted using China's coefficient to determine their respective monetization coefficient.

Disability Adjusted Life Years (DALY) was proposed by the World Trade Organization (WTO) and refers to the years of life lost due to illness or years of healthy life lost. DALY is now extensively applied in the fields of public health and health impact assessments. The value of statistical life (VSL) is cited for the monetary value of DALY, and we referenced the VSL of OECD countries at US\$3.4 million (USD in 2011) (OECD, 2012). After considering life expectancy and the age of premature mortality, the value of DALY is calculated at US\$185,990. Finally, we used a value transfer methodology to convert the values provided by the OECD to values for the regions where ASE's plants are located. We employed an appropriate inflation conversion method and determined the monetization coefficient for malnutrition and water-borne diseases in each region to be 0.000247 (USD/ton) in 2022.

Water Pollution

Wastewater discharge of ASEH factories was 17,461 megaliters in 2022. Toxic substances that are hazardous to human health and nutrient salts that affect the ecosystem are factored into water pollution. With regard to toxic substances, due to limitations in data availability and current publications, we only consider types of pollutants that are regulated and actually discharged. Toxic pollutants may directly harm human health through polluted water sources or indirectly harm human health (e.g. eating contaminated fish), and the health hazards may be divided into carcinogenic and non-carcinogenic. We relied on the USEtox LCA model to analyze the dose-response effects of different pollutants, and obtained the relative risk characterization factors and DALY values for water-borne pollutants. We also employed the average carcinogenic and non-carcinogenic coefficients provided by Huijbregts et al. (Huijbregts, Rombouts LJA, Ragas AMJ, Van de Meent D., 2005) in calculations. We used a value transfer methodology to convert the values provided by the OECD to values for the regions where ASEH's plants are located, and employed an appropriate inflation conversion method to obtain monetization coefficients for the impact of water pollution on health in the various areas.

The excessive discharge of nutrient salts into bodies of water can cause massive algae growth which depletes oxygen and results in eutrophication. Besides the economic loss and higher cost of using the bodies of water, this will also result in the loss of water recreational value, private property value (lower housing prices), decreased catches, and affect the ecosystem (e.g. wetlands improve water conservation). We referenced freshwater eutrophication in the LCA ReCipe (Hierarchist version) Midpoint method to assess the factors limiting freshwater eutrophication – phosphorus. The Willingness to Pay (WTP) approach by Swedish scholar Ahlroth (2009) is used for the monetization coefficient. The benefit transfer function is used to convert Swedish values into values for regions where ASEH factories are located, and suitable inflation has also been factored in.

Recycled Water

Total amount of water recycled by ASEH factories was 40,121 megaliters in 2022. The use of recycled water will simultaneously reduce water consumption displacement and wastewater pollution. We referenced the LCA method proposed by Pfister et al. in 2009 (Pfister, S., Koehler, A., Hellweg, 2009), to determine the loss of lives caused by malnutrition on this basis. To determine the effect of wastewater pollution in recycled water, we relied on the USEtox LCA model to obtain the relative risk characterization factors and DALY values for water-borne pollutants, and referenced freshwater eutrophication in the LCA ReCipe (Hierarchist version) Midpoint method to assess the factor limiting freshwater eutrophication – phosphorus. We also employed the average carcinogenic and non-carcinogenic coefficients provided by Huijbregts et al. (Huijbregts, Rombouts LJA, Ragas AMJ, Van de Meent D., 2005) in calculations.

Water Recycling and Reuse Impact Pathway

Input	Measurement	Output	Environmental Benefits
USD 6.38 million	Water Recycling Project	<ul style="list-style-type: none"> • 10 water conservation projects that saved a 13.14 million tons per year • Enable a recycling rate of 76% 	<ul style="list-style-type: none"> • Reduce the opportunity cost of using other water resources • Reduce the consumption of water for agricultural use and the risk of water contamination • Reduce the risk of water contamination due to water scarcity
<ul style="list-style-type: none"> • ASEH adopts three water use strategies: reduce, reuse, and recycle. The main source of water-use is tap water. Total water withdrawals in 2022 amounted to 23,398,956 tons, while water withdrawal decreased by 10% compared to the previous year. • The wastewater reclamation recycling systems were established in ASE Kaohsiung, Chungli, and Malaysia facilities to support wastewater treatment that meets local regulations. The wastewater reclamation recycling rate of ASE Kaohsiung and Chungli are 70% and ASE Malaysia is 50%. The robust recycling methodology at the facility result in a 11% reduction in effluent discharge, and significantly alleviated the manufacturing sites' pressure on water consumption and wastewater discharge. 			

Afforestation Project

In 2022, ASEH planted more than 200,000 trees, covering a total afforestation area of 1.31 square kilometers in Taiwan, Inner Mongolia and Ningxia. Afforestation has the benefits of conserving water sources, reducing soil erosion, sequestering carbon, and purifying the air. We refer to the Ecological Benefits of Vegetation Restoration in Yijinhuoluo Banner of Inner Mongolia published by Jiang Liwei et al. in 2019 (Jiang Liwei, Lu Zeyang, Gong Yinting, Yan Shiwei, 2019) and use the replacement cost method to calculate the forest ecosystem service value of the afforestation area. That is, we assess the value of forestland restoration through the expected savings in social costs such as water storage projects, sewage treatment, soil removal, dust filtration, industrial oxygen production, and carbon emissions, and suitable inflation has also been factored in.

Biodiversity

The Chinese box turtle, which is a terrestrial freshwater turtle, is the only species of its kind in Taiwan. Considering long-term poaching and threats to Chinese box turtle's habitat, ASEH has been contributing to the restoration and conservation efforts of the Chinese Box Turtle Conservation Team from the National Chung Hsing University. The years of research experience have significantly improved the success rate of rewilding. The 1,085 turtles were released and a noticeable increase in population density of nearly 2-3 times can be observed before and after the release. We continue to promote Chinese box turtle conservation and awareness through various education programs with a total of 137 activities in Taiwan during the project period that attracted participation from over 29,060 individuals. On the other hand, ASEH engages with local governments, diving shops and general public to develop coastal clean-up activities and clean up coastal and ocean litter. In 2023, we initiated coral reef restoration and reef cleaning in Penghu by partnering with local businesses and the seedling breeding farm to propagate coral, in order to let the ocean return to its original activities.

