



ESSENTIAL

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**ALL EYES ON
SOUTHEAST ASIA**

INTEGRITY IS THE KEY

Professor Tan Hwee Hoon explores intercultural trust.

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IN FIFTY WORDS



Southeast Asia is dynamic, diverse and on track for growth. A region full of contrasts, it is shaped by straits, rice cultivation, diverse species, enlivened by entrepreneurs and dynamic economies. Its crucial themes for the future will be mobility, food, energy and sustainability. It's worth a closer look. Join us.



All Eyes on Southeast Asia

By Claus Möhlenkamp, Chief Executive Officer,
Freudenberg Sealing Technologies

Arabs called Southeast Asia “the lands below the winds.” That is because their ships could only sail to it at certain times of the year. The Chinese considered it wild, uncivilized, and fly-infested. Europeans used names like Far India, East India, and Indochina, suggesting that it literally lay between India and China. While Southeast Asia has not been totally ignored over the centuries, it has long been out of the spotlight. That is still true, but the circumstances are different today. Without a doubt, there is economic news from Southeast Asia that is attracting attention, and some of the region’s countries qualify as “up-and-coming” markets or “forerunners of the next boom.” But the bottom line is that Southeast Asia does not always get the attention it deserves.

Its significance merely from a statistical standpoint sometimes falls off the radar. About 9 percent of the world’s population lives in Southeast Asia – 670 million people. Its economies

**Southeast Asia
is a region worth
focusing on.**

have grown by an average of 5 percent annually over the past two decades. There are 10 countries in the region, and nearly every one of them is home to a relatively young, striving, and digitally savvy population. In the six countries with the largest economies, 68 percent of the population is of working age. Nearly all the countries are seeing continued strong expansions of their middle classes, which have special consumer interests, improved access to education, and an optimistic entrepreneurial spirit.

Southeast Asia is a region worth focusing on. Companies are giving it more attention. They are coming to the realization that the region is diverse, distinct, and full of contrasts. With its 275 million people, Indonesia ranks as the world’s fourth-largest country by population, putting it in sharp contrast with the region’s smaller states like Brunei (400,000 inhabitants) or Singapore (5 million). The latter two countries happen to be the most prosperous in the region. Singapore is a technology-savvy state that has surpassed many European nations in digitalization. Its educated populace earns a median income of about US \$4,800 per month, compared to the minimum wage of US \$90 per month in Laos. The polar opposites of wealth and poverty extend into individual countries, where the urban middle-class in metropolises like Bangkok, Ho Chi Minh City, and Manila live modern lives seemingly

light years away from those of rice farmers, crab fishermen and wage laborers beyond the major cities.

So far, the region has been able to capitalize on these contradictions. It is developing its own dynamics. Young entrepreneurs with an optimistic streak are launching startups and are self-confident enough to compete with global brands. This, in turn, stimulates growing consumerism. At the same time, production costs are low in many of the region’s countries. Thailand has become an automotive center, and technology companies are eagerly eyeing Indonesia’s huge consumer market. The Philippines has built the region’s largest wind farm, and a Vietnamese businesswoman envisions a path to success with advanced electric cars. In the latest edition of ESSENTIAL, we feature these and other stories from Southeast Asia because we are taking a close look at the region ourselves.

It is a region under pressure to respond to different challenges with forward-looking solutions. Climate change will especially have an impact on Southeast Asia. Drought and flooding threaten agriculture, which is essential to feed these densely populated countries. Their proximity to oceans means that typhoons are a constant threat. And nearly all the large metropolises are in river deltas or on coasts. Rising sea levels

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would be devastating for the region. Southeast Asia also faces the challenge of finding new paths to sustainability – whether they involve energy, food or manufacturing. A number of these countries have already recognized this.

At Freudenberg Sealing Technologies, we have a strong interest in staying close to all of these developments. We are convinced that we have the appropriate solutions for them in our portfolio. Sustainability, energy, food, and mobility – all these challenges demand high-quality products. Products that are often unseen from the outside yet perform crucial tasks. That is one reason why we know what it means to take a close look. Join us as we take a detailed, precise look at Southeast Asia, a pulsating, dynamic and diverse region. ©

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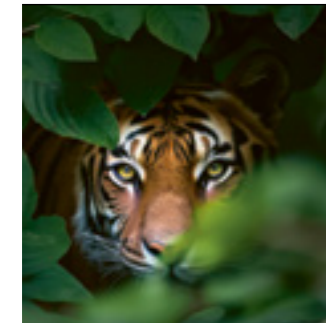
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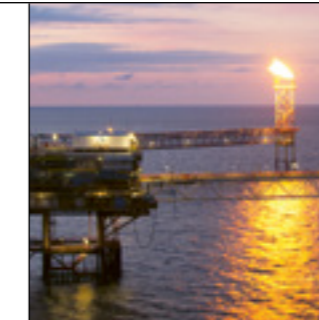
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Forward-looking

