

UN Sustainable Development Goals and Sustainable Values Assessment

2019 Total Impact Measurement and Management Report





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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; and expressed the results in monetary terms.

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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.

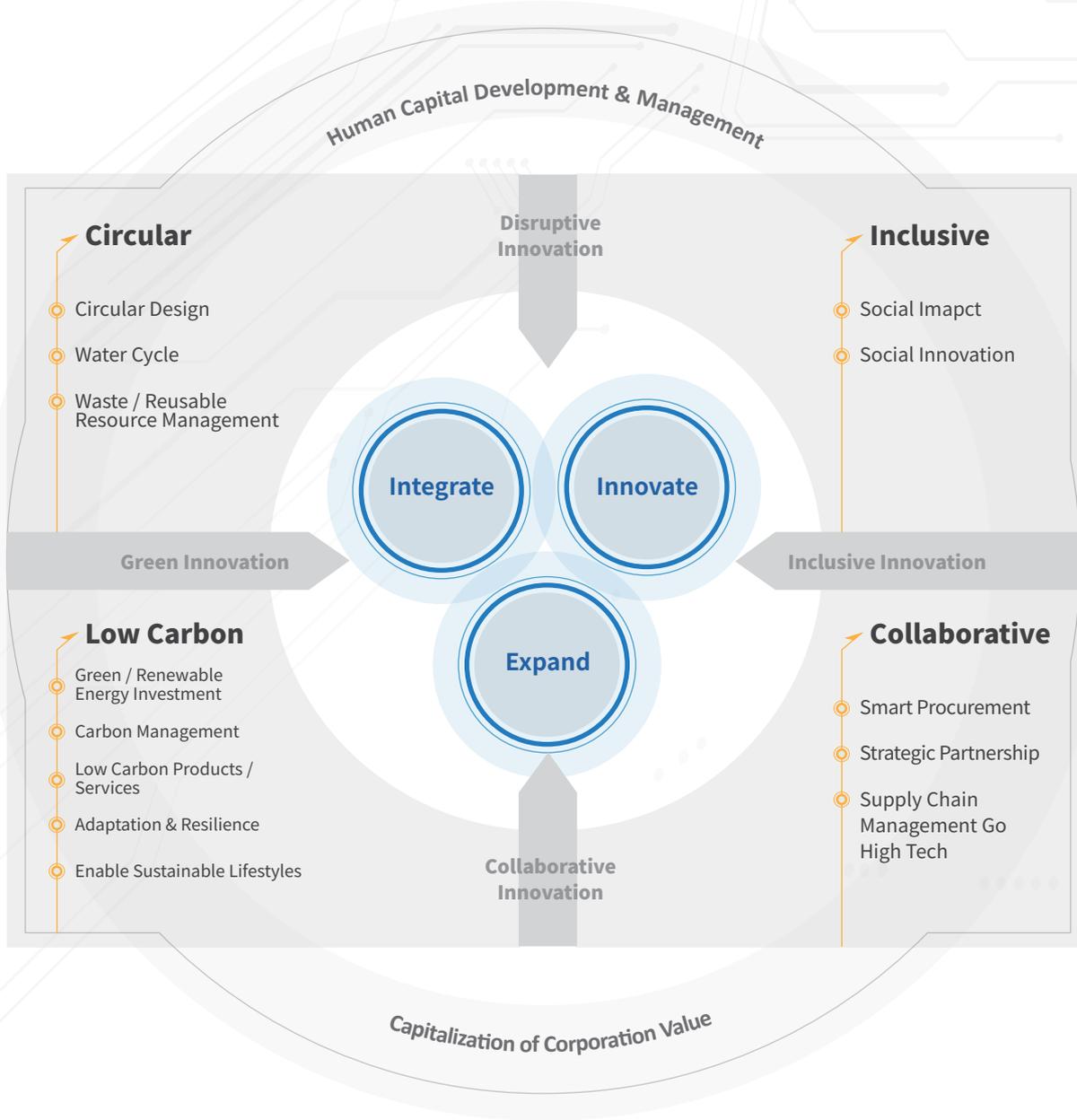
Part 1: ASEH's Total Impact Measurement and Management

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.

