Chinese white dolphins (Sousa chinensis) can be seen taking a leisurely swim, reflecting the balance that has been achieved between economy and ecology.
Under the guidance of the environmental sustainability policy announced by the Chairman of FPG’s Executive Board, the FPG Mailiao Harbor has actively promoted low-pollution ships and harbor sustainable management. On September 7, 2018, it received EcoPorts Certification from the European Sea Ports Organization (ESPO). The Mailiao Harbor is the first industrial port in Asia to win such an honor. In the future, the Mailiao Harbor will continue to push forward various green-port environmental protection measures, and will strive to become an international model for industrial ports and the best example of moving toward ecological sustainable development.

2018 Financial Highlights
(In Thousands of US Dollars, persons)

<table>
<thead>
<tr>
<th>Company</th>
<th>Capital</th>
<th>Assets</th>
<th>Equity</th>
<th>Sales Income Before Income Tax</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formosa Plastics Corp.</td>
<td>2,071,305</td>
<td>15,533,289</td>
<td>11,569,583</td>
<td>6,157,759</td>
<td>1,856,186</td>
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<tr>
<td>Nan Ya Plastics Corp.</td>
<td>2,580,556</td>
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<td>12,223,740</td>
<td>6,146,812</td>
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<td>Formosa Chemicals &amp; Fibre Corp.</td>
<td>1,907,131</td>
<td>15,460,496</td>
<td>12,032,957</td>
<td>8,902,227</td>
<td>1,768,420</td>
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<td>10,989,432</td>
<td>24,907,859</td>
<td>2,424,408</td>
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<td>Nan Ya Technology Corp.</td>
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<td>5,365,805</td>
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<td>Nan Ya PCB Corp.</td>
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<td>967,390</td>
<td>897,845</td>
<td>207,963</td>
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<td>Formosa Sumco Technology Corp.</td>
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<td>806,590</td>
<td>708,461</td>
<td>332,266</td>
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<td>Formosa Taffeta Co., Ltd.</td>
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<td>2,242,319</td>
<td>897,845</td>
<td>171,014</td>
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<td>Formosa Advanced Technologies Corp.</td>
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<td>412,409</td>
<td>369,521</td>
<td>285,866</td>
<td>56,973</td>
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<td>Mai-Liao Power Corp.</td>
<td>713,630</td>
<td>1,685,427</td>
<td>1,465,341</td>
<td>704,658</td>
<td>20,849</td>
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<tr>
<td>Subtotal of Public Companies</td>
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<td>57,925,550</td>
<td>52,040,708</td>
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<td>Other Domestic Companies</td>
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<td>16,440,139</td>
<td>5,472,621</td>
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<td>Subtotal of Domestic Companies</td>
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<td>74,365,689</td>
<td>57,513,329</td>
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<td>Companies in U.S.A</td>
<td>1,142,906</td>
<td>12,866,513</td>
<td>10,908,624</td>
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<td>Companies in China</td>
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<td>6,759,903</td>
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<td>Subtotal of Foreign Companies</td>
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<td>Total of Formosa Plastics Group</td>
<td>27,146,496</td>
<td>134,065,722</td>
<td>99,209,851</td>
<td>78,269,060</td>
<td>12,019,362</td>
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• NOTE: The financial data shown above is extracted from the individual financial statements of each company.

Financial Highlights
In 2018, the global economy grew in first three quarters, driving up the demand of petrochemical products. Crude oil prices continued to rise due to reduced production by oil production countries including the Organization of the Petroleum Exporting Countries (OPEC) and Russia. The Brent crude oil price was once soaring to US$ 86 per barrel. Since the fourth quarter, the trade war between China and US swiftly impacted the worldwide demand of the oil. The price trend was reversed and downward correction was continued to a point that could collapse the oil market. By the end of the year, the crude oil price was dropped to US$ 50 per barrel.

In Taiwan, the economy in the first half of 2018 grew as a result of the global economic recovery. This led to the stable growth in trade and in the economy. Private consumption and gross domestic product (GDP) was above 3%. Starting from the 3rd quarter, the China-US trade war continued to ferment and the global prosperity and final demand was uncertain. Affected by the China’s economic slow-down, the growth of Taiwan’s export trade was impacted and lost its momentum through the 2nd half of the year. In November and December, the annual growth rate of export trade turned negative.

Overview of Business Operations

Formosa Plastics Group's revenue for 2018 was NT$ 2,405.4 billion, which was 20.0% higher than 2017. While an improvement from the market was affected by the China-US trade war and the significant drop in the international crude oil prices. The market slowed down in the 4th quarter and the Group’s profit was greatly affected by the reduced demand for petrochemical and plasticized products. In turn, the profit before tax was NT$ 369.4 billion this year, a decrease of 5.7% compared to 2017.

1. Taiwan Region

In 2018, Formosa Plastics Group's combined revenue from subsidiaries in Taiwan was NT$ 1,767.6 billion, an increase of 17.8% from previous the year; the profit before tax was NT$ 329.8 billion, a decrease of 4.9% compared to 2017.

The petrochemical products benefited from the global economic recovery in the first half of the year. The international crude oil prices rose steadily, and pushed up petrochemical production and prices, which made the group’s first three quarters profitable. However, since the 4th quarter, the international crude oil price went down and the number of orders fell sharply. The group faced significant losses on inventory valuation, falling price on main products in transit, and price spread on refining and petrochemical products. The combined 4th quarter profit of the four main companies was reduced by 90% compared to the 3rd quarter, which resulted in a slight decline in the overall profit.

In response to the changes in international situation, FPG has continuously adjusted the production model and the combinations of the refining and petrochemical products based on the product price differences. FPG also developed high-value and differentiated products, and has gradually introducing artificial intelligence (AI) to production process optimization and quality testing. A total of 153 AI projects have been initiated and are under various stages of development. The annual benefits of the five AI projects, piloted by the
four major companies in 2018 were expected to reach NT$ 200 million. Obviously, AI applications will also become the trend in the future world.

In terms of product marketing, FPG will continue to develop the “Solution”, which provides instant supports to customer’s needs for technologies and product application services. In order to further expand distribution channels, export sector and diversify market risks, FPG has actively expanded distribution channels and developed markets beyond mainland China, such as India, Bangladesh, Southeast Asia, Central and South America, New Zealand and Australia. Furthermore, FPG will continue to focus on the global and overseas investment plans to enhance revenues and increase profitability. These and various additional approaches are being aggressively implemented to overcome the unfavorable conditions and potential risks on business operations.

2. US Region

Formosa Plastics Group owns several vertically integrated petrochemical raw material and plastic processing plants in the US. In 2018, FPG’s combined revenue from US subsidiaries was NT$ 197.2 billion, a 13% increase compared to 2017. The profit before tax was NT$ 36 billion, a 6.9% increase compared to previous year, which mainly benefited from the continued growth in the US economy and increased demand for petrochemical products. FPG’s production quantity and sales in US region were both improved compared to 2017. The crude oil prices continued to rise in the first three quarters, driving up product prices and increasing profits.

In particular, the construction of the ethane cracking plant, LDPE plant and HDPE plant in Texas will be ready for startup by 2nd quarter of 2019. It will be able to make use of the large production capacity and low-cost shale gas advantage to provide better opportunities for FPG. And also facilitate FPG’s long-term development in the United States.

3. China Region

Formosa Plastics Group in Mainland China, had a revenue of NT$ 297.3 billion in 2018, which was an 8.3% increase compared to 2017. The profit before tax was NT$ 8.9 billion, a decrease of 49.8% from 2017.

The main reason of the decline in profit was due to the “Three-Go” austerity measure which was for correcting the excessive expansion and growth in the past few years, since the new leader came in, in 2013. Mainland China’s export was suffered severe impact and middle and upstream raw material productions were seriously affected by China-US trade war in 2018. As a result, in 2018, FPG’s business performance was heavily influenced by these negative factors and was not as good as expected.

4. Vietnam Region

Formosa Plastics Group has been operating in the Vietnam for many years. In addition to the secondary processing plant of textile, fiber and plastics in the KCN Dong Nai, the two blast furnaces located in Ha Tinh Province were commissioned on schedule in May 2017 and May 2018. The completion of Ha Tinh steel plant phase I project was announced completed and put into full operation.

In 2018, FPG’s combined revenue for all plants in Vietnam was NT$ 124.6 billion, which was a growth of 239% compared to 2017. That was benefited from the combined transferred orders received from the US and Japan’s SPP pellets customers. In addition, textile spinning business turned losses into profits. The combined revenue and profit performance of Formosa Industries was outstanding. Ha Tinh steel plant was in early stage of commissioning, the initial unit cost was high and the amortization of various expenses was still considerable. Therefore, FPG’s profit before tax in Vietnam was negative, but the overall loss was under control.

Materializing Circular Economy

FPG has always been committed to the spirit of “Inquire into the root of the matter” and “To aim the sovereign good”. FPG is committed to promote “Energy Conservation, Emission Reduction and Recycling Economy”. FPG has committed to put raw materials, water resources, energy and waste, the four aspects into consideration. Therefore, we promote continuous improvement for energy conservation, emission reduction as well as group-wide energy and resource integration. In terms of the resource integration during the production processes, efficient emission reduction control, recycling and waste reduction are important pillars to FPG. The following measures and effectiveness of FPG’s initiatives in the “Circular Economy” are as follows:

1. Water Conservation

Even though the water of Ji Ji weir was for supply to the FPG’s Mailiao Industrial Complex, according to statistics of the Ministry of Economic Affairs, the industrial water consumption is only 5%. However, the agricultural water supply accounted for 92% to Yunlin County and Changhua County. FPG has proactively reduced water consumption by process water saving management, to reduce evaporation losses and many other measures. The water-saving in the Mailiao Industrial Complex has been reduced to 27,000 tons per day.

In addition to the use of “Spend Less” for water saving, FPG also has actively promoted “Broaden Source” to develop more water sources. By increasing rainwater collection areas and modifying rainwater storage tanks to effectively improve rainwater storage and reuse. The rate of rainwater collection efficiency was improved significantly in 2018, and the collection ratio was 92.8%, which resulted in 15,136 tons of rainwater collected per day and used effectively. Meanwhile, FPG also invested NT$ 5.4 billion to establish a 100,000-ton seawater desalination plant in Mailiao Industrial Complex. The project has passed the Environment Impact Assessment (EIA) in August 2018. It was expected to conduct commissioning by 2021 and start production soon afterwards.

2. Energy Conservation and Emission Reduction

The FPG production plants have been improving the energy consumption, waste heat recycling, production facility’s efficiency and energy management measures separately. In order to enhance its energy efficiency usage, FPG had established a dedicated unit for the energy conservation and carbon reduction in 2006. The Chairman of FPG serves as the chairperson, and hosts a monthly meeting to set an annual target. The most recent target set was a 3% energy saving and 5% water saving.
According to the statistics, the average daily production output of Mailiao Industrial Complex has grown by 15% during the past decade. However, the average daily electricity consumption and steam consumption per unit of the Mailiao Industrial Complex has decreased by 24% and 23% respectively, the energy-saving efforts have paid off.

In terms of air pollution control, despite the environmental protection standards in Taiwan is stricter than the EU, US and Japan. The local government still continued to raise the standards and has institute more stringent requirements. FPG still puts all efforts to meet the standards. For example, the actual emission of the Mailiao Industrial Complex was lower than the approved amount of the government’s environmental evaluation and permit’s approval under total amount control. The volume of the actual emissions (TSP) was assessed as 3,340 tons/year. The actual emission of the Mailiao Power is 7 mg/Nm³ which is lower than the national standard 10 mg/Nm³. In addition, regarding the volatile organic compounds (VOC) control standard, The US national standard is 50,000 ppm; while the other countries’ like EU, Japan and China are mainly focused on insuring producers provide proper maintenance instead of restrictions. The Taiwan national standard is 10,000 ppm, the standard of Kaohsiung City is 2,000 ppm and the standard of Yunlin County is even stringent to 1,000 ppm.