Singapore is ambitious. The city-state has scored high in the annual Global Competitiveness ranking in recent years. With the help of advanced technology, Singapore wants to transform itself into a “smart nation” by the end of the decade. Society, businesses and the government are expected to be thoroughly digitalized to achieve lasting benefits. The local recreation area “Gardens by the Bay” embodies this idea: It is packed with technology, including “supertrees” made of steel and concrete that are covered in plants. The structures rise up to 50 meters (164 feet) in the air. Some of them are equipped with solar collectors. Aside from storing rainwater, they provide air conditioning to huge greenhouses. There are also plans to use autonomous drones to inspect the supertrees’ irrigation systems. ©





Much-traveled

Southeast Asia is shaped by its seas and straits. For centuries, a huge amount of trade moved along its coasts. Today, a major share of the world's commerce flows through the region – in part because of the economic rise of Japan, South Korea and China. About 200 of the world's largest merchant ships maneuver goods, industrial products, and raw materials through the Strait of Malacca each day. That corresponds to about one quarter of the world's ship-borne trade. The strait connects with the Indian Ocean in the north, with Singapore positioned as an important hub at its opposite end. The Strait of Malacca, which runs between the Malayan Peninsula and Sumatra, is just 38 kilometers (23 miles) wide at its narrowest and 25 meters (82 feet) deep at its shallowest point. That makes it barely deeper than the man-made Suez Canal. ©





Steeped in Tradition

A number of religions have left their mark on Southeast Asia. They include Buddhism, Hinduism, Islam, Taoism and many folk religions, plus Christianity across much of the Philippines. They reflect diversity and commonalities in equal measure: For example, some countries celebrate the same religious and cultural holidays, such as the Buddhist New Year. The Angkor Wat Temple Complex in Cambodia – abandoned more than 600 years ago – was first dedicated to the Hindu god Vishnu, before it became a Buddhist site. It was 160 years ago that the world's largest temple was essentially rediscovered, and it now attracts up to two million visitors a year. Incidentally, the region has a mix of languages: Chinese, Thai and the Austroasiatic families are dominant on the mainland while Austronesian languages prevail on the islands. ©





“Integrity Is the Key”

Does the Southeast Asian notion of trust at work vary from that of Germany or the US? Singaporean management professor Tan Hwee Hoon gathered data globally on the issue and came up with a surprise.



Tan Hwee Hoon

As a professor at the Lee Kong Chian School of Business, Tan Hwee Hoon has focused her research on organizational behavior and human resources. She is also active in the study of business economics and innovation. Tan earned her doctorate at Purdue University in the United States. She has dealt with topics relating to trust in the workplace and in a cross-cultural management context since the 1990s.



MS. TAN HWEE HOON, WHAT IS TRUST EXACTLY?

It is the willingness to be vulnerable. When I trust you, I am opening myself up to injury. The more I trust you, the greater the risk. That, at least, is how one school of thought defines it. The other sees it as confidence, as a positive expectation. I trust someone when I base my judgement on their prior behavior.

WHY DO PEOPLE TRUST AND HOW DOES THIS WORK ON THE JOB?

Three reasons emerge from the research, and they can take different forms. We have a model called “ABI.” The “A” stands for ability, that is, the skills of the other person: I trust you because you are good at your job. “B” represents benevolence or goodwill. I know you and I believe that you want the best for me, so I trust you. And “I” stands for integrity: I trust you because I am convinced that you are a person who keeps his word, is reliable and lives his values.

DO PEOPLE IN ASIA TRUST DIFFERENTLY THAN THOSE IN THE UNITED STATES, FOR EXAMPLE?

That was the finding of the first international studies. The researchers involved with the subject initially came from North America. However, when we collected data in Asia, we obtained different responses and findings. Our interviews suggested a greater role for goodwill in Asia, and specifically, China, Singapore, Turkey, and India.

WHY MIGHT THAT BE THE CASE?

We know that the feeling of being part of a group is more pronounced in Asia. You see yourself as part of a community. In countries like Germany, your own identity and related issues are more important. What you know professionally and how you perform in your job, that is, your ability, are what counts. In Asia, people place greater emphasis on interpersonal relations. Employees have a stronger focus on whether colleagues or supervisors are interested in them. Are they ready to help when problems arise? That’s why it’s more likely in Asia for an employee to follow a supervisor when he goes to another company.



A good reputation is infectious, so to speak. If you are working in Southeast Asia, you should find ways to join the in-group.”

WHERE DID YOU GET THE IDEA OF STUDYING TRUST?

I earned my doctorate in the United States in the mid-1990s. At the time, a professor named David Schoorman was doing research on the topic. It occurred to him that we didn’t know what actually led people to trust one another at that point. So, the field of study is comparatively new. I was marginally involved with the studies as a student. When I returned to Singapore, I began doing research on other countries with a colleague from Turkey.

WHY DIDN’T THIS OCCUR TO ANYONE EARLIER?

You know, the field of cross-cultural studies is not always systematic. Researchers compare data from different countries, but a systematic global overview is much less common. Which countries are similar? We wanted to address the topic comprehensively. With a research grant from the United States Airforce Office of Research, we collected data from 20 countries over a four-year period. So far, it is the largest and most extensive study of its kind. It is also “quantitative.” It is not based on extensive interviews. Instead, it provides measurable, comparable data sets.