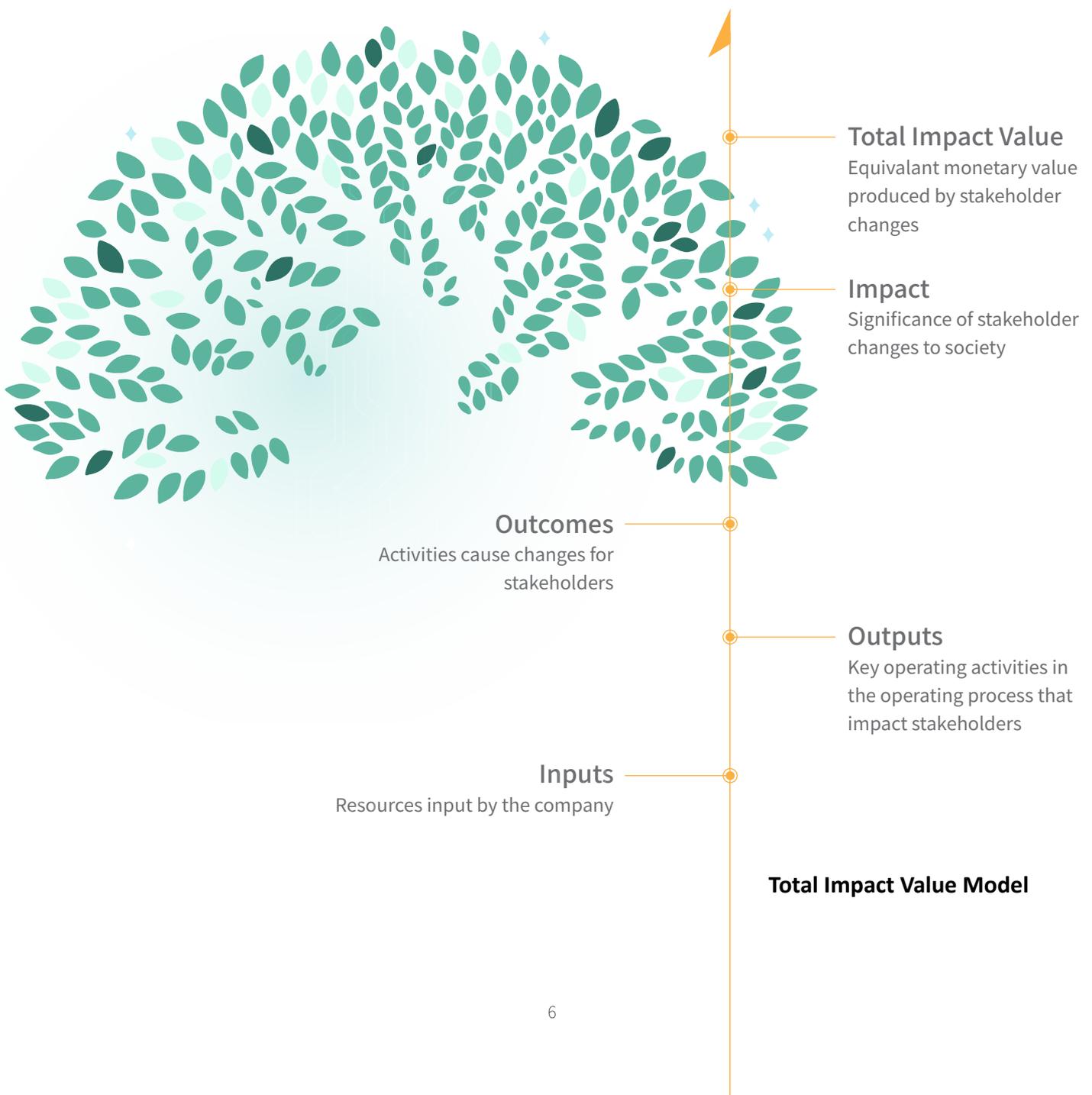
The Total Impact Measurement and Management (TIMM) framework developed by PwC was adopted to measure the sustainability impact of ASEH's operations to stakeholders in monetized values and also examine the effects of operations on stakeholders during decision making. The TIMM framework puts a value on 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. By employing a holistic view, we aim to combine corporate financial value and ESG value, and apply a uniform currency to express them in monetary values. We hope that our operations will have a positive effect on stakeholders, and strive to develop a sustainable management model that reduces our negative impact. We believe that this sustainable valuation report will assist corporate decision-making, performance assessment and stakeholder communication.