Through the above-mentioned terrestrial and marine ecological restoration and conservation actions, we promote the cooperation of the stakeholders including our employees, research institutions, local governments and local residents to enhance the awareness of environmental protection and the restoration of indicator species. We then used the value transfer methodology to determine that the benefit of biodiversity projects was US\$3.7 million.

Environmental Impact Pathway

Impact Driver	Activity/Output	Outcome/Impact	Monetary Valuation
Greenhouse gas	GHG Emission (Scope 1 and 2)	Human health, building deterioration, economic losses, agriculture and timber, desertification, and other ecosystem services	Reference:Accredited publication on the social costs incurred by greenhouse gases emissions
Other air emissions	Emissions of pollutant (SOx) Emissions of pollutant (NOx) Emissions of pollutant (VOCs) Emissions of pollutant (PM10)	Human health, forestry, materials ⁵ , and water acidification Human health, crops, and forestry Human health, crops, and forestry Human health	Reference:Accredited publication on the social costs incurred by air pollution
Waste	Hazardous and non-hazardous waste (recycling and reused are excluded)	Local and global pollution, audio and visual nuisances	Reference:Accredited publication on the social costs incurred by waste
Water use	Water consumption	Direct non-consumptive uses, indirect uses (ecosystem function), malnutrition, and water borne disease	Reference:Accredited publication on the social costs incurred by water use
Water pollution	Release of regulated contaminants ⁶ Release of nutrient (Phosphorus)	Human health Recreation, property values, and fish stock	Reference:Accredited publication on the social costs incurred by water pollution
Recycled water	Reduce water consumption	Mitigate crowding out of direct non-consumptive water use, ecosystem service, malnutrition and waterborne disease	Reference:Accredited publication on the social cost generated by water consumption and wastewater discharge
	Reduce release of regulated contaminants	Reduce harm to human health	
Afforestation	Restore woodland vegetation	Ecosystem services such as water conservation, soil erosion reduction, carbon sequestration, and air purification	Reference:Accredited publication on social costs saved by forest ecosystem services
Biodiversity	Land and marine ecology restoration	Ecology conservation awareness and species restoration	Reference:Accredited publication on social costs saved by ecology restoration

[5] Impact on building materials.

[6] Regulated contaminants considered in this study: phenols, hexane extracts, cadmium, plumbum, chrome, hexavalent chromium, copper, zinc, nickel, arsenic, and silver.

3.1.4 Social Impact

Apart from direct financial impacts on investors, ASEH's operating activities will affect different stakeholders and produce positive and negative impacts of varying social significance. We referenced assessment procedures in the Social Capital Protocol issued by the World Business Council for Sustainable Development in 2016 and the Social Return on Investment (SROI) issued by the UK government's Office of the Third Sector, in order to determine the sustainable value created in each aspect, including supplier partnerships, employee engagement and development, employee and contractor health and safety, and education and social cohesion. In 2022, ASEH's overall social impact totaled US\$6,419 million, with US\$6,399⁷ million directly resulting from the company's operations.

Supplier Partnerships

As a key player in a high-tech industry, ASEH works with more than thousands of suppliers globally to manage a complex semiconductor industry supply chain and meet the needs of customers worldwide. Hence, the building of stable partnerships with suppliers to create a better business environment and achieve social cohesion form the core values of our sustainable development.

Based on the principle of materiality, we identified important activities in ASEH's business process that had an effect on the supply chain in 2022, including supplier sustainability audits, supplier training, local procurement, and supplier sustainability awards. We duly determined the material impact on suppliers and to measure financial proxy variables, we applied the educational and training costs conducted by external consultants, the benefit values of revenue from suppliers, the mitigation of property losses due to improvements in audit shortcomings, contributions from local procurement, and the investment of supplier sustainability award.

Based on the cost approach and contingent valuation methods, the value created through partnerships with suppliers was US\$6,069 million. The main impacts are economic benefits derived from local procurements in the regions where our business operations are located, driving local employment and creating economic prosperity. Furthermore, the cooperation allows suppliers to understand the issues and trends of sustainability, improve occupational safety and reduce risks, and optimize existing management measures. Among our suppliers, 90% enhanced their competitiveness and expanded their business.

Employee Engagement and Development

Employees are key to maintaining ASEH's overall operations and we view them as a critical component of our core values and a major stakeholder.

In 2021, we introduced a new framework and new measurement indicators, restructuring the employee survey to a sustainability engagement survey which includes employee experience indicators and employee engagement indicators towards the company. Besides providing employees with financial satisfaction and taking care of their livelihood through salaries and benefits, we summarized the material impact generated, and focused on career development programs, work environment and healthcare programs. We consolidated performance bonuses, amount of company subsidies and allowances, mental wellbeing course fees, consensus building and motivational course fees, and professional management training course fees as the monetized value of the financial proxy.

The 2021 employee engagement survey recorded as score of 79% and employee coverage as 96%. Based on the results of the 2021 questionnaire survey and after the transfer of impact value, we calculated the effect of ASEH's personnel management and employee training on employees at US\$271 million. Outcomes include increasing employees' sense of achievement and sense of belonging, enhancing employee cohesion and management capabilities, and improving mental health. The top three outcomes which resonated most with employees are mental health improvement (84%), enhancing employee cohesion (82%), and sense of belonging (79%) respectively.

[7] The value of social impacts resulting directly from the company's operations is calculated by excluding public welfare activities and non-industry-academia educational projects.

Employee and Contractor Health and Safety

Employee and contractor's health and safety is vital to maintaining good labor-management relations, operational efficiency and organizational commitment. ASEH promotes a healthy workplace and monitors workplace accidents to understand the positive and negative impacts on the work environment, and to also determine if the company is providing employees and contractors a safe and healthy work environment.

We used the occupational injuries of employees and contractors, health examinations and health insurance as influencing factors of employee engagement. The number of ASEH employees that received health examinations surpassed 51,895 in 2022. A total of 138 occupational injuries and 21 occupational disease occurred, among which, 11 were contractor injuries. We then assessed the issue of employee health based on occupational accident subsidies, health examination expenses and health insurance premiums.

We calculated the social value of employees and contractors of positive effects at US\$42 million, and outcomes included higher probability of recovery from illness and less financial pressure from medical expenses. With regard to negative effects, the harm to employees physically and mentally was assessed at US\$0.4 million. We will continue to improve our occupational safety and health measures to effectively prevent injuries and illnesses caused by work, and eliminate the 1% negative effect it accounted for in the employees' and contractors' health and safety indicator.

