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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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ASEH’s Total Impact Measurement and Management

1.1 Why We Measure Our Impact Value
1.2 Definition of Impact Value
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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

- **Circular**:
  - Circular Design
  - Energy Resources Recycling
  - Waste as a Valuable Resource
  - Circular Economy in Value Chains

- **Low Carbon**:
  - Decarbonized Products and Services
  - Low-carbon Manufacturing
  - Adaptation and Resilience
  - Green/Renewable Energy Investment

- **Inclusive**:
  - Environmental Conservation
  - Industry-academia Collaborations
  - Community Engagement
  - Public Advocacy

- **Collaborative**:
  - Smart Procurement
  - Strategic Partnership
  - Supply Chain Management Go High Tech
  - Environmental Education

- **Expand - Integrate - Innovate**

**ASEH’s Total Impact Measurement and Management**
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

Inputs
- Resources input by the company

Outputs
- Key operating activities in the operating process that impact stakeholders

Outcomes
- Activities cause changes for stakeholders

Impact
- Significance of stakeholder changes to society

Total impact value
- Equivalent monetary value produced by stakeholder changes
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 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 effects and mitigate the negative, and contribute to SDGs through our business management. We have also integrated the global Sustainable Development Goals into this report, in order to present the assessment results of ASEH’s impact in a more comprehensive manner. In 2021, we expanded the sustainable value assessment framework from our operations to the value chain, in order to understand the external impacts of value chain activities on the environment and society. Moreover, through this report, ASEH impact assessment results will be disclosed comprehensively to ASEH stakeholders.

ASEH’s Key Value-Creation Milestones\(^1\)

- **2016**: US$6,070
  - ASE USI
- **2017**: US$6,640
  - ASE USI
- **2018**: US$8,192
  - ASE USI SPIL
- **2019**: US$9,162
  - ASE USI SPIL
- **2020**: US$11,932
  - ASE USI SPIL
- **2021**: US$15,118
  - ASE USI SPIL

\(^1\) For more details on ASEH’s sustainable values, please refer to ASEH’s corporate sustainability report.
The Scope of Impact Valuation

2.1 Period and Scope
2.2 Four Dimensions of Impacts
2.3 Responding to UN Sustainable Development Goals
The report discloses ASEH’s 2021 (January 1, 2021, to December 31, 2021) 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 20 semiconductor assembly and test manufacturing (ATM) plants and 6 electronic manufacturing service (EMS) plants in Taiwan, China, Hong Kong, 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:

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Economic</th>
<th>Tax</th>
<th>Environment</th>
<th>Social</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stakeholders</td>
<td>Shareholders, Suppliers, Customers, Employees</td>
<td>Government, Local residents</td>
<td>Employees, General public</td>
<td>Employees, Suppliers, Local community</td>
</tr>
<tr>
<td>Impact drivers</td>
<td>Profits, Payroll, Investment, Intangible assets</td>
<td>Profit taxes, Other taxes</td>
<td>Greenhouse gases, Other emissions, Waste, Water use, Water pollution, recycle water</td>
<td>Partnerships, Employee engagement and development, Employee health and safety, Education, Social cohesion</td>
</tr>
<tr>
<td>Explanation of the production of impact value</td>
<td>Economic value mainly consists of the creation of financial value for stakeholders and maintenance of their livelihoods through the four impact drivers.</td>
<td>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.</td>
<td>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.</td>
<td>The different impacts that our operations have on employees, suppliers, and local communities, demonstrate ASE's value to the society.</td>
</tr>
</tbody>
</table>

[1] 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). 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

[1] For more details on the assessment, please refer to our 2021 ESG Report English version " 2.3 UN Sustainable Development Goals and Sustainable Values Assessment."
ASEH’s Contributed Value

3.1 ASEH’s TIMM Results
3.1.1 Economic Impact
3.1.2 Tax Impact
3.1.3 Environmental Impact
3.1.4 Social Impact
3.2 ASEH’s SDGs and Impact
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 2021, ASEH generated US$15,118 million worth of sustainable value for stakeholders, which is 27% higher than 2020. The sustainable value of positive impacts increased by US$3,232 million.