ASEH's Four Sustainability Strategy Pillars

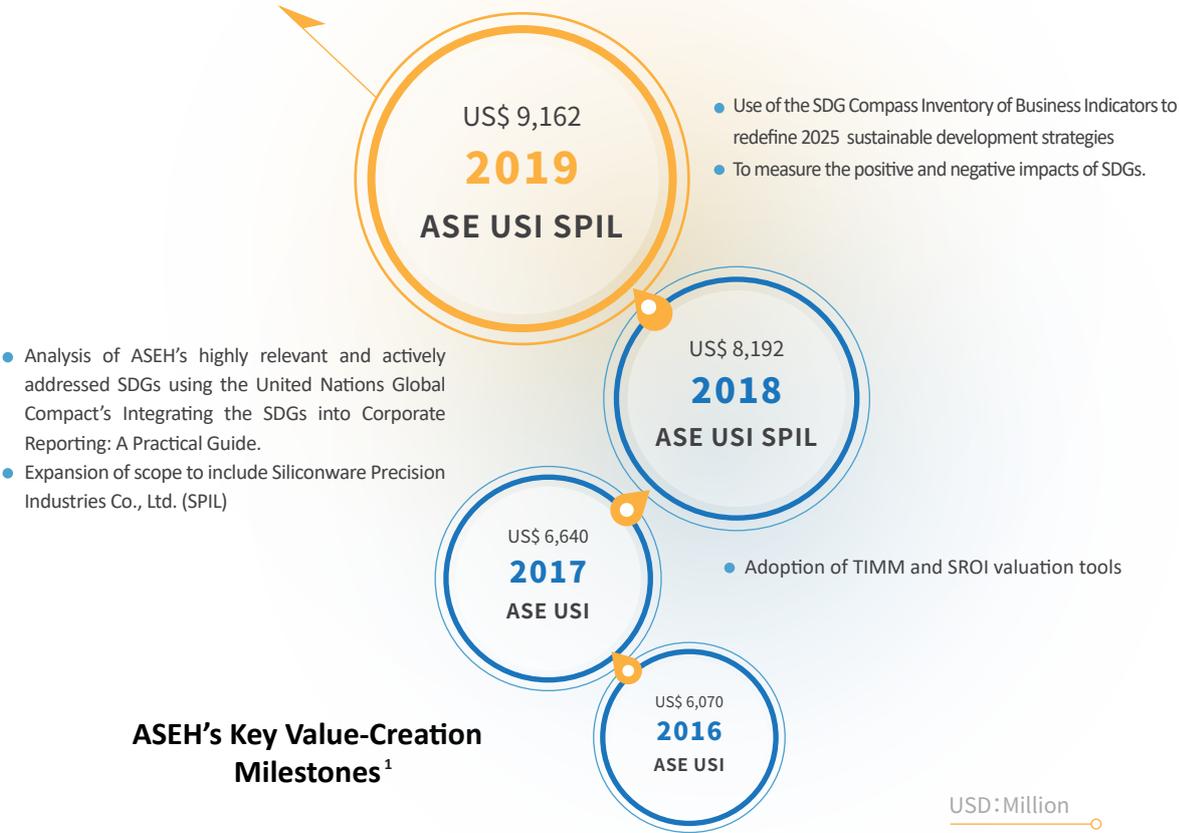
1.2 Definition of Impact Value

TIMM assesses the value of corporate operations from four dimensions - the economic impact, tax impact, social impact and environmental impact, and uses monetized value to quantify the impacts. The TIMM framework is based on the perspective of the stakeholders involved in corporate operations, 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.



1.3 ASEH 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 further reviewed the goals and results of our four sustainability strategies through the SDG Compass Business Indicators, and applied monetization assessment tools to measure the contribution impact of ASEH to the most critical SDGs and their sub-targets. We evaluated the SDGs that require active efforts in order to maximize the positive effect and mitigate the negative, and contribute to SDGs through our business management. In order to present ASEH's impact assessment results comprehensively, ASEH merged its Sustainable Development Goals Report into this report, in hopes of disclosing integrated information to stakeholders.



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

Part2 : The Scope of Impact Valuation



2.1 Period and Scope

The report discloses ASEH's 2019 (January 1, 2019, to December 31, 2019) 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")², and Universal Scientific Industrial Co., Ltd. and its subsidiary (hereinafter referred to as "USI"). ASEH's scope of operation includes 19 semiconductor assembly and test manufacturing (ATM) plants and 6 electronic manufacturing service (EMS) plants in Taiwan, China, Korea, Japan, Singapore, Malaysia, the US, Poland and Mexico.



2. ASEH was established on April 30, 2018, through the exchange of shares by ASE and SPIL. In 2018, SPIL's economic, tax and environmental impact only covers data from May to December 2018. Social impacts including supplier partnerships, and employee engagement and development were not taken into account in 2018.

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 ³	Explanation of the production of impact value
Economic	Shareholders, Suppliers, Customers, and Employees	Profits, payroll, investment and intangible assets	Economic value mainly consists of the creation of financial value for stakeholders and maintenance of their livelihoods through the four impact drivers.
Tax	Government and Local Residents	Profit taxes and 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, and General Public	Greenhouse gases, other emissions, waste, water use and water pollution, recycle water	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 five related environmental impact factors.
Social	Employees, Suppliers, and Local Community	Partnerships, employee engagement and development, employee health and safety, education and social cohesion	The different impacts that our operations have on employees, suppliers, and local communities, demonstrate ASE's value to the society.