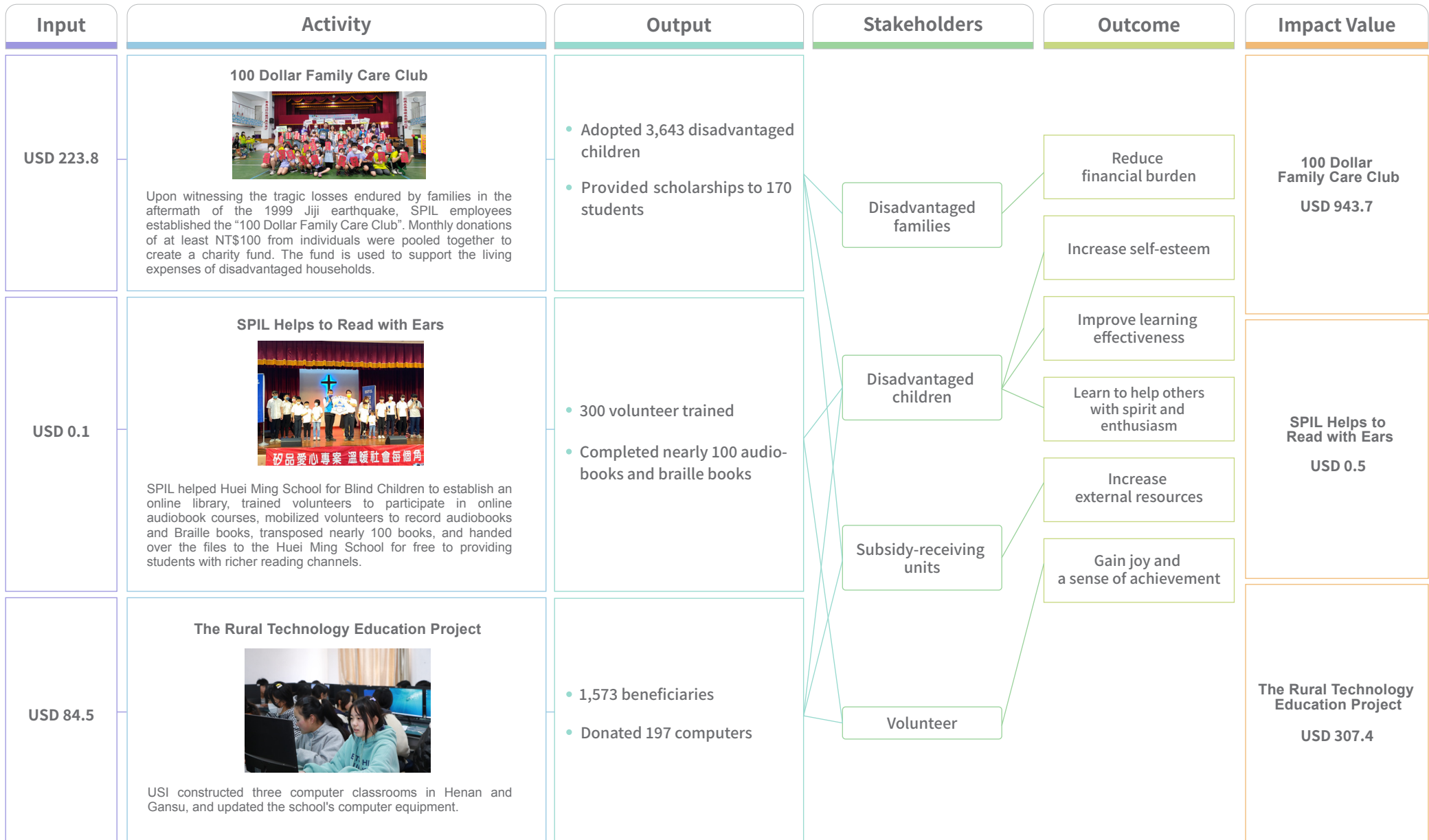
Social Cohesion

ASEH has business operations located in various parts of the world. We engage actively with the local community where we conduct our business, and participate in various public welfare programs to ensure that we enhance the positive impact on the natural environment and society, while allowing the public to better understand ASEH's approach to sustainability.

ASEH invested approximately US\$3.6 million in 135 social cohesion programs in 2022, including 16 public development programs; 40 community care programs; 48 care for disadvantaged families programs; 4 healthcare sponsorship; 23 arts and culture sponsorships; 4 sports sponsorships. Due to the large number and complexity of stakeholders at each business location, we analyzed secondary data and referred to public SROI reports to match activities with the chain of events. We then use the value transfer methodology to assess the positive and negative effects on communities and residents.

