

"Linde LienHwa is leading the development of the electronics market in China."

Alex Tong, President of Linde LienHwa

We visited Nangang in Taipei to interview Alex Tong, president of Linde LienHwa, a major gas producer in Taiwan. The Nangang District is located in the eastern part of Taipei City. It is in a redeveloped area that contains, among other things, the first station of the Taiwan High Speed Rail. Linde LienHwa (LLH) is a joint venture between the MiTAC-SYNNEX Group and Linde Group. The headquarters of Linde LienHwa is located in the head office building of the parent company.

The MiTAC-SYNNEX Group consists of nine companies--Lien Hwa Industrial, UPC Technology, Linde LienHwa, Harbinger Venture Management, MiTAC Information Technology, MiTAC Holdings, SYNNEX Technology International, Getac Technology, and SYNNEX--with composite group sales of ¥2 trillion in everything from food products to chemicals, materials, IT systems, distribution, and more.

Anshul Sarda, Head of Electronics Special Gases- Linde LienHwa, also joined President Tong for the interview. We asked about current trends centering on electronics business.



President Tong

Cutting-edge Taoyuan plant adding another gas each year

Linde LienHwa started as a joint venture in 1985 between the global gases company Linde Group and the LienHwa part of the Taiwanese conglomerate the MiTAC-SYNNEX Group to serve the entire industrial gases market in Taiwan. This was later extended in 2000 to address the growing electronics market sector in Mainland China. President Tong: "Linde LienHwa China handles semiconductors, wafers, displays, solar cells, LEDs, and other high-tech products, while Linde China handles non-electronic market sectors such as chemicals, iron and steel, and healthcare. There have not been any gas projects in the Taiwanese market for

a few years, but there are multiple projects in both Taiwan and China this year. Particularly gas project activity in China is increasing, by 50% more than the target."

Linde LienHwa has invested capital of US\$1 billion total in China and Taiwan for onsite gas and specialty gases, as well as for various types of equipment and construction. Investments are centered around Taiwan Semiconductor Manufacturing (TSMC), the world's top semiconductor foundry. Decisions have already been made to install a new cutting-edge, 3-nano-level plant at the Tainan Plant site and a new second plant in Nanjing, China.



HQ building of MiTAC SYNNEX Group

Incidentally, Linde LienHwa supplies hydrogen, argon, and specialty gases.

President Tong said "We are one of the major gas suppliers to TSMC spanning a portfolio of both bulk and specialty gases, and our track record in Taiwan holds in China as well. Sometimes specialty gases are brought from

Taiwan and sometimes they are produced in China. Within specialty gases, nitrous oxide and ammonia are produced in China. We are continuing to invest in specialty gases localization in Taiwan and China."

Mr. Sarda said in reference to bulk gases, "Linde emphasizes supplying hydrogen and argon and builds production centers locally to supply electronics users. Linde LienHwa produces and mixes over 25 specialty gases and supplies over 50 gases across the electronics customer segment in China and Taiwan."

With more than 50 varieties of gases, they supply almost all of the specialty gases, including bulk specialty gases, required by the electronics industry. For Linde, Linde LienHwa is their largest supply center for the Asia region. A wide range is covered, from production and purification to small-quantity filling. Gases are produced in Taiwan and then exported to China, Singapore, Malaysia, and elsewhere.

Mr. Sarda said "A wide variety of ultra-high purity gases and mixtures are involved in production of semiconductor chips for state-of-the-art smartphones. Our plants are designed with strict controls to achieve high-precision, super-high-purity specialty gases with a purity level of 100 ppb to mixed gases with mixture ratios of 1% to 30%."

Incidentally, Linde LienHwa has several specialty gas plants, such as a high-purity ammonia plant in Kaohsiung and a massive specialty gas production center with transfilling facilities in Taichung Harbor. Taichung mixes and produces various gases, such as nitrous oxide, germane, sulfur

hexafluoride etc. At their state-of-the-art site in Taoyuan, they produce silane-based and fluorocarbon-based mixed gases. They also fill hexachlorodisilane (HCDS) and carbon monoxide (CO). In the Jiangsu Province in China. There are production facilities for nitrous oxide in Zhenjiang and for high-purity ammonia in Xiamen.

President Tong said "We set up Taoyuan plant in 2014. We currently have plans there to add one more specialty gas to our production list every year. It is

often difficult to obtain licenses for special gases for production, in part because they are frequently poisonous. However, to ensure effective usage of facilities, we plan to add one more gas each year. At the end of 2017, we completed a mixed gas production line for fluorinated mixture using Linde's proprietary F₂ generator technology. We plan to complete a production line for CO by the second quarter next year. Other projects are also steadily moving forward."

Electronics area now provides 60% of our earnings

For Linde LienHwa, it is safe to say that products for electronics represent their biggest business area. President Tong said "The electronics area now provides 60% of our earnings. We consider ourselves one of the leading suppliers in both Taiwan and China."

For example, Linde LienHwa and Linde Korea cooperate in supplying both specialty gases and bulk gases to Korean electronics manufacturers in China, including Samsung Xian, SK Hynix Wuxi, and Samsung Display Suzhou.

Also, Linde LienHwa is a leading supplier of Helium in Taiwan. President Tong said "We have a strong demand for stable supply from semiconductor manufacturers. To do this, we have secured a commitment for stable supply from the global Helium team of Linde. We've done similar things for Xenon and other rare gases."

Of the specialty gases, there are concerns with the future stability of the supply of tetrafluoromethane (CF₄). President Tong said: "CF₄ is an important

gas for the Linde Group and we have operational analytical and transfilling infrastructure in Taiwan."

An Electronics Research & Development Center has been established in Taichung Harbor to handle future needs for processing semiconductors with even greater integration and miniaturization. This center combines R&D and technology, and works together with users to develop products.

President Tong said on future strategies: "In China, strategies can be built based on elements such as people, water, power, land, and money. AUECC, the chemicals division of Linde LienHwa, supplies 80% of their products to the electronics industry. We can better understand the mission sought by semiconductor manufacturers if we base our understanding on both gases and chemicals. We can get even more detailed information by establishing local companies to catch up with the competition. Particularly for specialty gases, investing in localization is an important strategy."