3. 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 inventory 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. In 2019, 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. In 2018, 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 SDGs⁴: 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). 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.



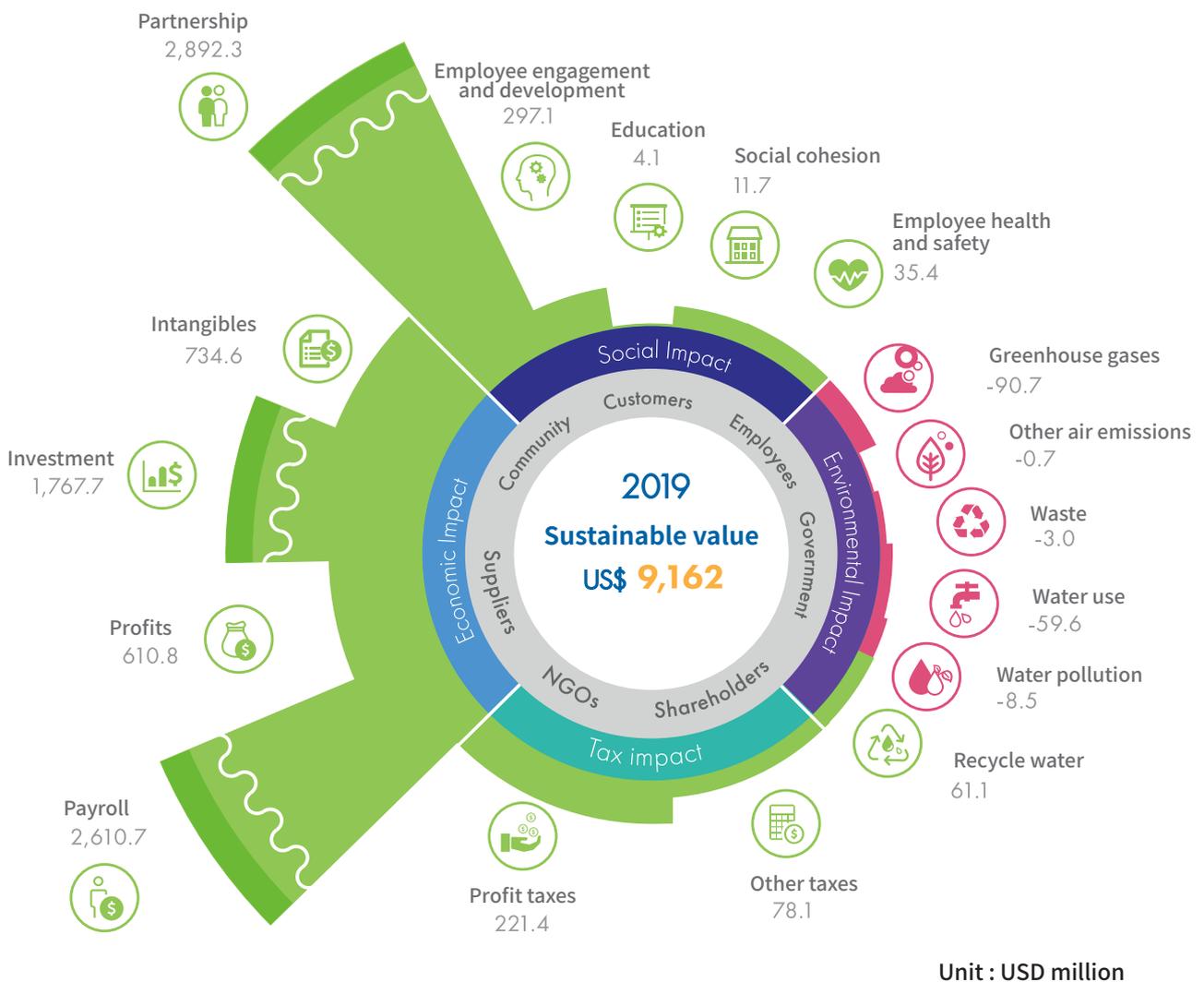
ASEH Value Creation Model

4. For more details on the assessment, please refer to our 2018 Corporate Sustainability Report English version "2.4 Practice of SDGs".

Part3 : ASEH's Contributed Value

3.1 ASEH's TIMM Results

ASEH adopted the TIMM framework to quantify the sustainable value of the company's impacts in four dimensions: economic, tax, environment and social. In 2019, ASEH generated US\$ 9,162 million worth of sustainable value for stakeholders, which is 12% higher than in 2018. The overall value created has increased by US\$ 970million.