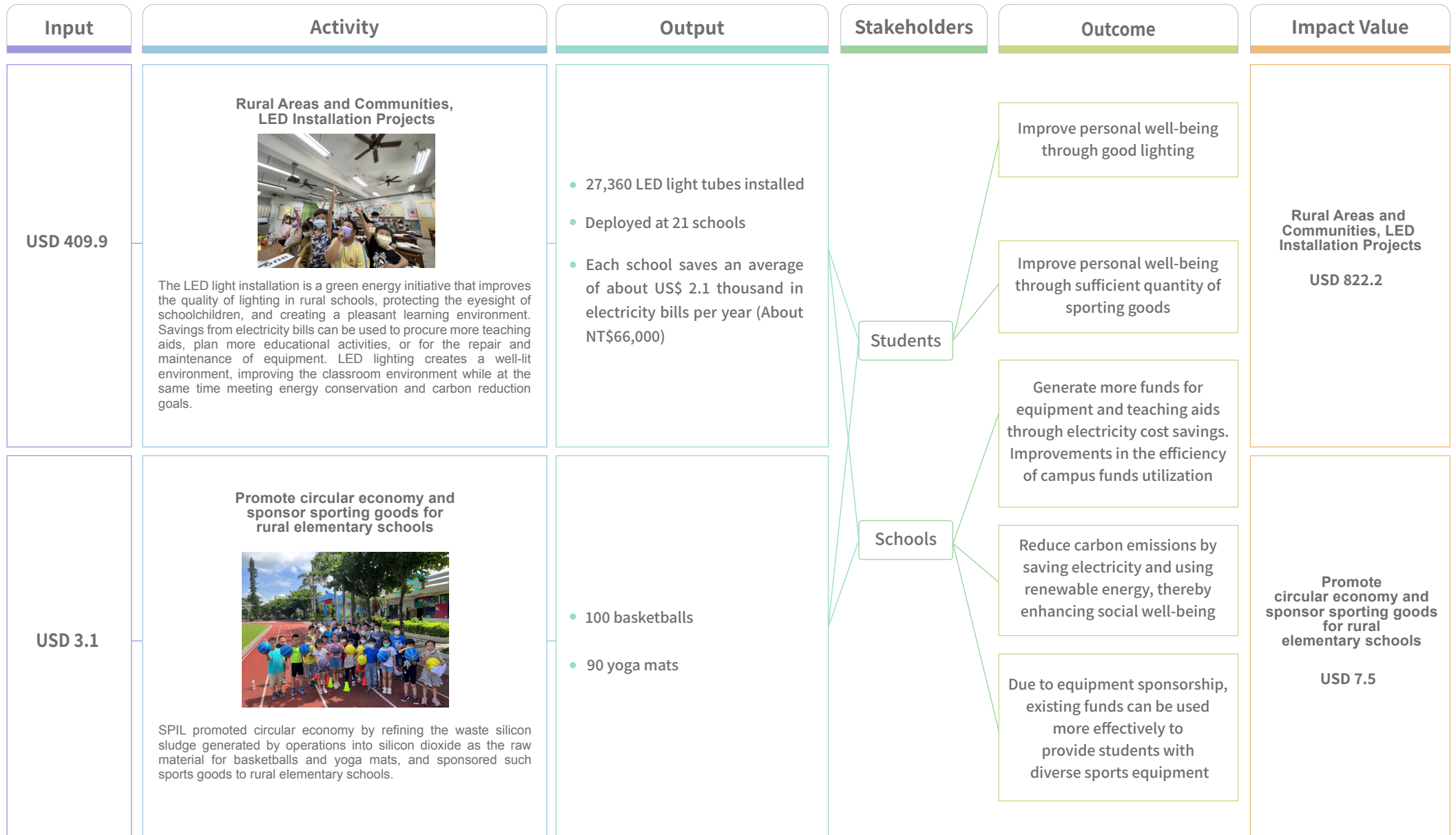
Public welfare programs that boost social cohesion created US\$13.8 million in social value. Among which, care for disadvantaged families accounted for the highest percentage at 58%, followed by arts and culture sponsorships at 24% and community care at 11%. Overall, SROI was 3.78 with the top three outcomes as follows: raising the self-esteem of children from disadvantaged families through education, increasing public literacy in the arts, and raising the efficiency of resource utilization by local communities, leading to improvements in the well-being of residents.