In addition, FPG’s Mailiao Harbor has been actively promoting the environmental protection measures, and became the first industrial port in Asia awarded EcoPorts Certification by the European Sea Port Organization, in September 2018.

### 3. Overall Investment and Results

As of 2018, FPG has invested approximately NT$ 35.19 billion in water-saving and energy-saving project. In particular, the water-saving project has 3,132 cases completed, and is expected to save up to 127.59 million tons of water annually. Meanwhile, there were 11,175 energy-saving cases completed and it is expected to reduce CO₂ emissions by 12.32 million tons per year. The result was quite impressive and the performances of the energy conservation and emission reduction will be also achieved in the future.

### Social Care and Feedback

While actively developing business, FPG has committed to uphold the spirit of “What is taken from the society is used in the interests of the society”. It has established three universities, the Chang Gung Memorial Hospital, multiple foundations and charitable trusts. FPG has engaged in various public charitable activities for years are as follows:

1. **Campus reconstruction:** Since the 921 earthquake on September 21, 1999, there were 76 old dangerous school buildings in disaster-stricken area that were rebuilt.

2. **Senior Citizens’ Welfare:** FPG has donated approximately 1.16 million doses of Pneumococcus vaccine with a market price of NT$ 960 million for vaccination for the elderly over 75 years of age. This can save the government NT$ 13.6 billion in medical expenses for pneumonia. It also provided subsidies to the elderly for housing improvements and home appliance replacements, and set up senior health centers and many other assistance programs.

3. **Rainbow Project (Inmate with drug addiction and AIDS) and Sunshine Project (Drug offenders):** Assisted the skill training, psychological counseling and health education of inmates with drug addiction and AIDS, as well as regular follow-up counseling after they are released from prison in order to help them return to society. The programs reduced the rate of recidivism from 60~80% to below 10%. For this reason, FPG Chairman received the 11th “Charity Award” from HK & Macau Taiwanese Charity Fund; besides donating all of the prize money, an equal amount of money was donated by the Chan-yang Wang Trust to expand the scale of the project and spread the warmth of love.

4. **Women and Children Welfare:** FPG has promoted the rare disease patients’ medical and financial assistances. Providing assistances to children and youth institutes and enhance the effectiveness of professional services for early childhood treatment (more than 20,000 children and 80 institutions benefited).

5. **Other social welfare:** FPG has provided funding for the training of young tennis athletes and table tennis athletes. It also provides a variety of arts and cultural events to the people in remote areas and helped cultivate the local art troupes to grow.

With all the various charitable activities launched by FPG, many precedents have been established that have become widely acclaimed and unparalleled in Taiwan. The Group will be able to
achieve the goal of improving the service quality and perpetual business operation for year to come. FPG under the leadership of Chairman of FPG will fully implement the goal of the two founders’ original intention of give back to the society.

Future Operating Environment

On May 8, 2015, the Premier of the State Council of the People's Republic of China Li Keqiang made a proposed, to transform China from a manufacturer of quantity to quality maker, by 2025. The US President Donald Trump also mentioned the “US Manufacturing”, with the goal of “Make America Great Again”. The two leaders of the world's largest economy powers were emphasizing to have manufacturing lead their nations. It is obvious that manufacturing is very important to the country’s economy, national defense, people's well-being, and employment.

Due to the recent rise in civil awareness in Taiwan, nothing can be discussed rationally. Such as: energy supply, environmental protection issues or flexible labor hours, which caused a significant disruption to the development of the manufacturing industry. The Taiwanese government has actively attracted Taiwanese entrepreneurs moving back from China during China-US trade war. In order to increase the entrepreneurs’ investment intentions, the government should return to the rule of law with rational judgment based on objective data.

Furthermore, the important thing is that the Taiwan government should more actively participate in regional economic integration, including the “Regional Comprehensive Economic Partnership” (RCEP) and the “Comprehensive and Progressive Agreement for Trans-Pacific Partnership” (CPTPP), and sign up FTA with the major trading partners. In order to see immediate and positive benefits in Taiwan’s economy, the authority should improve cross-strait relations and help Taiwan companies lifting unequal tariff barriers while promoting globalization.

Future Outlook

In 2018, the petrochemical industry prospered for the 4th consecutive year and the economic recovery of the major industrial countries such as Europe, the United States and Japan is nearing an end. It seems there is no short-term solution for China-US trade war. China economy continuous slowing down with Brexit and many confounding factors, therefore major institutions around the world have downward revisions for economic growth in 2019. Many forecasts that the global economy is will possibly enter into a decline in the future, which requires close observations and prudent responses.

On February 11, 2019, the US President Donald Trump signed an executive order “Accelerating American Leadership in Artificial Intelligence”. To keep its leading position in AI is very important for US to maintain its economic and national security. Promoting AI is a crucial issue and the President has asked the federal government to become fully committed to the promotion of AI.

In terms of continuing to invest in the development of high value products and product differentiations, FPG will also invest in developments of new applications, new materials and products in line with environmental trends. At the same time, the Group will actively introduce AI technology and big data analysis for sales and production optimization, environmental protection, occupational safety and improve maintenance for smart monitoring systems. With all these efforts, it will help to improve product yield rate and customer satisfaction, avoiding occupational accidents, and reducing energy and raw material consumption, in order to enhance FPG's long-term competitiveness in the future.

In China, FPG is currently actively developing the new construction of cold-rolled stainless steel plants in Fujian Province, Ningbo petrochemical production capacity expansion and the electronic material production capacity expansion in Huizhou. In the United States, the Group's 3rd ethane cracking and downstream petrochemical plants in Texas is expected to begin commercial operation in the 2nd quarter of 2019. The other large scale petrochemical project in Louisiana is expected to begin construction after completion of the Environmental Impact Assessment (EIA) in the first half of 2019. FPG is looking to increase its competitiveness which is benefited by the low-cost shale gas.

Although the global economy looks less optimistic in 2019, the overall operating environment will remain full of challenges. However, even the global economic environment is unpredictable, we will still maintain a positive attitude to encounter future challenges, take challenges as sources of motivation to drive business performance and adjust business strategies. At the same time, FPG will use new technologies to build a brighter future in the face of changes and to build a solid foundation to fulfill our goal of sustainable development.
Global economics has been in turmoil in 2018. In the first three quarters for 2018, the strong global economic growth has led to higher demand for petrochemical. Oil price jumped by 24% driven by production cut from major oil producing countries such as OPEC and Russia. Moreover, demand for alumina, paper, home appliance and epoxy resins have increased thanks to industry boom in automotive, construction, e-commerce and home appliance. The decreasing supply driven by capacity maintenance, production outages, or production reduction on environmental inspection of other companies, has pushed up prices and spreads for caustic soda, AN, MMA and ECH. However, amid the uncertainties brought by US-China trade tension, global economy and international trade have been deteriorated in 4Q18. While the US is driving its economic growth, pressures on oil prices have been weighted on. The US thus increased its oil production, which resulted in around 40% of decline in oil price and led to the sharp collapse in ethylene, propylene, and petrochemical product prices. Product spreads and sales volume have decreased as downstream clients have therefore turned to hold a more conservative, wait-and-see stance on its procurement.

In summary, the Company has completed the phase 1 and phase 2 Ningbo 42K tpa PP plant debottleneck project, and well-managed its equipment safety to maintain a stable operation, which have resulted in 91% capacity utilization rate in 2018, higher than 90% in 2017. Meanwhile, the Company has been developing overseas markets aggressively and increasing sales contribution from high-valued differentiated products. As a result, the Company’s consolidated operating profit of TWD25.34bn in 2018 increased 15% from 2017, which was a record high level for the Company in the past 7 years. Moreover, cash dividend incomes from Nanya Plastics Corp., Formosa Chemicals & Fibre Corp, Nanya Technology Corp. were TWD7.51bn, and equity investment incomes from Formosa Petrochemical Corp. and FPC-USA, Formosa Sumco Technology Corp., were TWD24.07bn in 2018, which supported the Company’s consolidated pretax profit to break the 2017 record high level at TWD57.09bn in 2018, and reaching the highest level in the past 64 years since the Company established.

In 2018, the US economy has been growing under the “First Priority” strategy and the positive effect from tax reduction, which has led to global economic recovery. However, the US has adopted trade protection measures to resolve its long-term trade deficit with China, and resulted in the US-China trade war. Starting from July 2018, China and the US have both raised their tariffs towards each other, resulting in the restructure of global supply chain, and dragged down the global economic growth and export. The International Monetary Fund (IMF) and the World Bank have both revised down their forecasts on global GDP growth. Due to a close trade relationship between the two major economies, it’s inevitable for Taiwan to suffer from the impact of trade war, leading to the decline in both export momentum and economic growth.
In addition, Taiwan’s economic growth has shown weak momentum. Taiwan has stayed in the last place among the Four Asian Tigers over the past 4 years and was not able to keep up with the pace with global economic growth. Aside from being impacted by the global economy trend, the society brimming with the ideology of environmental protection is also attributed to the weak momentum. According to Taiwan’s Environmental Protection Agency (EPA), over 70% of the PM 2.5 problem is generated from traffic, the transport from other regions, and from natural occurrence, while the petrochemical and power industry, which have long been misunderstood by the public, only make up 2% and 2.9%, respectively, to the problem. The two industries together only account for less than 5% of the problem, which is even lower than the 6.2% generated from catering industry, however, the two industries have long been the chief culprit of PM 2.5. The industries have long been misunderstood by the society, which have long been suffering from the stigma, and many long term investment projects were stuck under the unreasonable EPA review system. The environmental regulations have also became stricter gradually without considering whether the best feasible technique is achievable, which is very unfavorable to the long term domestic industry development.

On the other hand, both China and the US, the two economic majors in the world, are emphasizing “driving the economy through manufacturing industry”. The two countries even rolled out tax reduction and fee cuts to attract manufacturing investments, and expand new petrochemical capacities. In the long run, Taiwan’s industry development would thus be limited.

In addition, the government’s energy policy of “replacing nuclear power with green energy; replacing coal-based power plant with natural gas-based power plant” is posing a great risk to the stability of electricity supply, which will adversely affect the development of Taiwan’s economy. Besides, the increase in tax rate from 17% to 20% for corporates in Taiwan is exactly on the opposite of the world trend of “tax reduction”. This could potentially weaken corporates’ competitiveness in the world and hollow out the domestic industry development as corporates would be force to switch out from Taiwan to seek for investment opportunities overseas.

Furthermore, while export accounts for more than 60 percent of Taiwan GDP, Taiwan’s participation in the international Free Trade Agreement (FTA) coverage is poor at less than 10%. Facing the growing trade protectionism, unimproved cross-strait relations, the preferential tariffs enjoyed by ASEAN 10 plus one, the effective of “Comprehensive and Progressive Agreement for Trans-Pacific Partnership Agreement (CPTPP)” since 30 December 2018, and the upcoming formation of “Regional Comprehensive Economic Partnership Agreement (RCEP)” in Asia, of which Taiwan has been excluded in the discussion, Taiwan will be marginalized, and our industries will find it very difficult to survive and development if Taiwan government is not actively seeking for solutions on the breakthrough for the trade tariff obstacle.