2019 ASEH TIMM Result

Economic and tax dimensions

Growth in ASEH’s business activities has resulted in substantial profit and economic value for shareholders, suppliers, employees and the government while maintaining the high standard of its R&D and innovation capabilities. In 2019, the total value generated increased by 8% attributed mainly to the expanded talent recruitment, issuance of employee stock option plans, increases in manufacturing capacity, investment in equipment and intangible assets, and investments in multiple research and development projects to improve the company’s competitiveness.

Environmental dimension

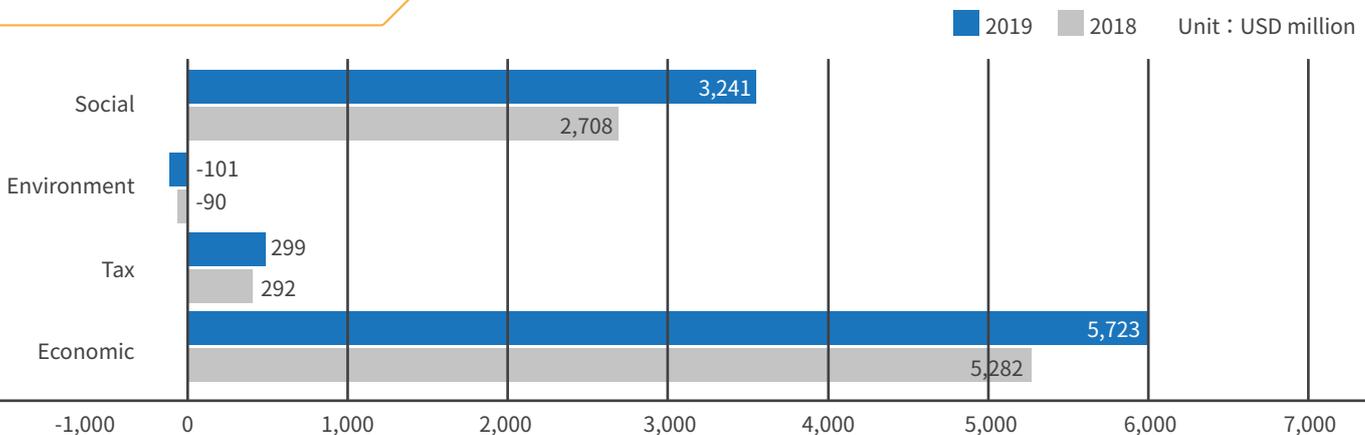
Environmental impacts primarily stem from the consumption of power, water, and chemicals and raw materials in the manufacturing and service processes. We have increased the percentage of renewable energy from 12% to 14% and water recycling has increased by 24%. We also fulfilled our commitment to use the proceeds raised through our green bonds to construct green facilities and establish water recycling plants, water treatment plants, and a real-time waste water monitoring system that would mitigate environmental impacts and improve human health.

Social dimension

The primary outcomes are the establishment of supplier partnerships and, employee development and support. The value of social impacts in 2019 increased by 20% compared to 2018. The difference in value stemmed from an increase in local procurement compared to the previous year, which increased the assessed value of local employment and economic prosperity, and the positive developments in supplier and employee competitiveness created a heightened level of giving back to the community.

Explanations and management strategies for the various areas can be found in relevant sections of ASEH’s 2019 CSR report, along with key dimensions of our CSR performance in conjunction with assessment and management.

2018-2019 ASEH Sustainable Values



2018 - 2019 ASEH Sustainable Values

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, and intangible assets.

Profit

ASEH is a public company in Taiwan, Shanghai and the United States. Shareholders include financial institutions, corporations, individuals and foreign investors. We are committed to being profitable and distributing our earnings to support our fiduciary duties. 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 SROI⁵ 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.

5. 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.



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, retirement pension, 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		Yearly intangible asset amortization expenses and research and development expenses

3.1.2 Tax Impact

ASEH's global business operations are located in Taiwan, Mainland China, Hong Kong, South Korea, Japan, Singapore, Malaysia, Mexico, Poland and the US. 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 CSR 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.