○ Care for Disadvantaged Families Impact Pathway ○



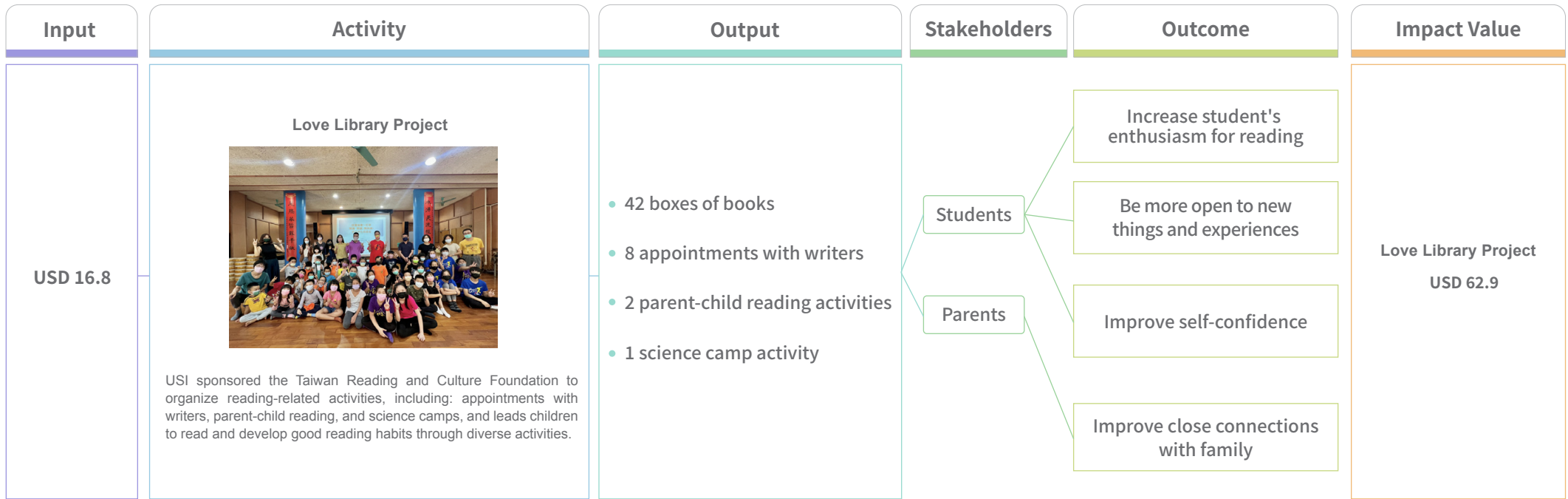
Unit: thousand US\$

Community Care Impact Pathway



Unit: thousand US\$

○ Arts and Culture Sponsorships Impact Pathway ○



Unit: thousand US\$

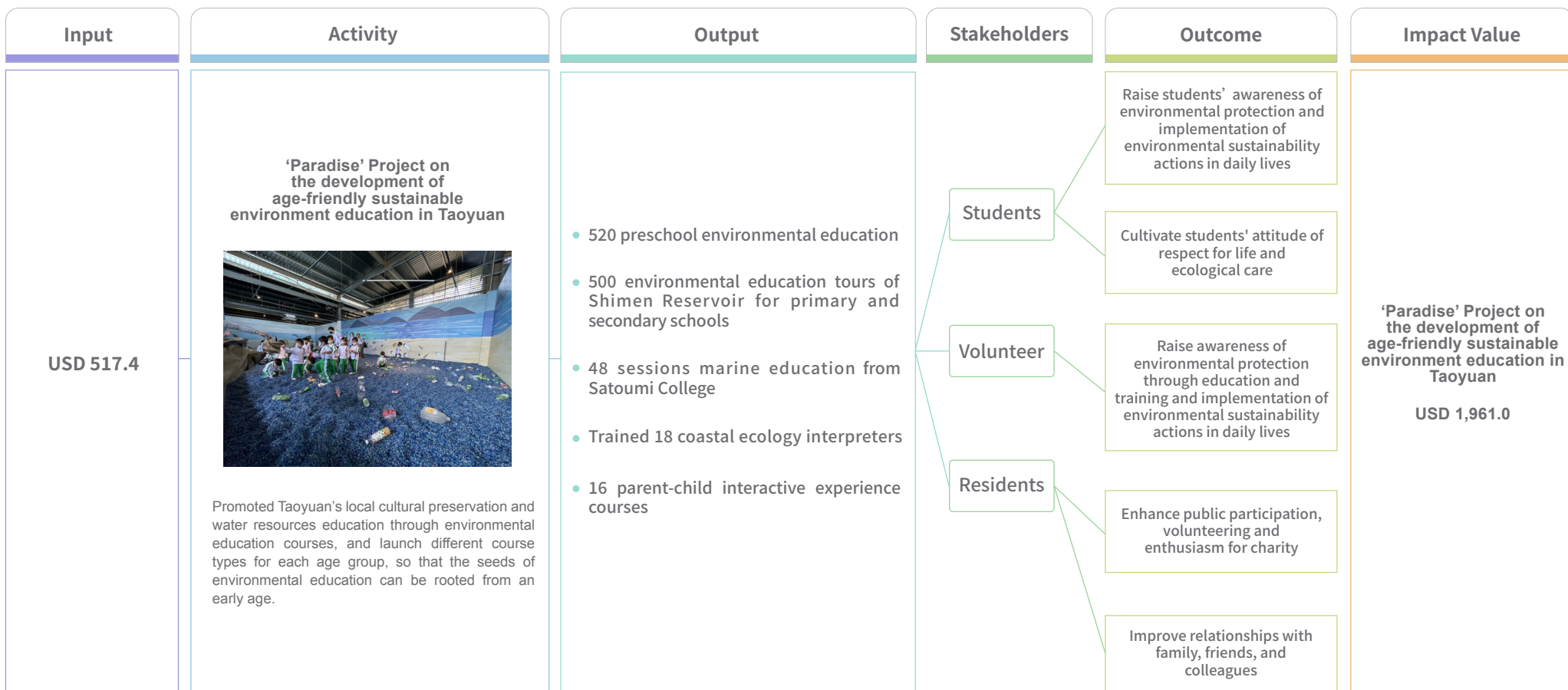
Education

Access to highly skilled human resource talent is key for ASEH to maintain its leadership in a competitive semiconductor industry. The semiconductor industry continues to experience strong demand for skilled workers and at ASEH, cultivating talent and semiconductor technologies are very important elements in our business process and strategy. Public values and consumption habits affect product demand and the direction of developments in the entire technology industry. Through public advocacy and active engagement with the community and in campuses, ASEH aims to influence consumer behavior to achieve growth and sustainable development for the company.

In 2022, ASEH worked together with many academic institutions and invested approximately US\$5.5 million in a total of 164 education programs, including academia-industry research and development, career counselling and employment matching programs. These programs have allowed ASEH to strengthen its technological advantages and gain access to quality employment candidates. Furthermore, ideas of sustainability are incorporated into corporate operations through the promotion of environmental conservation, road adoption and other social welfare programs, in order to raise the green awareness of employees and the public.

We used the value transfer methodology to determine that the SROI of education programs was 4.26, and that US\$23.3 million in social value was created, of which business-related industry-academia collaboration generated approximately US\$17.0 million. Main outcomes include better operational efficiency and industry competitiveness. Approximately US\$6.3 million was generated by environmental education, and main outcomes include better recognition and attitude towards environmental conservation of the public, as well as incorporating actions to protect the environment in their daily life.

○ Environmental Education Impact Pathway ○



Unit: thousand US\$

Social Impact Pathway

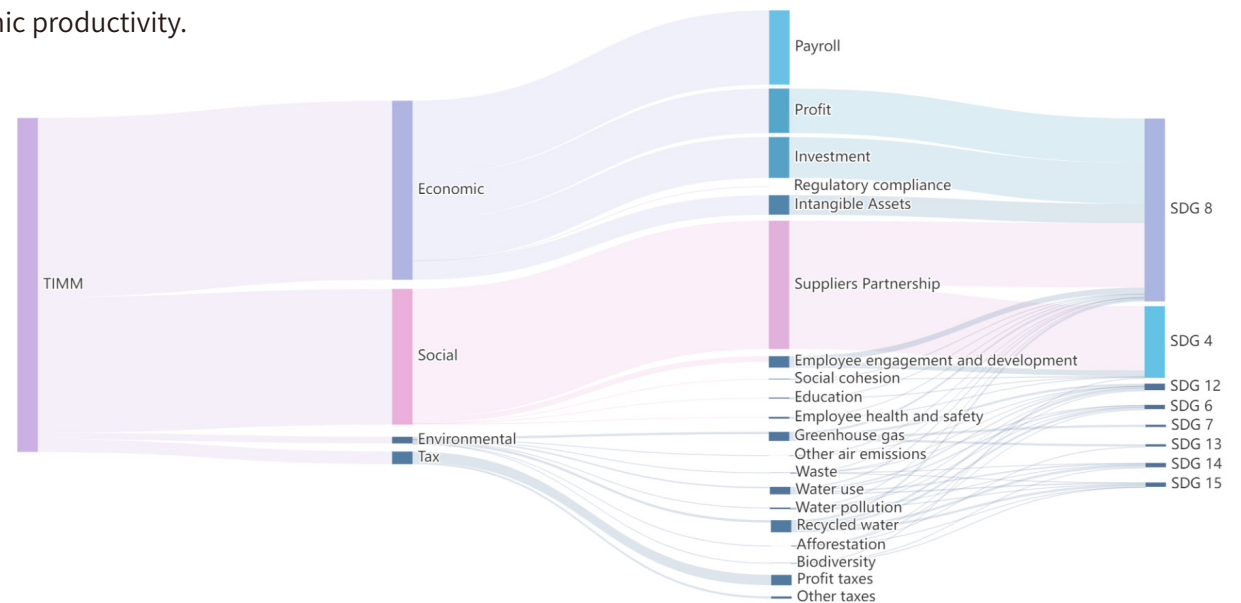
Impact Driver	Activity/Output	Outcome/Impact	Monetary Valuation
Supplier Partnerships	Supplier sustainability audit	Improve supplier's competitiveness and optimize supplier's management system	Property losses or external training fees
	Supplier training		Perceived value according to supplier survey questionnaires
	Local procurement	Create local job opportunity and promote local economic prosperity	Local procurement value
	Supplier Sustainability Awards	Support excellent suppliers to sustainable transition	The cost of Supplier Sustainability Awards
Employee Engagement and Development	Employee career Development work environment Employee care	Increase sense of belonging Increase mental health Enhance management capabilities Increase sense of achievement Enhance cohesion of employees	Mental wellbeing course fees Company benefits and subsidies Training and development expenses Consensus building and motivational course fees
Employee and Contractor Health & Safety	Number of occupational injuries	Employee and contractor physical/psychological injury	Disability payments
	Employee health check	Increase in recovery rate of employee with health issues	Health screening expenses
	Health insurance expense	Reduce financial impact to employee as a result of health issues	Health insurance expenses
Social Cohesion	Public development	Improvement in the knowledge and analytical abilities of public issues	Converted using the value transfer methodology ⁸
	Community care	Improvement of resource usage benefits	
	Disadvantaged families care	Improvement of self-identity and education benefits	
	Healthcare sponsorship	Increased healthcare resources and quality of life	
	Arts and culture sponsorship	Improved artistic knowledge	
	Sports sponsorship	Increased human interactions and group cohesiveness	
Education	Occupational education and training	Increased employment opportunities for participants in industry-academia collaborations	
	Environmental education	Improved environmental awareness and implementation in daily life	