2021 ASEH TIMM Result
Economic and tax dimensions

2021 was a watershed year in the semiconductor industry, creating invaluable applications that power the digital transformation. While the pandemic has caused much disruptions on one spectrum, it has also created new demand for 5G, IoT, electric vehicle and other applications that has led to a strong growth in global IC sales. The successive recovery of the world’s major economies boosted the export performance of Taiwan, and contributed to significant revenue growth and profitability at ASEH’s operations. The growth in revenues have brought about an increase in employee remuneration, and also the number of employees converting their stock options. In the same year, the strategic disposal of a subsidiary business operation resulted in an increase in non-operating revenue and tax payments. In order to capture future business opportunities and increase the value of our products and services, we continue to purchase capital equipment, expand our plants to build capacity, invest in the R&D of new technologies and acquire more patents. We will remain focused on strengthening our core competitiveness and optimizing the synergy of all entities within ASEH. For the year 2021, we recorded an increase in our value creation by 31%.

Environmental dimension

Water consumption during the production process and greenhouse gas emission from the use of electricity continue to be our two main source of environmental impacts. As such, we have increased our renewable energy usage, reaching 24% of the total electricity consumption in 2021. In parallel, 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. In 2021, the positive effects created from recycled water usage grew by 68%, while the overall environmental impact of our operations decreased by 16% compared to 2020. In the future, we will actively invest in environmental protection and use the proceeds from 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 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 2021 increased by 20% compared to 2020. The difference in value stemmed from an increase in local procurement by 21% in 2021, which increased the assessed value of local employment and economic prosperity. The total value increased in community and education rose by 51% and 36% respectively in 2021 compared to the year prior. We have been investing and participating in social welfare through various channels to improve the well-being of the community and its people, and maintain environmental resources. Explanations and management strategies for the various areas can be found in relevant sections of ASEH’s 2021 ESG report, along with key dimensions of our ESG performance in conjunction with assessment and management.

2020~2021 ASEH Sustainable Values

<table>
<thead>
<tr>
<th></th>
<th>2021</th>
<th>2020</th>
<th>Unit: USD million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-74</td>
<td>-88</td>
<td></td>
</tr>
<tr>
<td>Environmental</td>
<td>392</td>
<td>278</td>
<td></td>
</tr>
<tr>
<td>Tax</td>
<td>392</td>
<td>278</td>
<td></td>
</tr>
<tr>
<td>Economic</td>
<td>6,804</td>
<td>8,884</td>
<td></td>
</tr>
</tbody>
</table>
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. 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 SROI\(^1\) 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.

**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.

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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

<table>
<thead>
<tr>
<th>Impact Driver</th>
<th>Activity / Output</th>
<th>Outcome / Impact</th>
<th>Monetary Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tax payment</td>
<td>Improve people’s wellbeing</td>
<td>Income tax paid, property and real estate related taxes, and environmental/personnel incurred tax/charges and fees</td>
<td></td>
</tr>
</tbody>
</table>
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 2021, ASEH’s overall environmental impact of US$-74 million is mainly attributed to resource consumption and environmental emissions from its business activities. We will apply the sustainable value assessment method used internally to the value chain. In 2021, the monetized value of the environmental impact of our greenhouse gas emissions amounted to US$-890 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

- **Inputs**: Consumption of energy and resources needed by operating activities
- **Outputs**: Environmental pollution discharges attributable to operating activities
- **Outcomes**: Change caused to the environment
- **Impact**: Impact caused to society
- **Monetization of impact**: Monetized value of environmental impact
In 2021, ASEH’s total GHG emissions (scope 1+2) was 1,702,640 tCO\(_2\)e, of which renewable energy certificate amounting to 706,187 tons purchased in Taiwan, China, and Mexico were already deducted from the 2021 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 16,231,394 tons. We cited the quantified effect of the social cost of CO\(_2\)e 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 2021 rates, the social cost of one ton of CO\(_2\)e is determined at US$54.89.