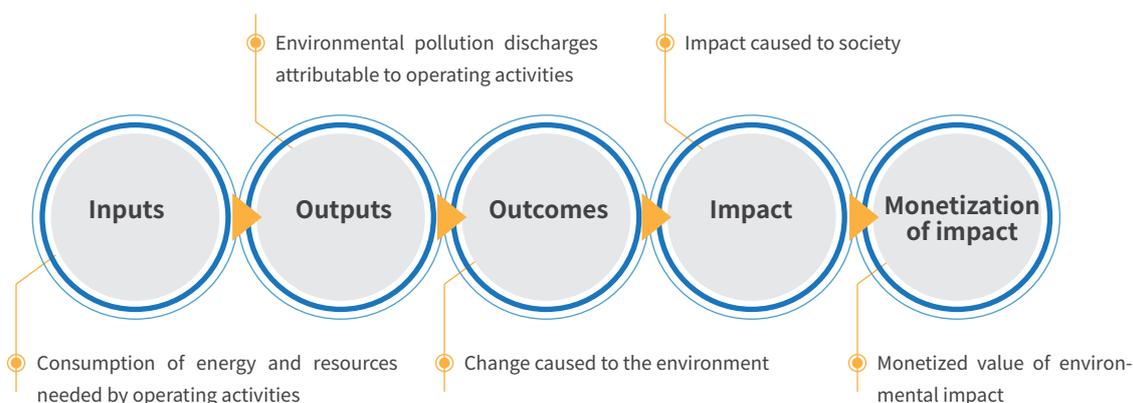


Tax Impact Path Diagram

Impact Driver	Activity/Output	Outcome/Impact	Monetary Valuation
Taxes	Tax payment	Improve people's wellbeing	Income tax paid, property and real estate related taxes, and environmental/personnel incurred tax/charges and fees

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 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 2019, ASEH's overall environmental impact of US\$101 million is mainly attributed to resource consumption and environmental emissions from its business activities.



Monetized Environmental Impact Assessment Procedures

Greenhouse Gas

In 2019, ASEH's total GHG emissions (scope 1 + 2) was 1,794,103 tCO₂e, of which carbon credits amounting to 386,555 tons purchased in Taiwan, China, and Mexico were already deducted from the 2019 emissions. 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 (Ahlroth, 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 2019 rates, the social cost of one ton of CO₂e is determined at US\$50.55.

Other Air Emissions

We collected data on total SO_x, NO_x, VOCs and particulate matter emissions of ASEH in 2019, and 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 11,850 tons of hazardous waste and 3,098 tons of non-hazardous waste in 2019. 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 24,177 megaliters in 2019. 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 2019 was 1.49 (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. (2009) (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 ASEH'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 0.066 (USD/ton) in 2019.

Water Pollution

Wastewater discharge of ASEH factories was 18,778 megaliters in 2019. 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 (eg. 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. (2005) (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 (eg. 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 28,158 megaliters in 2019. 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. (2005) (Huijbregts, Rombouts LJA, Ragas AMJ, Van de Meent D., 2005) in calculations.



Environmental Impact Path Diagram

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)	Human health, forestry, materials ⁶ , and water acidification	Reference: Accredited publication on the social costs incurred by air pollution
	Emissions of pollutant (NOx)	Human health, crops, and forestry	
	Emissions of pollutant (VOCs)	Human health, crops, and forestry	
	Emissions of pollutant (PM10)	Human health	
Waste	Hazardous and non-hazardous waste (recycling and re-used 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 ⁷	Human health	Reference: Accredited publication on the social costs incurred by water pollution
	Release of nutrient (Phosphorus)	Recreation, property values, and fish stock	
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	

6. Impact on building materials.

7. Regulated contaminant 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 inevitably 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 health and safety, and education and social cohesion. In 2019, ASEH's overall social impact totaled US\$3,241 million, with US\$3,227⁸ million directly resulting from the company's operations.

Supplier Partnerships

As a key player in a high-tech industry, ASEH works with over 2,000 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 2019, including supplier RBA audits, GHG inventory guidance projects, supplier training and local procurement. 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 energy cost-savings and benefit values from suppliers, the mitigation of property losses due to improve audit shortcomings, revenue and contributions from local procurement.

Based on the cost approach and contingent valuation methods, the value created through partnerships with suppliers was US\$2,892 million, and the main outcomes include enhancing suppliers' knowledge on sustainability and trends through collaborations, and lowering the risk of occupational safety hazards. Among our suppliers, 91% enhanced their competitiveness and expanded their business. Our local procurement provided economic benefits to the regions where our business locations are located, further driving local employment and creating economic prosperity.

○

8. The value of social impacts resulting directly from the company's operations is calculated by monetizing social impacts. The calculations therefore excluded public welfare activities and non-industry-academia educational projects.

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.

ASEH determines the willingness of employees to say, share, and strive at work based on the model of employee engagement⁹ published by Aon Hewitt in January 2015. 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, and professional management training course fees as the monetized value of the financial proxy variable.