Thus, the Company expects the government, aside from grasping the opportunity of industry restructure brought out under US-China trade war, should roll out a fiscal tax with investment incentives, renew the tax incentives in “Statute for Upgrading Industry”, amend the irrational environmental assessment process and loosen the environmental regulation restrictions. Particularly, the environmental issues should be assessed based on scientific data in order to dissolve the populist atmosphere. Meanwhile, the government should revisit the energy policy, formulate electricity allocation pragmatically and propose reasonable supporting measures for energy transition to provide stable, abundant and clean electricity and to build a friendly investment environment to attract and enhance businesses’ confidence in investing in Taiwan. Also, in order to make a breakthrough of the above difficulties and to keep businesses in Taiwan and develop sustainably, the government should understand the market mechanism and the problem of the unequal trade tariff towards the global market.

In view of the difficulty in domestic investment and the uncertainties brought out by US-China trade tension, in 2018, the Company developed the application of artificial intelligence (AI) technology thoroughly to ensure the improvement of the working environment and avoid operational issues, in order to improve product quality, production and management efficiency. In an effort to popularize AI concept to all employees and to cultivate AI talents, the Company provides the four-stage systematic training courses from the basics, practice, and project practice to “Taiwan Artificial Intelligence School”. In the meantime, the Company also interacts and cooperates with other companies, established an AI exchange platform to hold competitions, and set up an AI R&D studio at Renwu plant to develop AI technology and to accelerate progress on AI development. In 2018, 6 projects have been completed and introduced to application with annual benefit at TWD24m. There are 115 ongoing projects going forward, and the estimated annual benefit is at TWD142m.

Aside from this, by promoting Industrial 4.0 and the automatic selling system, production and sales efficiency has come into effect on PVC, PE and PP automatic selling system, and the Company has expanded the application towards other products. Meanwhile, in order to increase the product quality, optimize the operation and formulation and dispatch the power units, the Company has improved the production process and launched 42 improvement projects through instant and historical production data analysis. By the end of 2018, 29 projects had
been completed with annual benefit of TWD70m, and the implementation of the rest 13 projects are expected to be completed by end of 2019.

Moreover, in order to promote the transformation plan of the Renuwu complex, the establishment of the composite material center, the industrial 4.0 and artificial intelligence research and development center, and the dye-sensitized battery mass production plant, in March 2019, has been passed by the Ministry of the Interior to change 12.3 hectares of part of the land in Renuwu District to a kind of industrial zone.

At the same time, 13 office buildings, including the 2 founders’ offices in the Kaohsiung plant, the birthplace of Formosa Plastics Group, were registered as monument by the Kaohsiung City Government. The “Wang Yung-ching and Wang Yung-tsai Park” will be established in the 2.5 hectares original site. Moreover, in respect of the Formosa Building’s urban renewal plan, the Company invested TWD4,675m by a quarter of the shareholding among Formosa Group, together with Nanya Plastics Corp., Formosa Chemicals & Fibre Corp., and Formosa Petrochemical Corp., to purchase three office buildings, and lands, etc., located in “T-CBD”, Taipei’s Neihu District.

In an attempt to develop circular economy, promote project improvements, reduce the consumption of water, energy, and the liquid usage volume per unit, the Company accomplished 620 projects in 2018 and resulted in a total benefit of TWD320m. The Company established an innovation platform to hold seminars for time to time to boost up the innovation atmosphere. There have been more than 147 ideas proposed on an accumulated basis so far. By the means mentioned above, the Company is able to gradually pursue the rationalization, strengthen the business essence, overcome the operating difficulties and continue to grow the business.

The Company and its China Ningbo subsidiary mainly produce plastics and chemical fiber raw materials. In 2018, sales volume of PVC increased 3% to 1,661K tons mainly due to the continued market diversification with higher sales in Southeast Asia, New Zealand, Australia, and higher PVC demand for infrastructure ahead of the India’s general election in 2019. Sales volume of caustic soda was 1,437K tons in 2018, similar to the level last year, as the incremental caustic soda demand in Indonesia and Middle East for aluminum and Rayon was offset by the slowing global economy and market oversupply caused by the import ban on caustic soda to India that have not obtained the Bureau of Indian Standards’ approval in 4Q18.

Although the clients’ re-stocking demand in HDPE was conservative given weaker-than-expected HDPE demand for pipe due to the delay in coal-to-gas project in China and the US-China trade tension, the Company have aggressively diversified the market into to eastern Asia and Africa’s pipe material market and expanded to differentiated products like blow molding grade and cable grade HDPE products. As a result, the Company’s sales volume in HDPE was 489K tons in 2018, similar to that of last year. The Company’s EVA sales volume was 276K tons in 2018, up 12% from 2017 as there was no new capacity addition in China and no maintenance shutdown of EVA plant in Mailiao complex. The Company’s LLDPE sales volume was 162K tons in 2018, down 22% from 2017 given (1) oversupply in LLDPE market on tight competition due to new supply additions from India and the US, and (2) production reduction as the FOB prices couldn’t cover the Company’s variable cost.

The Company’s AE sales volume was 338K tons in 2018, increased 6% from 2017 driven by (1) higher re-stocking demand from downstream clients given tight supply resulted from heavy maintenance shutdown from peers in first half of 2018 and operational issue from Brazil peers and, (2) increased sales volume in Southeast Asia, India and Southern America. The Company’s carbon fiber sales volume was 5.4K tons in 2018, up 14% from 2017 due to the stable incremental demand for wind power and the demand recovery from Taiwanese and foreign clients given strategic production reduction from Japanese peers. The Company’s sales volume of NBA, which is mainly for captive use by AE plants, increased 6% to 232K tons in 2018 due to a sharp decreased in supply given heavy turnovers from China and Southeast Asia peers in first half of 2018. Sales volume of SAP increased largely by 38% from 2017 to 182K tons in 2018 mainly due to (1) demand recovery in Central America, (2) order win from international clients and took the advantage of ASEAN tariff exemption for sales into Southeast Asia, and (3) aggressive development for new clients in Africa.

Sales volume of PP increased 2% from 2017 to 958K tons in 2018 given better demand for the newly-developed fiber grade and extruded sheet products, as well as to sales expansion into Southern Asia and Central America market. Sales volume in AN and MMA increased 3% and 4% from 2017 to 277K tons and 83K tons in 2018, respectively, on the severer environmental inspection in China and operational issue from peers. Sales volume of ECH decreased 5% from 2017 to 89K tons in 2018 due to lower-than-expected downstream product expiry demand.

In terms of capacity expansion, in order to strengthen its competitiveness, the Company has been aggressively expanding its capacities and conducting debottleneck projects, including the debottleneck project of SAP plant in Mailiao, which will raise its SAP capacities by 10K tons to 70K tons, and it is expected to be completed by end of 2020. And in Ningbo, there are PP plant debottleneck project, which will increase its PP capacity by 30K tons to 522K tons after the project is completed in 2Q19; SAP plant debottleneck project, which will increase its SAP capacity by 10K tons to 100K tons after construction completed in 3Q19; AA plant debottleneck project, which will increase AA capacity by 10K tons to 330K tons, which is scheduled to completed in 2Q19; and the project of the new PDH plant, which will have 600K tons propylene capacity and is expected to complete and start production in 3Q21. In addition, the Company is building a new 400Kt HDPE plant in Texas, USA, scheduled to be completed in 2Q19. Furthermore, in Kaohsiung, the Company’s storage tank in Qanzheng District will be moved to the Phase II Intertropical chemical zone. The Company has rent the land and dock from Port of Kaohsiung Taiwan International Ports Corporation for petrochemical usage and will build 12 storage tanks and 1 salt warehouse, which are expected to be completed in 2Q22.

In terms of equity investments, FPC-USA (22.6% owned by the Company) generated pretax profit of USD1,000m in 2018, up 5% from 2017, mainly due to (1) increase demand for petrochemical driven by the improving US economy, (2) increase sales volume from 2017 given stable production, and (3) rising product price following rising crude price in the first three quarters in 2018. Also, the paste PVC plant in Delaware has stopped operating since August 2018 due to old facilities and poor profitability. In 2019, business should decline comparing to 2018 given significant capacity additions in ethylene and downstream polyethylene capacities in Northern America, which leads to the expected falling prices of petrochemical products, and the rising feedstock prices in ethane, propane and butane. In order to counteract the trend, the Company will leverage on the shale gas’ low cost advantage, aside from the 1.2m tons ethane cracker expansion project, FPC-USA is conducting the construction of a 400Kt tpa LDPE plant and a 250K tpa PP plant in Taxes, which are scheduled to start production starting from 2Q19 and can contribute to earnings.
In addition, profit loss of Fujian Fuxin Special Steel Co., Ltd. (29.17% owned by the Company) in 2018 has further expanded from 2017 given (1) higher raw material LME nickel price on the back of environmental inspection in China; (2) intensified pricing competition from Indonesian peers on new supply additions; and (3) shrinking demand in 4Q18 on US-China trade tension. Fujian Fuxin expects the global steel market should continue to decline, prices should fall as a result of the intensifying pricing competition. However, Fujian Fuxin is expected to decrease profit loss as Fujian Fuxin will expand the sales in super ferritic stainless steel differentiated products and increase the hot rolling OEM for Formosa Ha Tinh Steel Corporation. In order to enlarge the synergy of vertical integration and enhance the competitiveness, Fujian Fuxin is conducting the new cold rolling mill plant project with 300K tpa capacity, and expects the plant to start production by 2Q20.

Furthermore, Formosa Ha Tinh Steel Corporation, which the Company owns 11.43% equity stake, is constructing an integrated steel plant in Ha Tinh Province, Vietnam, with 7.1mn tpa steel billet capacity. The two blast furnaces have started production in May 2017 and May 2018, respectively. Sales volume has been smooth so far, the two blast furnaces have started production in May 2017 and May 2018, respectively. Sales volume has been smooth so far, the construction by end of 2019.

In terms of research and development, the Company has spent TWD2.2bn on R&D in 2018, accounted for 1% of the Company’s revenues. These R&D expenses were mainly spent on developing R&D and industrial production technique and to commercialize specialty products, the Company launched 49 R&D projects, including low polymerization degree paste resin, semi-solid electrolyte of lithium-ion battery, dye-sensitized cell electric curtain, injection & compression cap grade HDPE, high VA & Low melt index grade EVA, ultra-thin prelaminated diaper and odorless SAP, carbon fiber reinforced thermoplastic unidirectional tape, vinyl ester compatible sizing, gas phase process EPP expanded PP beads and high fluidity impact copolymer PP. The development in differentiated products and the enhancement in value-added products perform well.

Moreover, the Company further enhanced the development of key technology and applied for both domestic and international patent. In 2018, the Company has received approval on 9 patents, and as of the end of 2018, the Company has a total of 148 effective patents. Meanwhile, the Company will continue to work with both domestic and international industry experts, government, and academic area, as well as to establish a virtual laboratory to accelerate the interaction and resources integration of research development and production, as well as to speed up the process of commercialization. Also, in order to further strengthen the competitiveness, the Company will incorporate new technologies such as Internet of Things, Automation, and Green Technology to upgrade and expand its R&D capabilities in the area of compounds, circular economy, aerospace and medical materials.

In addition to cooperating with academic research institutions such as National Cheng Kung University and the Industrial Technology Research Institute in August 2018 on the technology development of the capture and reuse of flue gas carbon dioxide for the improvement on eco-friendly environment, the Company cooperated with the Ministry of Economic Affairs and the Industrial Technology Research Institute, to build the world’s only automated dye-sensing battery test line in National Chiao Tung University, Tainan campus in December 2018. The dye-sensing battery can be widely used in the wireless sensor for the Internet of Things and the power supply for daily necessities.

On the operational safety and environmental protection front, the Company has always been putting equal emphasis on industry developments and environmental protection. As of the end of 2018, the accumulated investments on operational safety, environmental protection, and firefighting has reached TWD22.7bn, which was mainly spent on controlling pollution, saving energy, reducing waste and greenhouse gases, and improving operational safety and firefighting. The Company’s pollution treatment and emissions are better than national regulatory standards.