### 2020-2021 Greenhouse Gas Value Chain Outcomes

<table>
<thead>
<tr>
<th></th>
<th>2021</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream</td>
<td>1,092</td>
<td>852</td>
</tr>
<tr>
<td>ASEH’s Operation</td>
<td>93</td>
<td>92</td>
</tr>
<tr>
<td>Downstream</td>
<td>38</td>
<td>18</td>
</tr>
</tbody>
</table>

**Greenhouse Gas Management Impact Pathway**

- **Input**
  - US$ 614,707.4

- **Measurement**
  - Greenhouse Gas Management Project

- **Output**
  - Renewable energy consumption accounts for 24% of total electricity consumption
  - 316 carbon reduction projects that resulted in a carbon reduction of 781,124 tCO\(_2\)e
  - GHG emission intensity reduced by 50% compared to the base year 2015
  - Absolute GHGs reduction (Scope 1 and 2) reduced by 13% compared to the base year 2016

- **Environmental Benefits**
  - Reduce the social cost of carbon emissions
  - Reduce the risk of using unclean energy
  - Reduce negative impacts on climate action

In addition to using energy management systems to increase energy use efficiency, we also encourage and motivate facilities to strive towards efficiency improvements through technology sharing and competitions. ISE Labs in the United States have installed solar photovoltaic and energy storage systems to generate their own electricity. Any excess electricity is stored in the energy storage system for use during peak hours and as power backups that last up to two hours.
In 2021, ASEH’s total SOx, NOx, VOCs and particulate matter emissions was 330 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 10,304 tons of hazardous waste and 2,762 tons of non-hazardous waste in 2021. 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 25,872 megaliters in 2021. 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 2021 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. (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 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 0.000229 (USD/ton) in 2021.

**Other Air Emissions**

In 2021, ASEH’s wastewater discharge was 19,569 megaliters. 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. (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 ASE’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 37,817 megaliters in 2021. 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.

Water Recycling and Reuse Impact Pathway

- ASE Kaohsiung regularly conducts analysis of the wastewater generated at the facility and assesses the water usage for various purposes to determine the optimum recycling and reuse rate.
- Wastewater from equipment cleaning was determined to be suitable for secondary reuse in cooling towers. The same evaluation was conducted on the wastewater from cooling towers and resulted in the subsequent reuse of the water in scrubbing towers. The two-stage water reuse resulted in a reduction in water consumption of 215,488 tons per year, and a savings of almost 61% of municipal water used in cooling towers.

<table>
<thead>
<tr>
<th>Input</th>
<th>Measurement</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>US$ 44,070.0</td>
<td>Water Recycling Project</td>
<td>14 water conservation projects that enable a recycling rate of 72%</td>
</tr>
</tbody>
</table>

Environmental Benefits

- 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
## Environmental Impact Pathway

<table>
<thead>
<tr>
<th>Impact Driver</th>
<th>Activity / Output</th>
<th>Outcome / Impact</th>
<th>Monetary Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Greenhouse gas</strong></td>
<td>GHG Emission (Scope 1 and 2)</td>
<td>Human health, building deterioration, economic losses, agriculture and timber, desertification, and other ecosystem services</td>
<td>Reference: Accredited publication on the social costs incurred by greenhouse gases emissions</td>
</tr>
<tr>
<td><strong>Other air emissions</strong></td>
<td>Emissions of pollutant (SOx)</td>
<td>Human health, forestry, materials(^1), and water acidification</td>
<td>Reference: Accredited publication on the social costs incurred by air pollution</td>
</tr>
<tr>
<td></td>
<td>Emissions of pollutant (NOx)</td>
<td>Human health, crops, and forestry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emissions of pollutant (VOCs)</td>
<td>Human health, crops, and forestry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emissions of pollutant (PM10)</td>
<td>Human health</td>
<td></td>
</tr>
<tr>
<td><strong>Waste</strong></td>
<td>Hazardous and non-hazardous waste (recycling and re-used are excluded)</td>
<td>Local and global pollution, audio and visual nuisances</td>
<td>Reference: Accredited publication on the social costs incurred by waste</td>
</tr>
<tr>
<td><strong>Water use</strong></td>
<td>Water consumption</td>
<td>Direct non-consumptive uses, indirect uses (ecosystem function), malnutrition, and water borne disease</td>
<td>Reference: Accredited publication on the social costs incurred by water use</td>
</tr>
<tr>
<td><strong>Water pollution</strong></td>
<td>Release of regulated contaminants(^2)</td>
<td>Human health</td>
<td>Reference: Accredited publication on the social costs incurred by water pollution</td>
</tr>
<tr>
<td></td>
<td>Release of nutrient (Phosphorus)</td>
<td>Recreation, property values, and fish stock</td>
<td></td>
</tr>
<tr>
<td><strong>Recycled water</strong></td>
<td>Reduce water consumption</td>
<td>Mitigate crowding out of direct non-consumptive water use, ecosystem service, malnutrition and waterborne disease</td>
<td>Reference: Accredited publication on the social cost generated by water consumption and wastewater discharge</td>
</tr>
<tr>
<td></td>
<td>Reduce release of regulated contaminants</td>
<td>Reduce harm to human health</td>
<td></td>
</tr>
</tbody>
</table>

---

\(^1\) Impact on building materials.