We calculated the effect of ASEH's personnel management and employee training on employees at US\$297 million. Outcomes include increasing employees' sense of achievement and sense of belonging, and enhancing their competitiveness and management capabilities. Comparatively, competitiveness in the workplace was slightly lower than other outcomes at 83%, but had the highest perceived value to employees at roughly 3 times higher than other outcomes, which proved that improving communication abilities and work skills were the most important to employees.

Employee Health and Safety

Employee 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 a safe and healthy work environment.

We used the ratio of employee injuries and number of incidents, health examinations and health insurance as influencing factors of employee engagement. The number of ASEH employees that received health examinations surpassed 82,400 in 2019. A total of 156 occupational injuries occurred, including 138 physical injuries, 4 chemical injuries and 14 ergonomic 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 positive effects at US\$36 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\$0.5 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' health and safety indicator.

9.ASEH adopts the Aon Hewitt's human resource management system, and applies the theoretical foundation and model for quantification and data collection. For the Model of Employee Engagement, January 2015, Aon Hewitt, please visit : <https://www.aonhewitt.co.nz/getattachment/77046028-9992-4d77-868a-32fbf622fec6/file.aspx?disposition=inline>

○ 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 reduce the impact on the natural environment and society, while allowing the public to better understand ASEH's approach to sustainability.

ASEH invested approximately US\$3 million in 227 social cohesion programs in 2019, including 7 community development programs; 101 community care programs; 56 care for disadvantaged families programs; 1 healthcare sponsorship; 39 arts and culture sponsorships; 21 sports sponsorships; 2 reforestation programs. 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\$12 million in social value, in which arts and culture sponsorships accounted for the highest percentage at 46%, followed by reforestation and care for disadvantaged families both at 15%. Overall, SROI was 4.34 with the top three outcomes as follows: increase in the public's artistic literacy, improvement of local water quality through ecological protection, and raising the efficiency of resource utilization by local communities, leading to improvements in the well-being of residents.

○ 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 2019, ASEH worked together with many academic institutions and invested approximately US\$2 million in a total of 126 education programs, including industry-academia collaborative R&D, scholarships, and recruitment assistance. These programs have allowed ASEH to strengthen its technological advantages and gain access to quality employment candidates, as well as garner public recognition of our green business model.

We used the value transfer methodology to determine that the SROI of education projects was 2.01, and that US\$4 million in social value was created, of which business-related industry-academia collaboration generated approximately US\$2 million. Main outcomes include better operational efficiency and industry competitiveness. Approximately US\$2 million was generated by environmental education, and main outcomes include better recognition and attitude towards environmental conservation, as well as increased civic consciousness to protect the environment.

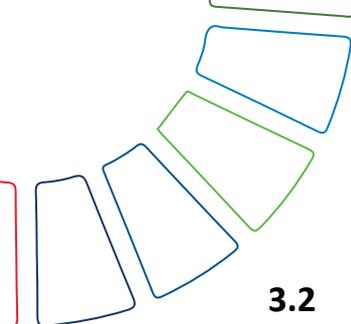


Social Impact Path Diagram

Impact Driver	Activity/Output	Outcome/Impact	Monetary Valuation
Supplier Partnerships	Supplier RBA 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 GHG inventory guidance project	Lower operating costs and improve reputation	Perceived value according to supplier survey questionnaires (SVI certification) ¹⁰
Employee Engagement and Development	Employee Career Development Work Environment Employee caring	Increase employees' sense of achievement and sense of belonging Enhance their competitiveness and management capabilities	Mental wellbeing course fees, performance bonuses, company benefits and subsidies training and development expenses
Employee health and safety	Number of workplace injuries	Employee 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 and safety	Community development and care	Enhance social welfare	Converted using the value transfer methodology ¹¹
	Disadvantaged families care	Improve the well-being of disadvantaged families	
	Afforestation activities	Ecology restoration and conservation	
	Healthcare sponsorship	Improve local healthcare standards	
	Arts and sports sponsorship	Cultural influence, and physical and mental wellbeing	
Education	Occupational education and training	Improve the quality of semiconductor industry talent	Converted using the value transfer methodology ¹¹
	Industry-academia projects	Enhance R&D capability and competitiveness of the semiconductor and technology industry	
	Environmental education	Civic consciousness towards environmental protection	

10. ASEH uses the SROI methodology to assess the social impact of the program, and the report published in 2020 was certified by Social Value International.