In 2018, there were 9 business units and 5 employees praised by competent authority. Among them, Mailiao PVC plant, HDPE plant, LLDPE plant, AN plant and MMA plant were all praised by Yunlin County and Ministry of Labor for strong performance on occupational safety and health. Mailiao PVC even received the “Occupational Safety 5-Star Award” from Yunlin County given the three consecutive years of praise awarded. Linyuan PP plant obtained the role model award money by Ministry of Economic Affairs for strong performance on energy conservation. Meanwhile, Linyuan plant were also praised by Kaohsiung Environmental Protection Bureau for its excellent performance on energy conservation with cross-departmental cooperation. Also, Renuw and Mailiao plant were praised by Ministry of Health and Welfare for strong performance on creating a safe and healthy working environment.

In terms of water and energy conservation and greenhouse emissions reduction, in 2018, the Company accomplished 460 improvement projects. Total water saved amounted to 5,340 tons/day while greenhouse gas emissions reduction reached 73,826 tons/year. Other ongoing 345 improvement projects would further conserve water by 3,375 tons/day and reduce greenhouse gas emissions by 168,124 tons/year.

Besides, the Company is promoting AI into operational safety, including the establishment of GPS system for employee safety, “Production Safety Management (PSM)” operations, equipment diagnosis, and continue to promote the “Execution Implementation SOP – Full Participation”, “Advanced Simulation” and, as a result to reduce abnormal operation and to secure the operation. At the same time, to conduct deep review and
and reducing environmental impact.

wastewater reduction, aiming at zero emissions for Renwu and instantly, conducted the improvement project on leakage, and set up FTIR to monitor air quality equipment components to strengthen the control on.

Looking into 2019, global agencies such as International Monetary Fund (IMF) and World Bank have revised down their forecast on 2019 global GDP growth given the impact from US-China trade tension, slowdown in China’s economic growth, Brexit risk, coupled with the impact from tightening monetary policies from Euro zone and US. The reasons above are likely to pressure the economic growth in the major economies.

In addition, looking into the historical upturn and downturn of global economic cycle, there was a recession in every 10 years, such as the Asian Financial Crisis in 1998, Global Financial Crisis in 2008, and 2018 could have reached the end of the economy upturn in the decade. Moreover, the petrochemical industry had remained its upcycle in four consecutive years since 2015 and the peak could have already ended in 2018. It is expected to face a challenging year of decline in 2019.

Nevertheless, in order to stabilize and mitigate the impact from trade tension, China government has rolled out measures such as the easing of environmental control, financial deleveraging, reduction on import tariffs, corporate taxes and fees, and the increase in export tax rebates. In the meantime, to expand spending on infrastructure improves domestic demand. These measures could help to improve the downstream plastic processing industry. Furthermore, although the US is now experiencing the slower pace in economy growth, petrochemical demand should not shrink sharply, which should be supported by the large domestic market in the US, the US presidential election in 2020, of which President Trump would create a favorable environment on both financials and economy, and the expectation on the growth in global economy in 2019.

However, there are still many variables that might affect global economic growth and petrochemical industry, which includes (1) the development of US-China trade tension, (2) the monetary policy in EU and US, (3) Brexit development, (4) the geopolitical risks in Middle East, (5) the trend of crude oil prices. The Company will still need to respond prudently when it comes to the potential problems mentioned above.

In the new year, facing the uncertainties brought by US-China trade tension and the environment under the unpredictable global market changes, the Company has prepared for the long resistance war. In view of the fact that AI is the key to future growth and competitiveness, the Company will expand its application into selling and production optimization, distillation tower energy saving, intelligent monitoring system maintenance, automatic optical inspection (AOI) image recognition, instrument digitization, product defect identification and other improvements, in order to avoid operational issue to ensure a smooth production, improve product yield and customer’s quality satisfaction, as well as reduce energy and raw material consumption to lower cost. In the meantime, to strengthen the Company’s long-term competitiveness via full implementation of AI model through rapid replication between plants.

Aside from this, the Company’s scheduled maintenance shutdowns in 2019 are lower than that in 2018. Although there will be fewer days of maintenance shutdown for ethylene capacity in Taiwan in 2019 from 2018, the Company will seek for imports to cover the shortfall in raw material, aiming to reach the target of “full production and sales”. Also, in an attempt to elevate sales volume for differentiated products and business operation, the Company will implement flexible sales strategies, diversify market into emerging markets such as India, Bangladesh, Southeast Asia, New Zealand, Australia and Africa, continue to expand sales agents in each region, and set up overseas warehouses in Vietnam and Bangladesh under the opportunity of international trade flow and supply chain restructure trend.

Meanwhile, the Company will continue to implement the review for strategy regarding to production, sales, research for each product, and will continue to hold innovation presentations, enhance the R&D and innovation, focus on the R&D of forward-looking products, recyclable and biodegradable green plastics, and continue to promote the circular economy to create an eco-friendly environment, as well as to develop new high value-added compounds for new applications to boost the Company's profit. In addition, the Company will aggressively promote the transformation program of Renwu complex, other capacity expansion and debottleneck projects. Through the efforts above, the Company expects to strengthen its business and to save growth momentum, and accordingly, to make the breakthrough of the challenges in 2019 in a constructive pace and achieve another new record in 2019.
In the first three quarters of 2018, as far as NPC’s scope of business is concerned, there are four major categories of products: plastic processing, petrochemicals, polyester, and electronic materials.

Plastic Processing Products

With regard to plastic processing products, NPC continues to engage in transformation due to increasingly mature processing technology and price war in Mainland China. Besides, NPC has incorporated automated monitoring to ensure stable quality during production. At the same time, NPC has accelerated the research and development of new applications, new materials, as well as products that meet the trend of environmental protection and unique specifications, in order to expand into new niche markets, thereby increasing the proportion of sales and profit of differentiated and high-value products.

NPC deploys our production and marketing operations at various plants in Taiwan, Mainland China, the U.S., and Vietnam in a timely manner according to the characteristics of each market, supplemented with the launch of e-commerce and online marketing, to expand into high-end markets such as the U.S. and Japan, as well as emerging markets with high potential, so as to provide customers with satisfactory services.

In the fourth quarter of 2018, global economic growth has declined, while oil prices have fallen by 40% from the highs at the beginning of October to the lows at the end of the year. As market demand froze rapidly, customers sat on the fence, dropping sales orders, our overall performance reflected a sharp downturn in the business environment.

Despite the significant change in the fourth quarter of 2018, NPC still managed to post a revenue at a record high, and achieved the third highest net income and earnings per share in our history, thanks to the foundation laid in the previous three quarters.

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Through various efforts made by NPC, plastic processing products are still able to provide stable profits.
Petrochemical Products

In regards to petrochemical products, in line with vertical integration and division of labor in the Sixth Naphtha Cracking Plant in Mailiao, NPC’s products, including ethylene glycol (EG), Bisphenol A (BPA), 1,4-butylene glycol (1,4BG), plasticizers, phthalic anhydride (PA), 2-ethylhexanol (2EH), and epoxy resin (EPOXY), have been vertically integrated with upstream and downstream industries, thereby forming a complete supply chain, which supports the development of downstream industries such as polyester, electronics, and plastic processing, respectively.

In the first three quarters of 2018, prices and volume of petrochemical products increased considerably due to rising international oil prices and market demand. However, oil prices fell sharply starting October. Besides, the China-U.S. trade war and economic slowdown in China led to a decrease in prices of petrochemical products. Yet, NPC continuously promoted the improvement of various process optimizations, and fully comprehended market developments so as to effectively regulate production, sales, and inventory. Besides, NPC also stepped up efforts to expand into sales regions outside Mainland China in order to actively diversify our target market. By adjusting our production and sales strategies, NPC recorded a higher revenue and profit in 2018 than those in 2017.

Polyester Products

In terms of polyester products, their prices and volume increased considerably due to significant increase in market demand and rising raw material costs in 2018, with polyester bottle chips showing the most obvious growth. Among differentiated and high-value products, polyester cotton and silk have achieved better performances. Shortage of passive components among downstream customers led to a considerable increase in demand for polyester release film products, thus demonstrating significant profit growth.

In the future, NPC will actively develop and promote products related to environmental protection, recycling and green energy, and collaborate with well-known brands to expand the application range of polyester products. In addition, NPC will also develop high-value products to segment the market and expand sales territory, while controlling product quality to enhance customers’ recognition in order to open up new markets, so that sales will continue to increase, thereby maintaining stable profits.

Electronic Materials

Regarding electronic materials, various electronic product application devices continued to develop since the fourth quarter of 2016. Rising demand for electronic materials, along with a lag in the expansion of production capacity by manufacturers, has brought about a period of prosperity for this industry. With the gradual resumption of newly expanded production capacity in 2018, tensions in supply and demand began to slow down. In the first half of the year, market demand was stable; however, affected by the China-U.S. trade war in the fourth quarter of 2018, orders and demand for home appliances and other consumer electronics products dropped due to increasing market uncertainty, thus forcing end customers to reduce inventory and response to urgent orders, and make orders conservatively.

In the future, NPC will use our advantage from complete vertical integration involving upstream and downstream industries to accelerate the adjustment of production and sales strategies, as well as transformation in response to market developments. Moreover, NPC will actively launch and promote differentiated products and increase the sales proportion of high-value and highly functional niche products, while striving for full-scale production and sales; flexibly deploying production and sales operations in manufacturing plants located in both Mainland China and Taiwan, thereby driving revenue and profit increase.

Nan Ya Technology Corp., another company invested by NPC, is committed to the development,
manufacture and sale of dynamic random-access memory (DRAM) products. In 2018, it completed the development and sale of 20nm 8Gb DDR4, 4Gb DDR4 and 2Gb DDR3 etc., and reactivated the development of the server product market. In 2019, it plans to introduce a series of low-power products, with a view to enhancing the diversification of product applications and increasing competitiveness. Due to the healthy environment of the overall DRAM industry in 2018, its operating profit continued to rise, thereby generating profit at record high once more. In the future, DRAM is expected to be an indispensable key component in emerging applications, including 5G, artificial intelligence (AI), electric vehicles, and big data. Hence, Nan Ya Technology Corp. will continue to enhance its capabilities, including process technology, product design, and customer service in response to market demand, so as to provide customers with the best memory solutions.

Looking forward to 2019, the biggest uncertainty in the global economy is the evolution of the China-U.S. trade war. Given that every link of the global industry chain is tightly connected, international trade tensions will affect all economies in the world and inhibit economic growth momentum. With such a concern in the general environment, international research institutions have revised the global economic growth rate downward.

In summary, the global economy will continue to be affected by multiple factors, including the China-U.S. trade war, cross-strait relations, and oil price fluctuations. In the face of a complex international scenario, maintaining stable growth and profit continues to be NPC’s most important goal.

NPC had achieved the expected results for four operational directions launched in 2018. These operational directions include: (1) Actively expand and segment the market to increase capacity utilization rate; (2) Enhance research and development, and develop high-value and differentiated products to increase profitability; (3) Implement circular economy, as well as reduce the use of resources and implement reuse of resources to realize cost-effectiveness; (4) Comprehensively promote process optimization and Industry 4.0, and incorporate AI to enhance product competitiveness.

Changes in the global economy will be more and more difficult to predict in the future, and a complex and ever-changing international environment will affect global economic development. In the face of such an adversity and challenge, NPC adheres to our philosophy of inquiring into the root of the matter and aiming at the sovereign good, while continuously making improvements and pursuing rationalization. NPC will continue to drive the four operational directions above, where process optimization and AI will become the most important themes this year. NPC will use AI to develop the best process operation methods and conditions in order to enhance product quality and production efficiency.