\(^2\) 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 2021, ASEH’s overall social impact totaled US$5,915 million, with US$5,887 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 2021, 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$5,520 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. Based on the results of the 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$315 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.

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 occupational injuries of employees and suppliers, health examinations and health insurance as influencing factors of employee engagement. The number of ASEH employees that received health examinations surpassed 5,216 in 2021. A total of 126 occupational injuries and 3 occupational disease occurred, among which, 3 were supplier 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$47 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’ and contractors’ health and safety indicator.

[1] 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, and optimize existing management measures. Among our suppliers, 90% enhanced their competitiveness and expanded their business.
**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$5 million in 140 social cohesion programs in 2021, including 26 public development programs; 58 community care programs; 32 care for disadvantaged families programs; 5 healthcare sponsorship; 14 arts and culture sponsorships; 2 sports sponsorships; 3 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$20 million in social value. Among which, care for disadvantaged families accounted for the highest percentage at 54%, followed by arts and culture sponsorships at 20% and community care at 12%. Overall, SROI was 3.91 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

<table>
<thead>
<tr>
<th>Input: thousand US$</th>
<th>Activity</th>
<th>Output</th>
<th>Stakeholders</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US$ 238.8</strong></td>
<td><strong>100 Dollar Family Care Club</strong></td>
<td>Benefit 7,141 people</td>
<td>Volunteer</td>
<td>Increase self-esteem</td>
</tr>
<tr>
<td></td>
<td>Upon witnessing the tragic losses endured by families in the aftermath of the 1999 Jiji earthquake, SPI employees established the “100 Dollar Family Care Club”. Monthly donations of at least NT$100 from individuals were pooled together to create a charity fund. The fund is used to support the living expenses of disadvantaged households.</td>
<td></td>
<td>Disadvantaged children</td>
<td>Improve learning effectiveness</td>
</tr>
<tr>
<td></td>
<td><strong>Hope for Pearls Project</strong></td>
<td>Help 40 students</td>
<td></td>
<td>Learn to help others with spirit and enthusiasm</td>
</tr>
<tr>
<td><strong>US$ 15.5</strong></td>
<td>USI Shenzhen Facility and Kunshan Facility worked together to improve education in remote areas. A special program consisting of a ‘pearl class’ was set up at Qianshan Yezhai Middle School in Anhui province, with each facility helping 20 students (using ‘pearls’ as a metaphor for students) to complete their education.</td>
<td></td>
<td>Disadvantaged families</td>
<td>Reduce financial burden</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Gain joy and a sense of achievement</td>
</tr>
</tbody>
</table>
Community Care Impact Pathway

**Input**

Unit: thousand US$

**Activity**

US$ 287.2

*Rural Areas and Communities, LED Installation Projects*

The LED light installation is a green energy initiative that improves the quality of lighting in rural schools, protecting the eyesight of schoolchildren, and creating a pleasant learning environment. Savings from electricity bills can be used to procure more teaching aids, plan more educational activities, or for the repair and maintenance of equipment. LED lighting creates a well-lit environment, improving the classroom environment while at the same time meeting energy conservation and carbon reduction goals.

<table>
<thead>
<tr>
<th>Activity</th>
<th>US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural Areas and Communities, LED Installation Projects</td>
<td>287.2</td>
</tr>
</tbody>
</table>

**Output**

- 17,260 LED light tubes installed
- Deployed at 17 schools
- Each school saves an average of about US$1.9 thousand in electricity bills per year (About NT$50,000)

**Outcome**

- 100% of school’s electricity is from renewable energy sources
- Reduced 55 tCO\textsubscript{2}e in GHG emissions per year
- Each school saves an average of about US$10.8 thousand in electricity bills per year (About NT$300,000)

**Stakeholders**

- Students
  - Improve personal well-being through good lighting
  - Generate more funds for equipment and teaching aids through electricity cost savings. Improvements in the efficiency of campus funds utilization.