[8] Based on the value transfer model described in the Social Capital Protocol, we benchmarked against SROI reports certified by Social Value International or SROI reports with similar topics from Taiwan. We have also reviewed impact pathways in the publications, and matched these pathways with ASE's social cohesion and educational programs. We then transferred the percentage of value attributable to the impact pathway to ASE's social cohesion and educational programs, which provided a basis for calculation of the SROI generated and the value to society.

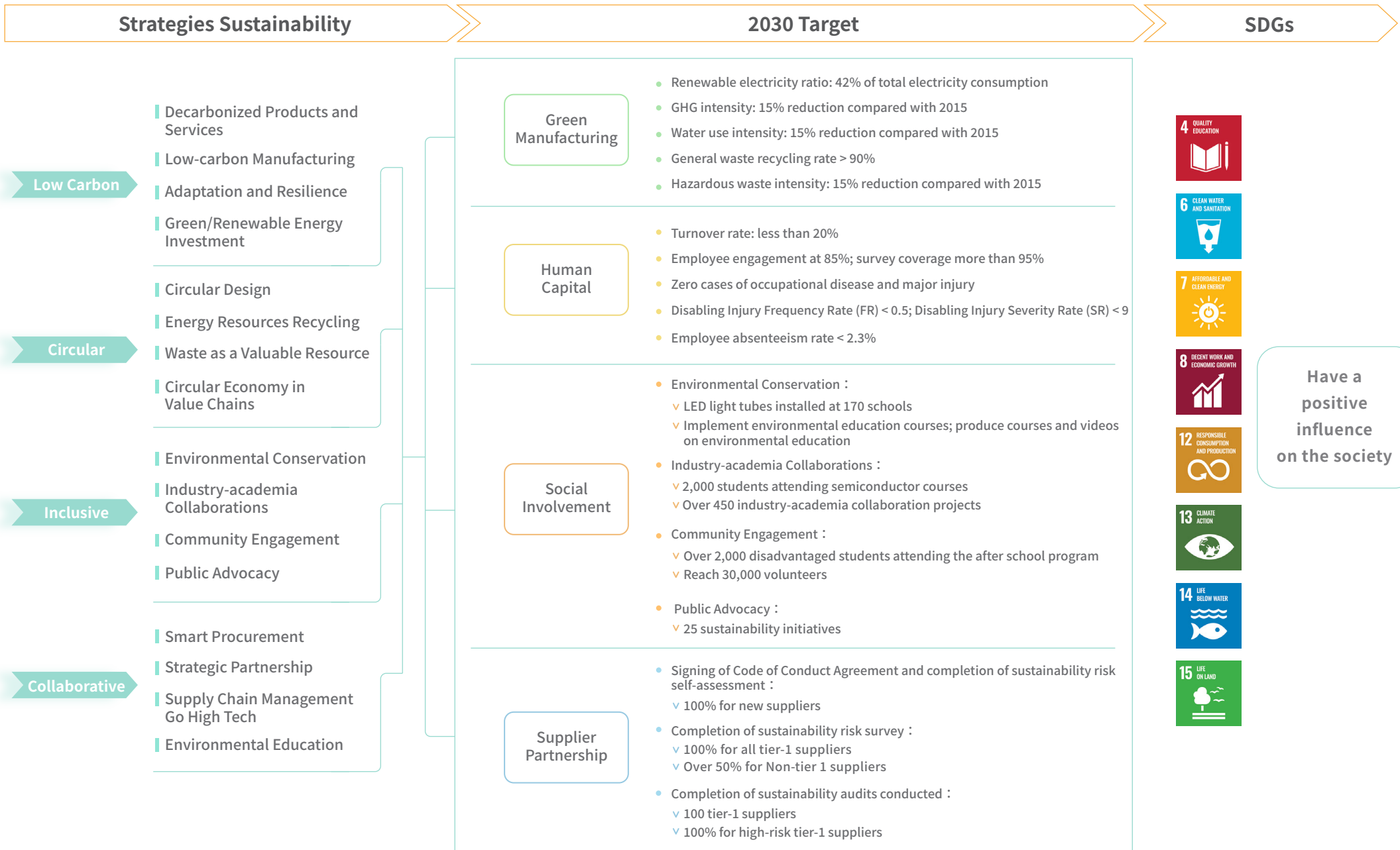
3.2 ASEH's SDGs and Impact

ASEH has identified Sustainable Development Goals (SDG) as our priorities. This year, we continued to evaluate our progress through the SDG common indicators of The SDG Compass Business Indicators database. The analysis showed that ASEH has created positive impacts and contributions for SDG 8 (Decent work and economic growth), SDG 4 (Quality education), and SDG 12 (Responsible consumption and production). These were mainly attributed to the establishment of supplier partnerships, and the increase in local procurement opportunities that benefited the local economy and created jobs in areas where we operate in. Through supplier education and training, and sustainability audits, we have improved the suppliers' understanding of sustainability issues and trends, reduced risks to occupational safety, optimized current management measures, driven overall supply chain improvements in economic productivity and resource efficiency, and provided the knowledge and skills needed for sustainable development. We also use operating profits, investments and intangible assets to drive the GDP and the local economy, further improving the dignity of labor and standard of economic productivity.