Our ongoing capital expenditure plans include not only improvements in process optimization to increase production capacity and efficiency, but also continuous increase in domestic and overseas investment. Among our ongoing investment plans, domestic plans cover investments in high-value copper foil, polyester films, and PP synthetic paper, whereas overseas investment plans mainly involve the expansion of EG factory in the U.S. and copper clad laminate and glass fabrics factories in Mainland China. After going into production, it is estimated that these factories can generate an annual production output of NT$50 billion, which adds new production capacity to NPC, thereby driving continuous performance growth.
In 2018, despite the numerous uncertain factors such as global geopolitical clashes and Brexit that had impacts on the international economic developments, the interest raise and powerful economy recovery in the US contributed to a slowly growing global economy. The international Brent crude oil price climbed all the way from US$66 per barrel in the beginning of the year to US$85 per barrel in October. As the China-US trade clash surfaced, however, the price dropped again to the bottom, that is, US$50 per barrel at the end of December. The sudden acute setback in oil prices and the China-US trade clash were a blow to the confidence on the market to result in hindered profit momentum for the operations in the fourth quarter. The company, however, continued to promote optimization and valuation of its portfolio by thoroughly enforcing recycling and re-utilization of raw materials and energy and started to introduce artificial intelligence for enhanced feed-in and production process control efficiency. The company will keep with its robust operation.

Among the consolidated revenue of 2018, net income from the parent company accounted for NT$217,923 million or 53.4% and that from the other subsidiaries in Ningbo, Vietnam, and Formosa Taffeta Co., Ltd., was NT$189,936 million or 46.6%.

Among all the products of the parent company, petrochemical and plastic products remain to be the main contributors to the revenue. Together, their net income accounted for 92.4% of the parent company’s revenue in 2018. Petrochemical products, in particular, totaled NT$140,300 million and plastic products NT$61,000 million and respectively accounted for 64.4% and 28% of the parent company’s net income.

For petrochemical products, the focus was placed on continued process improvement, raw material and energy conservation, reduced processing cost, and expedited promotion of expansions overseas. In terms of aromatic hydrocarbon products, after the Aroma II plant finished updating and improving the recombination furnace convection zone and the Aroma III plant updating the recombination catalyst in 2018, energy consumption is reduced to save the cost, process stability was enhanced as well. In
Business Overview

For synthetic phenol products, besides expansion from the Mai-Liao plant. The de-bottleneck improvement project began in the Ningbo plant in Mainland China. The annual capacity of phenol is planned to make it more flexible for the sale of phenol products. As far as PTA is concerned, downstream new plants in Taiwan and Ningbo showed significant increases compared to those in 2017. In 2019, for the sales of the Taiwan plant, besides maintaining the steady supply to loyal domestic customers, efforts will be devoted to secure a bigger domestic market share. For exports, besides supplying Formosa Industries Corporation in Vietnam, continuous efforts will be devoted to expanding the number of customers processing imported materials in Southeast Asia, the Middle East, and Mainland China to ensure full-load production of two existing production lines. Although current market share of the Ningbo plant is only around 2.6%, the steady quality and lead time have been deeply trusted by customers. Plus the process overhaul project completed in 2018, the processing cost has been significantly reduced and competitiveness is not a cause of concern. The sales will remain smooth. In 2019, besides working hard to reduce acetic acid and water consumption, new plant expansion contributing to an annual capacity of 1.5 million tons will be promoted.

As far as PIA is concerned, after constant process optimization and improved product quality, sales are currently available in 35 countries or regions around the world and it has become a mainstream brand on the market. In 2018, due to the fact that part of low melting point cotton was replaced by MPO and the increased production sizes of PIA from Korea LOTTE and Spain INDORAMA, the source of supply generally appeared to be eased on the market. PIA, to ensure the downstream demand for resins and coatings, the selling price throughout the year dropped compared to that in 2017 to result in a significant decline in the revenue and profit margins compared to that in 2017. In 2019, besides the priority to develop polyester customers that are newly commissioned in Mainland China, expanding the potential quality customer base in the Middle East, Russia, and other regions where customs duties apply and competitive criteria are identical will continue to ensure steady production of PIA in Long-de and to get ready in advance for sales once Ningbo PIA is commissioned.

In terms of plastic products, the first half of 2018 continued with the economy recovery trends for the trading and manufacturing sectors in 2017. Global economic prospects are optimistic. Starting in October, however, the oil price took a downturn to impact prices of raw materials. Meanwhile, the China-US trade clash made downstream plastic pellet customers conservative; they kept their inventory low in response. As a result, the prices remained low and were supported only by rigid demand; this was the cause of the relative decline in profitability throughout the year compared to 2017. Despite the low inventories kept by downstream customers, our company held onto the opportunity frequently visiting them and making effort to expand sales. As a result, the overall sales still grew by 2.9% compared to those in 2017. Looking into 2019, the China-US trade clash remains the focus of attention on the global market. Besides securing production and working for full-production and full-distribution, the company needs to expedite and maximize product differentiation and market diversification and continue to put solutions into action, support customers timely in terms of technology and source of materials, and pay attention to the financial easing measures in Mainland China as well as preferred policies in automobiles and home appliances so that the impacts from the trade war may be minimized.

In 2019, various types of plastic products will continue focusing on valuation and market diversification. In PS aspect, high-value products increased from 29.4% in 2017 to 30.4% in 2018 and the goal for 2019 is 32.7%. As far as market diversification is concerned, on the other hand, it is hoped that it can drop from 47.2% at the moment to 43.2% in Mainland China and Hong Kong in 2019.

In ABS aspect, the sales of special grade pellets of the Taiwan plant in 2018 accounted for 26.8% and those of the Ningbo plant in 21.8%. In 2019, efforts will continue in the exploration of high-threshold and high value-added special products in order to maximize the ratio of sales. For the Taiwan and Ningbo plants, the goal will be 28.3% and 24%, respectively. The Taiwan plant will focus on regions excluding Mainland China and work hard to raise sales volume to 27.9% in the location in order to diversify market. In addition, increased production of PC/ABS compound pellets in Taiwan will be proactively promoted. The target will be to grow 25.8%. For the Ningbo plant, on the other hand, improved sales of PC/ABS of the electroplating grade

addition, respective plants will continue to conserve energy, reduce emissions, and improve circular economy for enhanced energy use efficiency. Archived now available big data will be utilized proactively for comprehensive application of AI technology as the main tool to help improve the process.

The production of styrene (SM) remained steady throughout 2018 and multiple water and energy conservation improvements were accomplished to effectively bring down the production cost and increase profitability. Looking into 2019, the SM-III plant is going through the periodic inspection during the second quarter; the dehydrogenation catalyst will be updated and distillation column heat integration for improved energy-saving performance will be completed, which will further enhance the production performance. Energy reduction and process AI improvement will continue this year. Meanwhile, proactive efforts will be devoted to developing the Indian and Southeast Asian markets to avoid over-dependency on the Mainland China market and to ensure profitability.

For synthetic phenol products, besides expansion in the sales to keep full-load production, efforts were devoted to enforce the energy-saving solution to help reduce the production cost and enhance profitability in 2018. Looking into 2019, the plant in Mai-Liao, Taiwan will go through the periodic inspection in March and full-load production will be remained for the other months. It is expected that the capacity of acetone will still be in surplus. Nevertheless, service is arranged for phenol plants, which will lessen the stress brought about by surplus. In addition, in Mainland China this year, there is the issue of the levying of anti-dumping duties. Taiwan has been excluded from the said policy, which will make it more flexible for the sale of phenol products from the Mai-Liao plant. The de-bottleneck improvement project began in the Ningbo plant in Mainland China. The annual capacity of phenol is planned to increase from 300 thousand tons to 400 thousand tons. Once completed, it will enhance the operational performance and increase profits.

As far as PTA is concerned, downstream new polyester plants were commissioned one after another in 2018. With the increased demand for PTA and relatively low inventory in society, the selling price throughout the year was higher on average than that in 2017. Both the revenue and profit margins of the plants in Taiwan and Ningbo showed significant
and the flame resistant grade will be prioritized. Sales representatives will continue to understand the status of demand in depth by visiting downstream plants and jointly develop with customers the required materials and provide them with solutions to facilitate a long-term steady partnership.

In terms of PP, the company will make steady production as its top priority in 2019 by continuing to develop towards high liquidity and light-weight. For special products, in particular, it will increase to 53.5%. For medical device and contact lens male and female die materials, on the other hand, because of the extreme quality superiority, the market share will be further enlarged. The goal will be 10% of the overall production. For regions excluding Mainland China and Hong Kong, the target sales in 2019 will be 60.7%, a growth of 10.2% from those in 2018 and the markets will mainly include Israel, other countries in the Middle East, the US, Canada, South America, Vietnam, and Japan.

For PC, the company has continued with the valuation policy to accommodate the industrial demand of each customer and sales by the specifications sold domestically or exported are adjusted. Increasing sales of special grade is a priority. In 2019, continued efforts will be devoted to steady production and supply of highly liquid, highly photo permeable light-guide, telluride copolymerization, and highly liquid weather resistant special products to reach out to the high-end market. Forty thousand tons a year will be the goal. Meanwhile, emphasis will be placed on reaching the sales out to other regions to proactively decentralize the market, including daytime running lights for automobile customers in the Netherlands and Italy, tool kit and electrical switch material customers in Israel, CD and LED lighting industry customers in Vietnam to keep the good reputation of the company on the market going and create a desirable customer relationship, ensuring steady high profitability.

Fiber and textile products were impacted by the sluggish demand from end users, the price-cutting competition from Mainland China, and more supply than demand on the market in 2018. Although the revenue and profitability were still undesirable, there have been improvements. For 2019, valuation and development of new markets will be the priorities for rayon staple fiber. Full-capacity production was secured in 2018 for nylon filament. New products and markets were explored to contribute revenue to growth and to turn from losses to gains. In the future, differential mass production of recycling environmentally friendly silk and color silk, steady production quality, and combining the brand will be the distribution focus. Also, reflective of the demand of downstream customers, an integrated distribution network will be established for the upstream, mid-stream, and downstream.

In addition, the profits of synthetic yarns turned losses to gains for Formosa Industries Corporation in Vietnam because of transfer of orders for SPP pellets from the US and Japan to Vietnam and the increased number of operating hours for the power generators in 2018; both the revenue and profit margins showed growths. In the future, in light of the increased demand on the market, expansion and investment in facilities for polyester bottle pellets are ongoing. Given the superior geographical location of Vietnam and the vast ASEAN market, the production plan will be adjusted according to the market trends and the scale will be enlarged to boost competitiveness. It is expected that Formosa Industries Corporation will continue to see robust growths in 2019.

Under its corporate beliefs in “getting to the heart of the matter” and “aiming at absolute perfection”, the company has enforced related improvements in industrial safety and environmental protection, among others and been living up to its corporate social responsibilities. In terms of industrial safety, the Long-De facility was recognized as excellent occupational safety and health institution for the third consecutive year in 2018 and accepted the “Five-Star Award for Occupational Safety and Health” from the Ministry of Labor. The acetic acid plant and the facilities in Xiangang and Long-De were awarded from the Ministry of Health and Welfare the “2018 Outstanding Workplace”. In 2019, promotion of personnel, equipment, and environmental safety will continue to realize a people-oriented safe environment. By organizing PHA, JSA/SOP, MOC, and false alarm exemplary case presentation and safety supervisor and undertaker educational training programs, continuous efforts are devoted to exploring blind spots in industrial safety management and to eliminating potential industrial safety risks. Safe production with “zero occupational hazards” will be the goal.