11. 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

In 2019, ASEH used common SDG indicators in the SDG Compass Business Indicators database to review 6 Tier 1 SDGs as SDG target responses. Results from the analysis showed that ASEH has made significant positive contributions to Decent Work and Economic Growth (SDG 8) and Quality Education (SDG 4). These were the results of profits from business activities, investments and intangible assets that contributed to the GDP and local economy, and helped the nation achieve higher economic productivity through the positive impacts generated from decent work and economic growth. On social inclusion, ASEH has invested resources in programs for senior citizens, after-school programs for the underprivileged and semiconductor courses. These programs have positive impacts on achieving quality education and fulfilling the company's support for higher education. We also support free education programs that focus on fairness, inclusion and contribute to honing skills needed for employment and entrepreneurship. As our business grows, rising resource demands from our operations remain a key area of concern. The social impact derived from the environment, has a negative impact on Affordable and Clean Energy (SDG 7), Decent Work and Economic Growth (SDG 8), and Clean Water and Sanitation (SDG 6). In order to achieve the SDGs, we reviewed and redefined sustainability goals for 2025, and will further implement two sustainability strategies; Low Carbon and Circular. We will set various environment-related business goals to manage emissions and resource use and utilize pollution prevention technologies to mitigate the impact of wastewater discharge. We will also implement process water recycling management in an active effort to reduce the external social cost of the SDGs.





ASEH' s Sustainable Value Creation Framework

A decorative graphic in the top-left corner features a grey microchip with a circular fan-like pattern on its top surface and numerous gold-colored pins extending from its sides. The background is a light blue-grey color with a complex network of white circuit traces and lines, some of which are highlighted with small blue and white dots.

Part4: 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\$9,162 million in sustainable value for stakeholders in 2019. In terms of the economic impacts, employee salaries and benefits had the highest monetary value, which indicates the high level of influence ASEH has on the local labor market where its businesses are located. On the tax impact, we pay our taxes conscientiously and avoid any transaction designed solely for tax purposes. Our environmental impact is mainly caused by resource use and environmental emissions from our business activities. We monitor the efficiency of resource use by our factories and actively invest in environmental protection to generate a positive effect and reduce external costs. We continue to invest in green energy to become carbon neutral, increase the utilization of water resources to reduce our environmental footprint, and expand the scope of our environmental impact management, in order to achieve the sustainability strategies of low carbon and circular. The sustainable value of our social impact is mainly generated by our partnership with suppliers and employee engagement and development, indicating the creation of extraordinary value for suppliers and employees through our operations.

In 2020, we established new goals for 2025 based on the four sustainability strategies linked to Tier 1 SDGs and incorporated the SDGs into long-term goals of our corporate sustainability management. ASEH further analyzed the positive and negative impacts from the operations of its subsidiaries based on financial and non-financial measurements, as well as the assessment of business and non-business activities. The analysis and assessment allow each facility to make better business decisions. The valuation is used as the basis for the Corporate Sustainability Committee to plan the company's value creation path that formulates improvement actions and decisions that will reduce the impact of potential risks. Our next step is to truly reflect on the value created by our value chain, and further expand the monetization of impact to the upstream supply chain. We will leverage on our industry leadership to enhance sustainable influence within the industry, and work together with upstream and downstream partners to bring change and innovation to 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
Primary data	V	V	V	V
Extrapolated from Primary data	V	V	V	V

Tax

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

	Profit taxes	Other taxes
Primary data	V	V
Extrapolated from Primary data	V	V

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
Primary data	V	V	V	V	V	V
Extrapolated from Primary data	V	V	V	V	V	V
Secondary data	V	V	V	V	V	V
Extrapolated from Secondary data	V	V	V	V	V	V

(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 GNI¹² (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 GNI, if the monetization value is derived from data prior to 2017, we will adjust the data using the US dollar inflation rate¹³ to reflect the monetized values for 2019.

12. GNI values for various countries were obtained from information published by the World Bank:
<https://data.worldbank.org/indicator/NY.GNP.PCAP.PP.CD>

13. USD inflation rate reference: <http://www.usinflationcalculator.com/>

Social

Primary data (including stakeholder interviews and surveys) 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 methodology¹⁴

Our report employs mainly the input-output model, social return on investment (SROI)¹⁵ 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	V	V	V	V	V
Extrapolated from Primary data	V	V	V	V	V
Secondary data	V	V	V	V	V
Extrapolated from Secondary data	V	V	V	V	V

14. Social Capital Protocol, WBCSD, 2016, p51

15. 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.

Appendix2 : Reference for Value Transfer Methodology

Item	Reference Report
Community Development	Social Value of Local Area Coordination in Thurrock
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
Reforestation	Restore the Earth Foundation Cypress Reforestation Social Return on Investment Report
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 Value of Hamelin Trust's Roots and Shoots: An SROI Analysis

Appendix 3 : References

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