As our business grows, we understand that issues arising from the demand on environmental resources in our operations, and the social impacts we create due to our environment, could negatively affect SDG 7 (Affordable and clean energy), SDG 13 (Climate action), SDG 6 (Clean water and sanitation), SDG 14 (Life below water), and SDG 15 (Life on land). Therefore, we continue to increase environmental protection related investments, focus on improving resource efficiency and conversion rate, and actively develop diverse and clean energy sources. We have increased our renewable energy use ratio over the years in response to climate change and net zero requirements, allowing more efficient use of natural resources and sustainable management. We are also gradually improving the resource efficiency in consumption and production, and are actively minimizing the external social cost of SDGs. To fulfill our global sustainability goals, we have formulated our 2030 performance goals embedded within the core of our business, in accordance with the company's four major sustainability strategies. Our SDG responses will become strategic indicators of ASEH's periodic evaluation and management, that will enable the company to lead the industry and bring positive impacts to global sustainable development.



ASEH' s Sustainable Value Creation Framework



04

Conclusion

Appendix

Appendix 1: Methodology and Data Collection	37
Appendix 2: Reference for Value Transfer Methodology	40
Appendix 3: References	41

04 Conclusion

ASEH expresses its sustainability performance in monetary values, through the four sustainability strategic goals and results. The purpose of the valuation is to determine the economic, tax, environmental and social impact of our business process on stakeholders based on a uniform monetization standard. We hope to completely capture the impacts of our non-financial performance, and to generate positive value for our stakeholders through effective management and performance in sustainability.

ASEH generated US\$15,403 million in sustainable value for stakeholders in 2022. On the economic impact, employee salary and benefits generated the highest monetized impact, demonstrating ASEH's substantial influence on the labor market where it operates. When it comes to taxes, ASEH continues to uphold its core value as an honest taxpayer and refrain from performing transactions solely for tax purposes. On the environmental dimension, we recorded significant reductions in negative impacts from waste, and water pollution, further demonstrating our resolution and relative success in renewable energy usage, facilitating air pollution control, increasing water resource efficiency, and circular solutions in resource reduction. In 2022, we applied the SROI framework to quantify the impacts of our business operations and value chain activities on the environment based on SDG14 Life Below Water and SDG15 Life on Land. On the social dimension, we focus on the sustainable values created through supplier partnerships, and employee engagement and development, that allow ASEH to further create extraordinary value for suppliers and employees through its operations. In response to the negative impacts created in 2022, ASEH will step up efforts to mitigate negative environmental and social impacts to stakeholders.

Item	Greenhouse gas	Other air emissions	Waste	Water use	Water pollution	Employee health and safety
Impact	The social cost of human health, architectural and asset damages and economic losses caused by greenhouse gas emissions.	The social cost of threats to human health, agriculture loss, forest loss, resources depletion, and acidification of water caused by other air emissions.	The social cost of local and global pollution, visual and auditory disruption caused by the hazardous and non-hazardous waste treatment process.	The social cost of ecosystem service devaluation, malnutrition, and waterborne diseases caused by water usage.	The social cost of threats to human health, decrease of tourism value, devaluation of real estate, and post-harvest fish losses caused by water pollution.	The effect of work injuries on the physical and psychological wellbeing of employees.
Mitigation Action	<ul style="list-style-type: none"> Moving towards low-carbon energy transformations Establish and purchase renewable energy Execute energy-saving and carbon reduction solutions Expand investments in carbon reducing equipment Adopt low-carbon substitute materials 	<ul style="list-style-type: none"> Introduce high-efficiency processing equipment Worked with academia to study the processing efficiency of air pollutants The closed negative pressure design increases the collection rate Substitute cleaning materials 	<ul style="list-style-type: none"> Waste reduction at source Introduced circular economy operating models Adopted environmentally friendly substitute materials 	<ul style="list-style-type: none"> Established a waste water recycling plant Promote water saving projects Invested in water recycling equipment Rainwater collection and utilization 	<ul style="list-style-type: none"> Continuous monitoring of water quality/volume Waste water recycling and cyclic reuse Distribution of chemicals Develop innovative processes and technologies through academia-industry cooperation 	<ul style="list-style-type: none"> Established organizational structure, management guidelines and procedures, and periodic audit procedures in the OHS Management System Formulated management measures for occupational injury and accident reporting and investigation procedures Health screening for employees Stipulated combined disaster handling and recovery plans
2022 Key Outcome	<ul style="list-style-type: none"> GHGs intensity (Scope 1+2) : 51% reduction compared to 2015 Scope 3 GHG emissions: 32% reduction compared to 2020 Renewable energy and certificate accounts for 19% of total electricity usage Executed 454 cases to reduce 600,110 tCO₂e 	<ul style="list-style-type: none"> Due to production expansions in recent years, our VOCs emissions have increased in 2022. We will strengthen our emission management to focus on source emissions and facility upgrades to reduce the environmental impact caused by the concentration of air pollution emissions. 	<ul style="list-style-type: none"> Non-hazardous waste recycling rate achieved 96% Hazardous waste intensity:55% reduction compared to 2015 In 2022, ASE Kaohsiung established a 'Green Plastic Center.' The initiative will also help us save approximately USD 185,000 in disposal costs, and reduce the use of plastic raw materials by about 870 tons. 	<ul style="list-style-type: none"> Water use intensity : 49% reduction compared with 2015 Promoted 10 water saving projects which saved 13.14 million tons per year The recycling rate of process water increased to 76% 	<ul style="list-style-type: none"> Water discharge intensity: 66% reduction compared with 2015 Distribution of chemicals for 15 plants 	<ul style="list-style-type: none"> 51,895 employees participated in health checkups, invested approximately US\$2.9 million Completed 500 drills for earthquakes, fire and chemical disasters Accumulated over 310,000 hours of occupational health and safety education and training, reaching 304,073 participants