As far as environmental protection is concerned, best available control technologies (BACTs) and energy efficiency-optimized process and pollution prevention and control equipment will continue to be adopted to reinforce related operations such as waste reduction. As of the end of 2018, the accumulated value invested in prevention and control of pollution had reached NT$18,087 million. In addition, believing in circular economy, the company continued to promote “energy conservation and emission reduction” to bring down carbon emissions and for sustainable utilization of water resources in honor of its corporate responsibilities in reducing greenhouse gases, fulfilling sustainable management. In 2018, the phenol plant received the “Silver Medal” for Division B of the “Energy-saving Signature Award” from the Bureau of Energy, Ministry of Economic Affairs. The PTA facility in Mai-Liao was awarded by the Water Resources Agency, Ministry of Economic Affairs for outstanding water conservation performance in the industrial division. Over the years, for the promotion of energy conservation and reduced emission, a total of NT$10,986 million has been invested and 4,534 projects for improvements have been completed, saving a total of: 90,800 tons of water a day, 959 tons of steam per hour, and 110 mw/h of electricity per hour. The combined benefits reached NT$10,052 million. A total of approximately 3,587,000 tons of CO2 was reduced in emissions, which is equivalent to greening and forestation spanning 298,000 hectares in area.

Looking into 2019, the global economic growth will fall short of expectations and will be gradually downgraded. The tense trade relations between the US and China have taken a toll on the world. In light of the high level of dependency of foreign trade of Taiwan on Mainland China, this will impact Taiwan to quite some extent. As protectionism rises in respective countries, it is hoped that the cross-strait relations will ease and new FTAs will be signed to minimize trade barriers. In addition, subsequent developments of the China-US trade clash and impacts of events such as trends in international oil prices, exchange rate variation, and Brexit on the economy will be closely watched so that the Company can adjust its operation adequately in response to the world situation.

In Taiwan, besides continuing with the investment in de-bottleneck that helps improve the production structure and in the improvement of circular economy to better stabilize product quality and the manufacturing process, the company has personnel, equipment, and environment as its three safety goals. The application of AI is comprehensively promoted in respective production facilities in order to reduce energy waste and bring down cost. AI will be a prerequisite tool for any enterprise that is to create greater efficiency in sluggish economy. In addition, for sustainable management, the investment projects in Louisiana, USA, and Ningbo, China will continue to help secure future developments of the company.
Foreword

The year 2018 can be best described as “drastically unpredictable”; far different from the previous year when trends of economics gradually progressed toward stability, in 2018 impacts of all sorts, including politics, economics, and technologies, brought about variables to different fields, and further affected the developments of all industries. The burst of the Sino-US trade dispute, the radical fluctuations in oil prices, and the bloom of artificial intelligence technology, all of these have not only added uncertainty to business operations, but also seem to have foretold the increasing challenges and competitions thereafter. Despite the unpredictable business environment, Formosa Petrochemical Corp. (FPCC) has worked scrupulously to comply with various industrial safety and environmental protection principles, implement cost management, and integrate continuously artificial intelligence into production procedures; meanwhile, FPCC has also been pushing its overseas investments into higher gear. Although disturbed last quarter by the sudden price changes among crude oil and chemical products, FPCC’s performance over the year still excelled, demonstrating remarkable results.

Business Operation

(1) Refining Business

FPCC’s Refining Business coordinated with integrated sales logistic planning, dexterously adjusting production patterns of refining units and yield-rates of oil products in react to crack spreads alternation, to maximize overall performance. Due to fewer scheduled maintenances, refining throughput in 2018 was rather stable and hit record high at 504,000 barrels per day, a 7% increase compared to that in 2017. In respect of FPCC’s petroleum sales strategy, domestic market development was still prioritized. For sales of gasoline and diesel, the primary objectives were to increase domestic distribution and to expand the number of channels and franchisees; proactive utilizations of various advertising channels, such as the collaboration with Dajia Jenn Lann Temple’s Chinese New Year Festival, Yilan County’s International Children’s Folklore and Folkgames Festival, and Taitung County’s Taiwan International Balloon Festival, were implemented to advertise features of the 95+ unleaded gasoline and of diesel. Additionally, FPCC scaled up the cooperation with Uber and launched a platform-based fuel card in an attempt to boost the overall sales volume of gasoline. Moreover, FPCC not only teamed up with the Victory Petrol Station, which is operated by disadvantaged staff members, to provide assistance in onsite refurbishment and hardware upgrades.

FPCC’s consolidated revenue in 2018 came to NT$767,550 million, a 23% increase compared to NT$624,108 million in 2017; consolidated earnings before tax was NT$74,547 million, a 22% decrease compared to NT$96,095 million in 2017. Earnings per share after tax was NT$6.31 per share.
(3) Utility Business

Generation units, whose primary goal is to supply the steam and electrical power throughout the Mailiao Complex sufficiently and stably to the extent of self-sufficiency. In recent years, for the sake of air-pollution reduction, FPCC, aside from enhancing cogeneration efficiency, has proactively adopted various kinds of advanced technology regarding improvements in contamination control, in pursuit of the balance between economic development and environmental protection. In the year of 2018, the utility business generated 21,589 KT of steam and 14.8 billion KWH of electricity; overall production and sales were higher than the previous year due to less maintenance.

(2) Olefins Business

Situated in the upstream of petrochemical industry, the Olefins Business has been consistently supporting downstream units within Formosa Plastics Group, and has optimized product combination with strengths in economies of scale, cost advantages, and flexible feedstocks, all of which have made decent demonstration of the synergy of upstream-downstream collaboration. In 2018, the annual ethylene production was 3,078 KT, a 1.3% increase compared to that in 2017.

In the first three quarters of 2018, market supply was reduced due to intensified turnarounds on Asia-based ethylene plants, and that along with positive petrochemical market prospects, provided supports for the prices of downstream products at the higher end. Starting from the fourth quarter, however, both buying spree and prices of petrochemicals plummeted under the pressure of the dropping crude oil price and of the heated Sino-US trade dispute. During the period when oil prices kept falling, the cost of naphtha consumed price was also negatively impacted due to the time difference of received raw materials pricing in the previous period and the devaluation of inventory. All the above factors have caused a decline in year-on-year profits.
Coexistence with the Environment

FPCC continuously promotes all sorts of management and improvement projects in order to minimize industrial accidents and environmental impacts. In addition, circular economy concepts, as well as various operations for energy and water saving, have been assiduously implemented to achieve the win-win situation for industrial safety, environmental protection, and economic growth.

In 2018, FPCC completed a total of 266 improvements regarding water-saving, energy-saving, and greenhouse gas emission reduction, and was granted the “Award of Excellent Performance - Industry” in water-saving by Water Resources Agency, Ministry of Economic Affairs. The efforts result in 3,372 tons per day of water-saving, 6,771 KW of energy-saving, and 141.8 KT per year of greenhouse gas emission reduction. Furthermore, a desalination plant with a capacity of 100 thousand tons per day is now under preparation, and has received the permit of Environmental Impact Assessment. The plant is scheduled to finish commissioning test in the second half of 2021 and operate officially afterwards.

For air pollution prevention, beginning 2018, vessels owned by FPCC porting at Mailiao Harbor are required to turned for low-sulfur fuel to decrease air pollution emission. The regulation will extensively apply to all other vessels in 2019. More measures, such as the installation of shore power electricity infrastructures and the requirement for allowing only diesel trucks that comply with the Stage 4 Vehicle Emissions Standards (or above) into the Complex, were put into execution, which earned Mailiao Harbor the EcoPorts Certification awarded by the European Seaport Organization (ESPO) in September 2018, and made the Harbor the very first industrial port in Asia to receive the honor.

To be in line with the policy of Yunlin County, FPCC has substituted coal for petroleum coke as the fuel for the Company’s two sets of circulating fluidized bed (CFB) boilers, whose commissioning tests were completed in October 2018. Moreover, the Company proactively enacted a pollution improvement project to reuse heat emitted from boiler chimneys so as to eliminate visual pollution. The retaining of boiler heat can reduce moisture condensation, and therefore achieve the elimination of white smoke. The project will be progressively completed by the end of 2020.

Sales Targets

In 2019, except for scheduled annual turnarounds, all refinery and petrochemical units are set to operate at full capacity. The expected sales for gasoline is 6,145 thousand KL, and 10,898 thousand KL for diesel. As for exports, FPCC will consistently work with oil dealers and brokers to develop gasoline markets in Singapore, the Middle East, and Indonesia, while actively expanding the diesel markets in New Zealand and Australia.

In respect to petrochemical products, the expected sales volume of ethylene, propylene, and butadiene are 3,072 KT, 2,496 KT, and 414 KT respectively. Utility Business, on the other hand, will mainly focus on stably providing electricity and steam to the Complex in accordance with production plans.

Prospects

Looking ahead to 2019, the overall business environment is expected to be strewn with hurdles and impediments. Global economics has been dragged by the unresolved Sino-US trade dispute and the US interest rate rise policy which weakened the momentum of economic growth. Taking into account the non-economic factors, such as regional political tensions and climate changes, that worsen economic uncertainty even more, many of the major forecasting institutions predict that the global economic growth rate will slope downwards this year compared to 2018, and the main reason is the retarded economic growth in China and the US.

From a market perspective, overall supply is estimated to be on an upswing due to the capacity added from the newly built refineries and ethylene plants based in Asia and the US; furthermore, improved vehicle energy efficiency and new energy policies will certainly cause substantial impact on the demand. All of these unfavorable factors will only intensify market variation and competition in the refining industry. Despite the difficult global economy and upcoming external challenges, FPCC will still adhere to a high standard of industrial safety and environmental protection principles, and keep applying Industry 4.0 and big data analysis to the optimizations of operation, targeting stable business performance in harsh environments.
The 2018 US economy continued steady growth, benefiting from reduced unemployment and gradual improvement in various economic indicators. With US natural gas prices remaining low, resulting in relatively low prices for ethane, propane, and electricity, our competitive advantage increased and petrochemical profits grew steadily. Thanks to our vertical integration and stable PE/PP market demand in North America, we maintained profitability during the year through excellent production and successful sales of different products.

All three major product segments, Olefins and Polyolefins, Chlor-Vinyl and PET/Fiber, continued efforts to improve product quality, optimize operational processes and improve production efficiency. These efforts contributed to the advantage in cost positions and competitiveness in the North American marketplace.

In the Olefins and Polyolefins segment, both our oil & gas operations and the spot market supplied natural gas, ethane, and propane to our olefins crackers. The crackers produced 1,670,000 tonnes of ethylene and 660,000 tonnes of propylene per year. The polyolefins operations produced 1,270,000 tonnes of polyethylene (PE) and 920,000 tonnes of polypropylene (PP).

In Chlor-Vinyl segment, the Utility Venture generated electricity for FPC USA to produce 1,490,000 tonnes of PVC resin. Using a portion of the resin, NPC USA produced 78,000 tonnes of rigid PVC film and NPCA produced 48,000 tonnes of flexible PVC film.

In PET/Fiber segment, FPC USA produced the ethylene used by NPCA to produce 360,000 tonnes of ethylene glycol, 860,000 tonnes of polyester derivatives and NPC USA to produce 11,000 tonnes of Pet Rigid Film.

Our marketing strategy balanced production and sales among our North American customers, as our key focus, as well as our export customers. In building
customer relationships, we established broad customer bases and selected specific product grades to develop new customers strategically. We also formed partnerships for new products through research and development. In North America, we focused on high-growth, high-profit margin segments across customers of different sizes. Our exports focused on the growth in Mexico, Central and South America to take advantage of low freight costs.

Looking forward to 2019, although the US economy has grown steadily, growth in major economies, including the EU and China, has slowed. Affected by the US-China trade war, it is expected that the situation will not be optimistic in the next few years, and the United States will resume economic sanctions against Iran, disrupting the global trade in raw materials. Economists warn that the trade war between the United States and China will be the biggest threat to the US economy in 2019, and it may also lead to a further risk of economic slowdown. Overall, we remain cautious, although we continue to see the continuing cost advantage in US petrochemical industry.