- Schools
  - Reduce carbon emissions by saving electricity and using renewable energy, thereby enhancing social well-being

- Residents
  - Provide community backup power during power outages to improve social well-being

**Unit: thousand US$**

US$ 234.3

*Shanlin Junior High School Smart Microgrid Installation Project*

The smart grid integrates energy generation and energy storage, creating an independent electricity source that also reduces carbon emissions through the use of photovoltaic cells. The smart grid supplies uninterrupted power at the school by redistributing the power supply. The smart grid also includes a power consumption and smart monitoring system to provide quantified data that facilitate power consumption management and power distribution.

- 17,260 LED light tubes installed
- Deployed at 17 schools
- Each school saves an average of about US$1.9 thousand in electricity bills per year (About NT$50,000)
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 2021, ASEH worked together with many academic institutions and invested approximately US$3 million in a total of 95 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 projects was 4.17, and that US$14 million in social value was created, of which business-related industry-academia collaboration generated approximately US$6 million. Main outcomes include better operational efficiency and industry competitiveness. Approximately US$8 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

**Da-Gang Elementary School Aquaponic Farming Project**

The Da-Gang Elementary School Aquaponic Farming Project is an educational farming project to develop sustainable food production. We built basic facilities such as a greenhouse powered by a smart grid installed by ASEH. The smart microgrid system uses solar energy, allowing the farm to achieve 100% renewable energy consumption. We also assisted Da-Gang Elementary School in designing environmental education courses on aquaponic farming to promote sustainable farming practices.

**Input**

- **US$ 94.6**

**Activity**

- 300 students involved
- 1 community activity
- 21 training hours for seed teachers
- Produced 400kg vegetables and 400 sea basses per year

**Output**

- Stakeholders
  - Students
    - Raise students’ awareness of environmental protection and implementation of environmental sustainability actions in daily lives
  - Teacher
    - Cultivate students’ attitude of respect for life and ecological care
  - Residents
    - Enhance public participation, volunteering and enthusiasm for charity

- **Outcome**
  - Improve relationships with family, friends, and colleagues
  - Enhance public participation, volunteering and enthusiasm for charity
  - Incorporate actions to protect the environment in their daily life.
### Social Impact Pathway

<table>
<thead>
<tr>
<th>Impact Driver</th>
<th>Activity / Output</th>
<th>Outcome / Impact</th>
<th>Monetary Valuation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supplier Partnerships</strong></td>
<td>Supplier sustainability audit</td>
<td>Improve supplier’s competitiveness and optimize supplier’s management system</td>
<td>Property losses or external training fees</td>
</tr>
<tr>
<td></td>
<td>Supplier training</td>
<td></td>
<td>Perceived value according to supplier survey questionnaires</td>
</tr>
<tr>
<td></td>
<td>Local procurement</td>
<td>Create local job opportunity and promote local economic prosperity</td>
<td>Local procurement value</td>
</tr>
<tr>
<td><strong>Employee Engagement and Development</strong></td>
<td>Employee Care Development</td>
<td>Increase sense of belonging</td>
<td>Mental wellbeing course fees</td>
</tr>
<tr>
<td></td>
<td>Work Environment</td>
<td>Increase mental health</td>
<td>Company benefits and subsidies</td>
</tr>
<tr>
<td></td>
<td>Employee care</td>
<td>Enhance management capabilities</td>
<td>Training and development expenses</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Consensus building and motivational course fees</td>
</tr>
<tr>
<td></td>
<td>Number of occupational injuries</td>
<td>Employee physical/psychological injury</td>
<td>Disability payments</td>
</tr>
<tr>
<td></td>
<td>Employee health check</td>
<td>Increase in recovery rate of employee with health issues</td>
<td>Health screening expenses</td>
</tr>
<tr>
<td></td>
<td>Health insurance expense</td>
<td>Reduce financial impact to employee as a result of health issues</td>
<td>Health insurance expenses</td>
</tr>
<tr>
<td><strong>Social Cohesion</strong></td>
<td>Public development</td>
<td>Improvement in the knowledge and analytical abilities of public issues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Community care</td>
<td>Improvement of resource usage benefits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Disadvantaged families care</td>
<td>Improvement of self-identity and education benefits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Afforestation activities</td>
<td>Improvement of water quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Healthcare sponsorship</td>
<td>Increased healthcare resources and quality of life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arts and culture sponsorship</td>
<td>Improved artistic knowledge</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sports sponsorship</td>
<td>Increased human interactions and group cohesiveness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Occupational education and training</td>
<td>Increased employment opportunities for participants in industry-academia collaborations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental education</td>
<td>Improved environmental awareness and implementation in daily life</td>
<td></td>
</tr>
</tbody>
</table>