As we continue to improve our competitiveness, we will also continue to strengthen our corporate sustainability management. We apply financial and non-financial measurements, as well as evaluate operating and non-operating activities to analyze the positive and negative effects of external impacts on the operations of our subsidiary companies. The analysis allows factory management to make better business decisions, and the valuation results provide the basis for the Corporate Sustainability Committee to plan our value creation path that formulates improvement actions and decisions that will reduce the impact of potential risks. In 2022, we continually expanded our sustainable value evaluation from our own operations to the value chain, that enables us to understand the environmental impact on the value chain from indirect greenhouse gas emissions. Our next step is to reflect the true value created by the value chain, and to that end, we will extend the scope of impact measurement upstream. We will leverage on our industry leadership to increase the influence on sustainability, and work together with upstream and downstream partners to bring about change and innovation for benefit of the industry and society.

Appendix 1 : Methodology and Data Collection

This report was prepared according to the Natural Capital Protocol, Social Capital Protocol, and the monetization framework for SROI. The TIMM framework proposed by PwC was also employed as an analytical integration tool based on the GRI and integrated reporting framework. Data used in calculations are divided into primary data and secondary data. Primary data is raw data from ASEH, while secondary data are projections based on the database, referenced from relevant publications or derived in this report.

- Economic**

Information on the distribution of financial resources was directly obtained from financial statements or the accounting system of ASEH.

	Payroll	Profit	Investment	Intangible Assets	Regulatory Compliance
Primary data	✓	✓	✓	✓	✓
Extrapolated from Primary data	✓	✓	✓	✓	✓

- Tax**

Information on tax was directly obtained from financial statements or the accounting system of ASEH.

	Profit taxes	Other taxes
Primary data	✓	✓
Extrapolated from Primary data	✓	✓

- **Environment**

We studied the 2016 Natural Capital Protocol by the Natural Capital Coalition to monetize the environmental impact generated from greenhouse gas and other air emissions, waste material, water resource and wastewater management.

1. Information collection:

The information collected during the compilation of this report included both primary and secondary data, and great effort was taken to ensure the reliability and validity of the collected data. However, due to geographical limitations or lack of reference data, it was impossible to obtain monetization information for some social impacts.

	Greenhouse gases	Other air emissions	Water use	Water pollution	Waste	Recycle water	Afforestation	Biodiversity
Primary data	✓	✓	✓	✓	✓	✓	✓	✓
Extrapolated from Primary data	✓	✓	✓	✓	✓	✓	✓	✓
Secondary data	✓	✓	✓	✓	✓	✓	✓	✓
Extrapolated from Secondary data	✓	✓	✓	✓	✓	✓	✓	✓

2. Adjustment on the basis of purchasing power in different countries/areas:

The coefficient of monetization used in this project have always been based on the value transfer methodology, and we have collated monetization data from research reports by academic experts, international organizations and NGOs. In order to determine the monetized values in areas where our facilities are located, the basic monetized value was adjusted according to the PPP GNI (purchasing power parity gross national income). As Taiwan was not included in the World Bank database, we derived the values from data obtained through the Taiwan Directorate General of Budget, Accounting and Statistics, and the IMF (International Monetary Fund).

3. Adjustment for inflation:

Apart from adjusting for regional differences using PPP and GNI⁹, we will adjust the data using the US dollar inflation rate¹⁰ to reflect the monetized values for 2022.

[9] GNI values for various countries were obtained from information published by the World Bank: <https://www.imf.org/en/Publications/WEO/weo-database/2021/April>

[10] USD inflation rate reference: <http://www.usinflationcalculator.com/>

- **Social**

Primary data (including stakeholder interviews and surveys¹¹) and secondary data (accredited documents and literature on social studies) obtained through stakeholder engagement were employed to assess the monetized value of the impact of ASEH's business activities on local residents. We also determined the social impact value on employees, suppliers, and the public using the value transfer methodology¹².

Our report employs mainly the input-output model, social return on investment (SROI)¹³ and value transfer methodology. The input-output model was used in conjunction with stakeholder engagement to obtain the monetized value of the social impacts of ASEH's business activities on stakeholders. The SROI and value transfer methodology were used in conjunction with the materiality principle to select higher value activities as well as referring to SROI reports certified by Social Value International (SVI) to verify if these programs' stakeholders, chain of events, and outcomes were consistent with those in the SROI reports and use this basis to estimate the resulting value.

	Suppliers Partnership	Employee engagement and development	Employees health and safety	Social cohesion	Education
Primary data	✓	✓	✓	✓	✓
Extrapolated from Primary data	✓	✓	✓	✓	✓
Secondary data	✓	✓	✓	✓	✓
Extrapolated from Secondary data	✓	✓	✓	✓	✓

[11] The analyzed information of the 2022 supplier education and training is based on the previous survey questionnaire. The SROI methodology related calculation parameters were recalculated based on the related questionnaires selected from the education and training of subsidiaries in 2022, and social impact was calculated based on average value per person.

[12] Social Capital Protocol, WBCSD, 2016, p.51.

[13] We converted the resulting values in accordance with the seven major principles found in the SROI methodology: Involvement of stakeholders, understand what changes, value the things that matter, only include what is material, do not over-claim, be transparent, and verify the result.

Appendix 2 : Reference for Value Transfer Methodology

Item	Reference Report
Public Development	The outcomes and value of SOUL' s advanced SROI training course
Community Care	The Cedar Foundation Community Inclusion Programmes SROI
Care for Vulnerable Families	Social Return on Investment (SROI) Report of Taiwan Dream Project on Dahu Community
Medical Sponsorship	Healthwise Hull SROI Forecast
Arts Sponsorships	Turner Contemporary: Art Inspiring Change Social Value Report
Sports Sponsorships	Bums off Seats SROI Evaluation Report
Environmental Education	《Cherish the Earth, Spread Love Far SROI Report》 2018 SROI Report
Vocational Training	The Cornwall Exchange: A Social Return on Investment (SROI) Report
Biodiversity	Restore the Earth Foundation Cypress Reforestation Social Return on Investment Report

Appendix 3 : References

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