For our Phase 4 Expansion, FPC USA has obtained all required permits from the US Environmental Protection Agency (EPA) and Texas Commission on Environmental Quality (TCEQ). High Density Polyethylene III (HDPE-3), Low Density Polyethylene (LDPE), and Olefins III Plant are expected to startup from second quarter of 2019. We also continue EG-2 Plant and PP-2 Train-3 Unit construction and expect to complete them soon. Genuine efforts will be made to complete these projects as scheduled.

We have always had a core management goal of ensuring sustainable operation and growth. Achieving this goal depends on our ongoing efforts to emphasize environmental and safety management, human resources management, employee skills enhancement, new products development, and increasing our sales and service capabilities – with a focus on high profit margin, long-term customers who demand excellent product quality and services.

We fully expect that these marketing and operational efforts will strengthen our presence in our markets, grow our market share and further increase profitability.

In addition to these four major corporations, the Formosa Plastics Group has many other affiliates.

Our domestic affiliates include:

Our overseas affiliates include:
Formosa Plastics Corporation, USA, Nan Ya Plastics Corporation, America, Formosa Ha Tinh Steel Corporation and P. T. Indonesia Nan Ya Indah Plastics Corporation. FPG's investments in Mainland China include Formosa Plastics Corporation, Nan Ya Plastics and Formosa Chemicals & Fibre Corporation.

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Chang Gung Memorial Hospital

Established in 1976, Chang Gung Memorial Hospital (CGMH) is now in its 43rd year of operation. Adhering to the belief of “What is Taken from the society is to be used in advancing the interests of the Society”, we have overcome numerous obstacles during that timeframe. By integrating teaching, research, services and sound management, we have created an institution that serves the public as we strive toward upgrading the level of medical care and enhancing the well-being of the society.

1. Teaching

As a teaching hospital, we have launched cooperative programs with major medical schools in the country to provide their interns with clinical training. We have also developed a highly respected resident training system designed to nurture highly competent attending physicians in different specialties. In 2018, 124 residents finished their training program at CGMH for promotion to Attending Physician. Over the years, CGMH has graduated over 3,873 students to achieve excellent performance in their respective careers in the medical profession.

2. Research

To encourage R&D, we provide funding for clinical research, basic Medical research and international studies for our medical, nursing, technical and administrative staffs. In 2018 we conducted more than 3,120 medical research projects under the commission of the National Science Council and the Department of Health. In addition, we provided funding of US$123.4 million, published nearly 2,775 papers in domestic and international journals and supported international studies for 71 research staff personnel.

3. Services

As one of the biggest general hospitals in Taiwan, both our facilities and our level of health care are on par with first-rate hospitals around the world. By the end of 2018, we offered 9,000 beds with health care services provided by over 23,900 employees. In 2018 we served over 9.1 million outpatients and admitted almost 314,000 patients for inpatient services.

4. Management

To achieve the goal of enhancing service quality and controlling medical costs within reasonable limits, for over 42 years we have constantly evaluated local conditions and needs, inquiring into the root of every problem. With patients at the center of our mission, we have embraced innovations allowing us to provide the best possible medical care, to make the most of limited resources and to enhance the quality of health care in the country.

In terms of management, we follow the belief of Founder Wang and the spirit of ‘inquire into the root of the matter and aim at the sovereign good’. In terms of service, one out of every three people in Taiwan has been a patient of CGMH. In terms of teaching, one out of every four doctors in Taiwan has been trained by CGMH. In terms of research, we publish over 2,700 papers a year in world-leading medical journals. We search for excellence in every aspect, establishing CGMH in the world arena.
In recent years, rapid changes in Taiwan's society and economic environment have increased the public's need for quality medical care. The change in the country's national health insurance policy presented significant challenges to medical institutions. Chang Gung Memorial Hospital's spirit of social responsibility drives us to adopt every countermeasure possible to reduce the impacts and burdens of these changes as much as possible. As a result, 2018 operational income growth remained stable. Further, patients and the community have recognized the hospital's devotion to providing service and quality medical care.

To further enhance the quality of our medical service, we have embarked on a wide range of service improvement projects. For example, we introduced a 24-hour Internet and computer voice appointment booking service that allows patients to make appointments over the Internet or phone instead of showing up in person to make an appointment. The computerization of doctor orders has substantially shortened the time necessary for outpatient patients to make payment and pick up their prescriptions. 99% of patients have been able to leave the hospital within 15 minutes after their consultation.

The implementation of the CGMH website now allows the public to learn more about our services. The Electronic Medical Record (EMR) And Picture Archiving and Communication System (PACS) allow doctors from different branch hospitals (including outside institutions in the coalition) to access and exchange medical information and patient's images. To give our patients the best medical care possible, we are also promoting the Clinical Path Way and Protocol Project. This project provides computer-based tools to help doctors make accurate diagnoses and provide effective treatments.

In the area of organ management, we continue to promote the concept of organ donation and perform organ transplants. In 2018, CGMH received organ donations from 84 people and performed organ transplants that included 104 cornea cases, 9 heart cases, 5 lung cases, 85 kidney cases (include 45 case of vivo transplant), 203 liver cases (include 174 case of vivo transplant). The hospitals also handled 1 anatomical pathology cases, and 8 body donations.

CGMH has also been active in providing advanced social services. In 2018, CGMH provided relief to over 4.36 million patients, representing an outlay over US$ 17.25 million from our social service fund.

Our facilities have expanded our service area and fulfilled the aspiration of Founder Wang to care for both the young and the elderly. For example, recognizing the specialty services for children in Taiwan were inadequate compared with those offered in other advanced nations, CGMH established children's hospitals in Linkou and Kaohsiung in 1993 and 1995, respectively. These hospitals have trained pediatricians of various sub-specialties and treated numerous acutely or critically ill children in these regions.

In addition, in 2003 we established a hospital for patients with Chronic illnesses and a nursing home in response to the aging population in Taiwan, where over 12.5% of the population is over the age of 65 and face a lack of long-term care facilities. Other efforts to address this issue included the establishment of a health culture village to provide the elderly with proper and comforting care. Given that medical resources in Taiwan were relatively scarce in the Chiayi and Yunlin district, in that community we built Chiayi and Yunlin branch that opened in December 2001 and December 2009.

For the proper care of cancer patients and to protect people health, we invest billions of dollars to set up the Asian first and largest Proton radiation therapy center at Linkou Y.C.WANG Center for Advanced Medicine. Had started service since Nov 2015. We have also set up YUNG-CHING Premier Cancer Therapy Center and provided proton radiation therapy at Kaohsiung branch since Oct 2018. In the view of Founder Wang, after five thousand years of development Chinese medicine is an invaluable asset that reflects the amalgamation of wisdom and experience of our ancestors and warrants being carried forward. Thus, in 1996 we became the first among large medical centers to set up a Chinese medicine department at our Linkou medical center and started at our other centers. In practice, we will unite the concepts of Chinese medicine with modern scientific techniques and methods of Western medicine to care for the health of the public.
Chang Gung University was established in April 1987 under the name of Chang Gung Medical College, with the aim of preparing future outstanding medical professionals. In order to support the economic development of the nation, Chang Gung Medical College later introduced the engineering and management programs to prepare young talents in these fields, and was renamed to Chang Gung College of Medicine and Technology. In August 1997, the Ministry of Education formally approved the name change to Chang Gung University. At present, Chang Gung University has three colleges: Colleges of Medicine, Engineering and Management and includes 18 undergraduate, 29 master's and 12 doctoral degree programs.

From the very beginning of the establishment, Chang Gung University has been planning long-term curricula and academic research programs under the educational motto of “Diligence, Perseverance, Frugality, and Trustworthiness”. These endeavors have helped the university achieve its goal of “combining theory and practice in education programs”. In addition, efforts have been made in pursuit of excellence in instructions and academic research and long-term promotion for holistic education of its students.

There are 587 full-time and 584 part-time faculties and preceptors. 7,052 students, including 5,260 undergraduate students and 1,792 graduate students. In addition to classroom learning, students are required to participate in various internships and cooperation programs with Formosa Plastics Group, Chang Gung Memorial Hospitals and other institutions in order to achieve the goal of “combining theory and practice”. There are plenty of opportunities for various practical training or work-study programs available to students during semester breaks. These programs are designed to allow them to gain working experience and to develop proper working ethics before graduation. The university has also introduced over 36 academic...
programs, including the Biotechnology Management Program, the Long-term Care Industry Program, the Program of Information Security with Medical Applications, the Reliability Science and Technologies Program, the Clinical Trials Research Program, the Program of IoT and Bioelectronics Applications, the Smart Manufacturing Program, and the Artificial Intelligence Program, just to name a few. These programs are also available to the students who desire to develop additional expertise or secondary specialty in addition to their major programs. Graduates of Chang Gung University have proved their abilities and competence at work or during their advanced studies; they also are well liked by their employers because of their devotion and ethics displayed in the workplace.

Chang Gung University integrates its expertise in engineering and management with the core research fields in biotechnology and medicine, and leverages on the abundance of practical experience and manpower of Chang Gung Medical Foundation and Formosa Plastics Group. By incorporating the uniqueness of surrounding areas as well as promoting the liaison with industries, Chang Gung University has successfully developed a comprehensive iHealthCare system. This system is a perfect example of integrating advanced technology into health care. In addition, in order to maximize the effect of teaching and research resources, the research teams and resources are coordinated to cooperate with top research institutions abroad. The university’s “people-oriented” teaching, research, and industrial innovation network enables the university to apply its research results to industry-university liaisons and scientific research services. University’s stellar performance has been recognized by the Ministry of Education, which funded the university under the Higher Education Sprout Project, including the Global Taiwan Research Center. Chang Gung Molecular Medicine Research Center (CGMMRC) was invited to join the us Cancer Moonshot program, a project collaborated by eleven countries. The Healthy Aging Research Center applied advanced technologies developed by the Metabolomics Core Laboratory to the promotion of the gerontological health care industry. The Institute for Radiological Research patented its proton range verification and is at the forefront of radiological research and clinical application. The Center for Reliability Sciences and Technologies launched the first specialized product reliability technology service in Asia. The Research Center for Emerging Viral Infections has carried out large-scale cutting-edge international scientific research projects and was invited by the Ministry of Science and Technology to present and exhibit the research and development results in the Future Tech Expo 2018. In addition, with the rapid development of artificial intelligence around the world, the university launched the Research Center for Artificial Intelligence in 2018, which is expected to innovate multi-disciplinary scientific research and technology in medical biotechnology, engineering, and management.

Chang Gung University places emphasis on the equal development of morality and literacy, professional abilities integration between the individual and groups, and harmony between body and mind. Students are expected to develop into well-balanced individuals by following the “Learning by doing” philosophy. Besides, indicators including caring and giving, teamwork, humanity and art, self reflection, self discipline, and innovation and progress, etc. are used to measure the effect of holistic education. These endeavors are made to ensure our students to transform into individuals who have balanced development in all aspects, have moral integrity, and maintain their principles.

Chang Gung University aims to develop into a top-notch university with distinctive global vision. The University will keep enhancing teaching and research in various fields, continue working on industrial innovation, and facilitate academic exchanges with international institutions in response to social demands and trends. In addition, the university will persist on edification of its students by encouraging them to care for humanity and to devote themselves to serve. The university’s mission is to educate good young generation to develop sound personality, to acquire specialized knowledge and skills, to possess excellent learning capabilities, and to believe in lifelong learning.
The Chang Gung University of Science and Technology began in 1988 as a two-year nursing junior college. It was founded by Mr. Yung-Ching Wang and named after his father. The University, with the aims of elevating the quality of medical and nursing practices and fostering nursing professionals in Taiwan, commits itself to nurturing in its students such qualities as endurance, reliability, diligence and sincerity. Indeed, these four words are the motto of the University.