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[1] 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.
Since 2019, ASEH has identified 6 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 SDG12 (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), and SDG 6 (Clean water and sanitation). 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 achieve the UN SDGs and create a better world.

**ASEH’s Sustainable Value Creation Framework**

<table>
<thead>
<tr>
<th>Sustainability Strategies</th>
<th>Green Manufacturing</th>
<th>Supplier Partnership</th>
<th>Social Involvement</th>
<th>Human Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Decarbonized Products and Services</td>
<td>1. Electricity intensity 10% reduction (1% p.a.)</td>
<td>1. Signing of CoC and completion of SAQ by all new suppliers</td>
<td>1. 25 sustainability initiatives</td>
<td>1. Turnover rate is less than 20%</td>
</tr>
<tr>
<td>2. Low-carbon Manufacturing</td>
<td>2. GHG intensity 10% reduction (1% p.a.)</td>
<td>2. Completion of SAQ by all first-tier suppliers</td>
<td>2. Afterschool care for over 2,000 students from disadvantaged households</td>
<td>2. Employee engagement at 85% or over</td>
</tr>
<tr>
<td>4. Green/Renewable Energy Investment</td>
<td>4. Hazardous waste intensity 10% reduction (1% p.a.)</td>
<td>4. Completion of SAQ by over 50% of non-first-tier suppliers</td>
<td>4. 2,000 students attending semiconductor courses</td>
<td>4. Adopted by 95% of company facilities worldwide</td>
</tr>
<tr>
<td>5. Low-carbon Design</td>
<td>5. Renewable electricity ratio 27% of total</td>
<td>5. Completion of sustainability audits conducted on 100 first-tier suppliers</td>
<td>5. Over 450 industry-academia collaboration projects on technology</td>
<td>5. Employee engagement survey coverage more than 95%</td>
</tr>
</tbody>
</table>