In 1989, an evening nursing degree program was launched, followed by a five-year junior nursing program in 1991. In 1996, the two-year Child Care and Education Program was established. In 2000, the Department of Information Management was created. Two years later, in 2002, the school was upgraded by the Ministry of Education from a Junior College to an Institute of Technology. In order to respond to a growing demand for medical and nursing services in the Chiayi and Yunlin areas, the additional Chiayi Campus was established in January 2003. In 2006, two new departments were established: the Department of Cosmetic Science on the original Linko campus, and the Department of Respiratory Care on the Chiayi Campus. To cope with a rapidly growing elderly population and to meet the changing needs of senior citizens, the Department of Geriatric Care and Management was founded in September 2008. In the same year, the Graduate School of Nursing (Chiayi Campus) was also launched. The Department of Nutrition and Health was founded a year later, in 2009. In August 2011, Chang Gung Institute of technology CGIT was transitioned to Chang Gung University of Science and Technology (CGUST). Graduate Institute of Health Care was founded in 2012, Graduate Institute of Health Industry Technology was founded in 2013, and the following year, Graduate Institute
Non-Profit Organization—Education

The teachers and students analyze oxygen concentration, carbon dioxide concentration, lung air flow and heart rate after exercise by Metabolic Cart for Human VO2 max Measurement in the Human Metabolic Functions Lab

of Nursing (Linkou Campus) was inaugurated in 2014. In June 2017, the Ministry of Education approved to merge the Gerontological Care and Management and Graduate Institute of Health Care to form the Department of Gerontology and Health Care Management since August, 2018.

The University educational scope has been broadened gradually, and its growth clearly reflects the soundness of the University central tenet. Currently, the University employs 335 full-time teachers, and 6,635 students are enrolled. With additional expansion of excellent academic programs over the years, the University seek to nurture best professionals in the field of health care industry.

Moreover, the University has implemented a mandatory boarding school policy in order to pursue integrate school education with guidance and discipline. Based upon the belief that ethical and moral education is developed in daily life, the policy aims to promote all-rounded development of students, cultivate students to become good-tempered and modest, respect for life, and concern for society. The students are envisioned as professionals endowed with love and patience.

Within the aspect of academic research, the University encourages teachers to participate in research projects in cooperation with the government, Chang Gung Memorial Hospital, and the Formosa Plastics Group. Efforts in cooperative research projects with other industries are strongly encouraged as well. In the academic year of 2018 alone, the university received 221 Industry-University Collaboration Projects with total grant of nearly $4,405,346.40 USD. The results are listed as followed. Grant of $1,154,076.27 USD from the Ministry of Science and Technology for 42 research projects, and a grant of $1,305,689.58 USD from governmental offices for 63 research projects.

In addition, grants totaling $1,945,580.55 USD were accumulated by 116 cooperative projects between the University and the private sector.

In response to the rapid changes in society, the University is dedicated to improving its administration, with personnel as its central consideration. Moreover, the learning environment is being improved to support the ideal of providing quality health care for the general public. In the future, the aim of “being the best” will continue to guide the development of the University administration, teaching, research, industry cooperation, and student development. The Chang Gung University of Science and Technology continuously strives to foster top-quality professionals who provide the best professional education.

The postdoctoral research fellows perform qualitative and quantitative analysis of Chinese herb medicine using high-performance liquid chromatography and ultra-high pressure liquid chromatography tandem mass spectrometry in the Research Center for Chinese Herbal Medicine.
The University is located on the hillside of Kueizi Village in Taishan District, New Taipei City and was originally named “Ming Chi Institute of Technology.” The campus occupies an area of 62 hectares with vast green areas and beautiful yet tranquil sceneries. More than 200 years ago, during the reign of Emperor Chienlong in the Ching Dynasty, the “Ming Chi Academy,” founded by a Tributary Scholar, Mr. Hu Cho-yu in Southern Fukien, was located in the vicinity of the University. At that time the Academy was a center of intellectual and cultural hub and was also the cultural origin of northern Taiwan. This university was named “Ming Chi” with an aim to encourage the faculty and the students to learn from the virtuous elders and to embrace heritage and vision as their own mission.

With the exceptional operational performances and in response to the need for talents due to the economic development and the industrial advancement in Taiwan, the School was approved in 1999 for its transformation into “Ming Chi Institute of Technology.” After being awarded Excellence by the annual evaluation conducted by the Ministry of Education (MOE) for six consecutive years, the Institute was approved again in 2004 for its further transformation into “Ming Chi University of Technology.”

The University currently hosts 4,559 students (4,040 students in the day division and 519 students in the continuing education division), 189 faculty members, and 112 staff members. The University includes the College of Engineering, College of Environmental Resources, and College of Management and Design, offering 11 Masters’ programs, one Ph.D. program and 10 departments. All the departments and graduate institutes have passed the certifications of IEET (Institute of Engineering Education Taiwan) and ACCSB (Accreditation of Chinese Collegiate School of Business), showing that the University’s educational system is on the international track.

In the 1960’s while both the industrial and economic developments were taking off in Taiwan, there was a lack of mid-level professionals in the industries. In response to the developmental needs, Mr. Y. C. Wang and Mr. Y. Z. Wang, the founders of Formosa Plastics Group, donated the funds for the establishment of the University in December 1963 in order to strengthen the cultivation of talents.

Due to the fact that all the units of MCUT received top rankings and the school was ranked number one nationwide in the 2011 MOE Evaluation of Technological Universities, MCUT was approved to self-evaluate since 2016 instead of being evaluated by the MOE. In that year, MCUT passed the MOE evaluation on technological university affairs and self-evaluation on colleges. According to the data collected from Web of Science, MCUT ranked the third among all the technological universities and colleges in the year of 2018 in producing SCI/SSCI papers per author, including assistant professors and above, and ranked number one among all private technological universities nationwide. In 2018, the Institutional Research Center was established to develop a data-based decision-making model to implement efficient and effective school management systems and pursue sustainable school administration. The average amount of subsidies per student at MCUT received from the MOE (including MOE grants, Teaching Excellence Program funds, and Higher Education Sprout Project grants) has led other funded technological universities for years. MCUT, which has been awarded certificates of information security management system (ISMS) ISO-27001, and environmental management system (EMS) ISO-14001 every year, is an outstanding technological university with excellent traditions and achievements.

The motto of the University is “Diligence, Perseverance, Frugality and Trustworthiness.” In terms of “Diligence and Perseverance,” we expect the students not only to work hard but also to do the right and useful things. Students are encouraged to build their wisdom and enhance self-confidence through the accumulation of such useful experiences. When students live simple and honest lives, they can concentrate on the pursuit of their life goals. Based on this foundation and equipped with the professional knowledge and skills, all our students are expected to become useful members of the society. Since its founding, faculty members and students have lived continuously on campus. Through this shared on-campus living, we can encourage students to

All the units of MCUT received top rankings from MOE Evaluation of Technological Universities
maintenance a regular life, strong body and mind, while fostering grounded characteristics and good moral character. The Mindfulness Center was established in 2016. A selective course of Mindfulness for general education was offered to help students boost their concentration and observation. Ming Chi has been honored by the MOE for its excellent performances in health promotion, waste reduction and recycling, as well as managing food materials of school cafeteria in 2016. Moreover, since teachers also live on campus, they can better guide students and live up to the standards of propagating the doctrines of the ancient sages, who would not only teach but also clarify any doubts.

In order to take both theory and practice into account, and to help students develop the spirits of self-supporting, hard working, and endurance, the University practices the teaching model integrating regular classes and internship in four years. Students are arranged to take turns participating in the full time practical internship program for one year in the Formosa Plastics Group taking part in the co-op practical training program. The practical training program has expanded to various industries and companies in the U.S., Switzerland, Mainland China, Indonesia and Vietnam. The amount of students working overseas has accumulated to 532 till now. Moreover, Ming Chi has been selected to establish a project office to facilitate nationwide vocational schools in offering co-op practical training programs. The practical training program has expanded to various types of industries with over 150 companies participating in the program. Students’ performances are highly accredited in the industry. The University has also received lots of recognition of “Excellent Performances in Industry-Education Cooperation” evaluated and selected by the Chinese Institute of Engineers. The discrepancies between education and the employment in the business field are effectively eliminated, realizing the educational goals in connecting industries and education. According to the 2018 university ranking released by Global Views Magazine, Ming Chi ranked number one in the technology category of comprehensive universities among all other private technology universities. The Ming Chi alumni of the past years have received positive affirmation from the academic, industrial, and business fields. In addition, to continue the founder’s spirit of caring for the financially/physically challenged, Ming Chi has been offering scholarships of NTD 138 million accumulated until now.

Beginning from the academic year 2004, the University started to recruit aboriginal students in the four-year college in order to extend our concerns for the aboriginal students. The University has funded the aboriginal students up to NTS 430 million. This program has gained much appreciation from the aborigines and acclamation from the public in the society. Moreover, in coordination with the needs in lifetime learning and returning education for technical training, the University provides assistance for the enterprises in employee training as well as career guidance for young adults of the society. Meanwhile, in order to satisfy the needs of the alumni and members of the society in continuing education, the Division of Continuing Education was established. This Division has offered continuing education credit courses, in-service courses, and community university courses for the residents of Taishan District, as well as on-the-job master program. In 2016, Dual Award Master’s Degree Program was offered between Ming Chi and University of Cincinnati. Further in 2017, Ming Chi together with National Taiwan University of Science and Technology set up dual award Ph.D.’s degree program. The “Steel Industry Program” was offered in the same year by Ming Chi, Formosa Ha Tinh Steel, and Da Nang University. Eighty-seven sister schools partnership agreements have been signed with overseas schools striving toward a goal of globalization.

After the institute was upgraded to the university level, in addition to the usual devotion in the maintenance of the existing educational beliefs and practice, the University also focuses on “Industry-University Collaboration.” The University has frequently been honored by the Chinese Institute of Engineers for its excellent practices in industry-university collaboration. In 2014, the Small and Medium Enterprise Administration has honored the University as one of the best incubation centers. According to the statistics released by the Ministry of Science and Technology (MOST), Ming Chi has ranked number one for consecutive years among the private technology universities in the category of the average amount of funding per project director. Those honors demonstrate the fruitful results of developing collaborative relationships with industry partners. In recent years, by means of continually integrating the resources of various colleges, seven research centers have been established: the Biochemical Engineering R&D Center, the Center for Plasma and Thin Film Technologies, the Chinese Herbal Medicine Center, the Battery Research Center of Green Energy, Organic Electronics Research Center and Center for Reliability Engineering, Research Center for Intelligent Medical Devices. The faculty and students are always encouraged to participate in practical researches and to provide industry-education services for the enterprises. With the development of internship opportunities, the industry-university collaboration relations are actively being built. Via the diverse channels of intern students, guidance teachers, specific research centers, the Industry-University Collaboration Center, and the Innovation and Incubation Center, we are able to achieve close cooperation with the industries and improve the quality and quantity of the research, and further contribute the research results to the industries. While the educational functions as well as the advancement of technological power in the industries are achieved, a win-win situation is also created.

Education is the foundation of a nation and its importance is hardly surmountable. Ming Chi looks for “perfection” in every aspect including school administration, research, industry cooperation, and the development of personal integrity of the students. We seek the best for everything we do, and pursue self-improvement at all the times. We hope to contribute to help the entire economic development of the industry through the cultivation of professionals with sound personality, and set our goal for a new model for the vocational education in Taiwan.