**Tier 1 SDGs**

- Tier 1 SDGs
  - SDG 4: Quality Education
  - SDG 6: Clean Water and Sanitation
  - SDG 7: Affordable and Clean Energy
  - SDG 8: Decent Work and Economic Growth
  - SDG 12: Responsible Consumption and Production
  - SDG 13: Climate Action
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$15,118 million in sustainable value for stakeholders in 2021. This year, we will apply the sustainable value assessment method used internally to the value chain. In 2021, the monetized value of the environmental impact of our greenhouse gas emissions amounted to US$-890 million. The main sources of impact included product and service procurement, upstream transportation and distribution, and external influence of capital goods. 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. Our environmental impact is mainly attributed to resource usage and environmental emissions from business activities. Greenhouse gas emissions from the value chain are mainly attributed to procurement of products and services, upstream/downstream transportation and delivery, and capital and finances. To reduce external environmental costs, we continue to increase investments in environmental protection, improve resource efficiency and conversion, develop diverse and clean energy sources, increase water efficiency and adopt green transportation. We will also expand the management scope of our environmental impact that helps fulfill our low-carbon mission and strategic vision of circularity. 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 2021, ASEH will step up efforts to mitigate negative environmental and social impacts to stakeholders. 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 Sustainable Development Committee to plan our value creation path that formulates improvement actions and decisions that will reduce the impact of potential risks. In 2021, we 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.
<table>
<thead>
<tr>
<th>Item</th>
<th>Impact</th>
<th>Mitigation Action</th>
<th>2021 Key Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse gas</td>
<td>The social cost of human health, architectural and asset damages and economic losses caused by greenhouse gas emissions.</td>
<td>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</td>
<td>Scope 1 GHG emissions reduced by 4%, Scope 2 GHG emissions reduced by 3%, Renewable energy and certificate accounts for 24% of total electricity usage, Executed 316 cases to reduce 781,124 tCO2e, GHGs intensity: 50% reduction compared to 2015</td>
</tr>
<tr>
<td>Other air emissions</td>
<td>The social cost of threats to human health, agriculture loss, forest loss, resources depletion, and acidification of water caused by other air emissions.</td>
<td>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</td>
<td>Emission intensity of unit revenue decreased by 1%</td>
</tr>
<tr>
<td>Waste</td>
<td>The social cost of local and global pollution, visual and auditory disruption caused by the hazardous and non-hazardous waste treatment process.</td>
<td>Waste reduction at source, Introduced circular economy operating models, Adopted environmentally friendly substitute materials</td>
<td>Increased general and hazardous waste recycling rate by 84%, Recycled materials for reuse in the plant, outsourced the processing for reuse by other industries. Total volume of materials processed equaled 48,893 tons</td>
</tr>
<tr>
<td>Water use</td>
<td>The social cost of ecosystem service devaluation, malnutrition, and waterborne diseases caused by water usage.</td>
<td>Established a waste water recycling plant, Promote water saving projects, Invested in water recycling equipment, Rainwater collection and utilization</td>
<td>Unit revenue water usage density decreased by 17% compared to 2020, Promoted 14 water saving projects. The recycling rate of process water remained at 72% compared to last year, Expenditure for recycling and reuse of water resources reached USD44.07 million</td>
</tr>
<tr>
<td>Water pollution</td>
<td>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.</td>
<td>Continuous monitoring of water quality/volume, Waste water recycling and cyclic reuse, Distribution of chemicals, Develop innovative processes and technologies through academia-industry cooperation</td>
<td>Distribution of chemicals for 15 plants, Expenditure for recycling and processing efficiency of waste water reached USD113 million, Conducted 24 development projects for innovative water processing technologies through academia-industry cooperation</td>
</tr>
<tr>
<td>Employee health and safety</td>
<td>The effect of work injuries on the physical and psychological wellbeing of employees.</td>
<td>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</td>
<td>52,168 employees participated in health checkups, invested approximately USD2.5 million, Conducted over 300 drills in plants around the world, Accumulated over 330,000 hours of occupational health and safety education and training</td>
</tr>
</tbody>
</table>
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.

| 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.

| 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.
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 GNI, if the monetization value is derived from data prior to 2017, we will adjust the data using the US dollar inflation rate to reflect the monetized values for 2021.

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 methodology.

Our report employs mainly the input-output model, social return on investment (SROI) 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.

<table>
<thead>
<tr>
<th></th>
<th>Suppliers Partnership</th>
<th>Employee engagement and development</th>
<th>Employees health and safety</th>
<th>Social cohesion</th>
<th>Education</th>
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<tr>
<td>Extrapolated from Primary data</td>
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<td>Secondary data</td>
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</table>

[1] 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


[3] The analyzed information of the 2020 supplier education and training is based on the 2019 survey questionnaire. The SROI methodology related calculation parameters were recalculated based on the related questionnaires selected from the education and training of subsidiaries in 2020, and social impact was calculated based on average value per person.


[5] 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

<table>
<thead>
<tr>
<th>Item</th>
<th>Reference Report</th>
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<tbody>
<tr>
<td>Public Development</td>
<td>The outcomes and value of SOUL's advanced SROI training course</td>
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<tr>
<td>Community Care</td>
<td>The Cedar Foundation Community Inclusion Programmes SROI</td>
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<tr>
<td>Care for Vulnerable Families</td>
<td>Social Return on Investment (SROI) Report of Taiwan Dream Project on Dahu Community</td>
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<td>Reforestation</td>
<td>Restore the Earth Foundation Cypress Reforestation Social Return on Investment Report</td>
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<td>Medical Sponsorship</td>
<td>Healthwise Hull SROI Forecast</td>
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<tr>
<td>Arts Sponsorships</td>
<td>Turner Contemporary: Art Inspiring Change Social Value Report</td>
</tr>
<tr>
<td>Sports Sponsorships</td>
<td>Bums off Seats SROI Evaluation Report</td>
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<td>Environmental Education</td>
<td>(Cherish the Earth, Spread Love Far SROI Report) 2018 SROI Report</td>
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<tr>
<td>Vocational Training</td>
<td>The Cornwall Exchange: A Social Return on Investment (SROI) Report</td>
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</table>
Appendix 3  |  Reference for Value Transfer Methodology