AND THE FINDINGS?

They are exciting and surprising: The findings from 19 of the 20 countries were amazingly similar. Integrity was the most



important factor in every country. If I impute low integrity to another person, other factors with high ratings offer no benefit at all. I will trust that person the least. This seems to be universal. I admit that we expected much greater differences. The I-factor trumps everything. Integrity is the key. But an interesting secondary finding was that women all around the world are less likely to trust. They need more convincing and make a greater effort to understand things. Men trust more quickly.

WHAT SHOULD I CONSIDER DOING IF I AM A WESTERN-ORIENTED MANAGER AND I WANT TO INSTILL TRUST IN SOUTHEAST ASIAN EMPLOYEES OR CUSTOMERS?

As I mentioned, Asians are more group oriented. In Asia, it is very important to be seen as part of a special “in-group.” It promotes trust to be introduced by someone from the in-group. A good reputation is infectious, so to speak. If you are working in Southeast Asia, you should find ways to join the in-group. You

have to show that you have the other person’s best interests in mind and that you are seriously interested in a good relationship. But I have to be frank: Our problem at this point is that the latest data from the study is not reflecting these findings as clearly as we had hoped.

CAN IT BE SHOWN THAT TRUST HAS A DIRECT FINANCIAL IMPACT? THAT IT CONTRIBUTES TO EMPLOYEE PRODUCTIVITY AND SATISFACTION?

Our data on productivity is quite clear. The answer is yes. Employees who trust their company are more productive. Satisfaction is somewhat harder to measure, but we can at least tell from the data that there is a connection between trust and job satisfaction. This has led to some extreme cases: During my interviews at a company in Hyderabad, India, I spoke with employees in deep crisis. The firm’s share price was in freefall, but the staff employees still trusted their management. It turned out that the managers had, in fact, committed fraud.



No one trusts completely. People always trust only to a point.”

ARE THERE DIFFERENCES AMONG ASIAN OR SOUTHEAST ASIAN COUNTRIES?

Based on earlier studies, we can show that people in Singapore apparently pay more attention to professional skills, that is, to ability than in China, for example. We are more oriented to the West in this regard. We had international companies in Singapore early on. That has certainly shaped our management culture.

AND IT DIFFERENTIATES SINGAPORE FROM OTHER COUNTRIES LIKE VIETNAM IN THE REGION?

My impression is that the Vietnamese generally come to trust others more slowly – and that it is hard for us in Singapore to gauge their level of trust accurately. Yet as a researcher, I would stress that I am relying on purely anecdotal evidence. I have had many students from Vietnam from whom I learned that “yes” doesn’t mean they agree with you. It can also mean “yes, but ...”.

IS TRUST EXPRESSED IN DIFFERENT WAYS CULTURALLY?

Definitely. From our qualitative interviews, for example, we know that there are clear differences as to whether professional and personal trust are linked. If someone trusts you personally in Turkey or India, it carries over to the workplace. That’s not necessarily the case in Germany or New Zealand. I can trust you on the job, but not personally or vice versa.

DOES THAT BRING US BACK TO THE “IN-GROUP” THAT IS SO IMPORTANT IN AN ASIAN CONTEXT?

Yes. I’ll give you an example. I had an interview with a Singaporean businessman, and I asked him how he makes a decision on whether to trust someone. He told me he was once at the home of an employee and his family during the Chinese New Year’s festival, the most important holiday of the year, and he noted whether the man was respectful to his parents. In Asia, respect for parents or “filial piety” is a very important value. Of course, you can ask what this has to do with trusting the individual on the job. But in our region, the personal and the professional blend together. In the United States, on the other hand, there is a much greater distinction between personal and professional lives.

ARE PEOPLE MORE TRUSTING IN SOUTHEAST ASIA?

Not necessarily. When I outlined the model to people suggesting that the more you trust and the less you monitor, the more vulnerable you are, some people had this response: No matter what my level of trust is, I am going to monitor anyway. Verifying goes without saying.

GERMANS HAVE A PROVERB THAT BASICALLY TRANSLATES AS “TRUST BUT VERIFY.”

(laughs) Yes, that sums it up. No one trusts completely. People always trust only to a point. Or in certain areas, but not others. ©



REGIONAL FOCUS

Ready to Pounce

When the first Asian countries began their economic ascent 50 years ago, economists were expecting several Southeast Asian economies to follow suit. But why are they still awaiting their breakthrough? And what does the future hold for them?

🔍 Point of Departure

Tigers are quick. They leap very far and very high. And: They live in Asia. When the first Asian countries began growing at a record pace decades ago, the term “tiger economies” quickly came into use. Thanks to a dynamic industrialization process and a strong export orientation, South Korea rose to the status of an industrialized nation within a short period of time. The then-British Crown colony of Hong Kong and the city-state of Singapore have, in the meantime, established themselves as global finance and service centers. Each of the tiger economies has had rapidly rising per capita incomes, following in the footsteps of Japan, the first Far Eastern country to experience an economic miracle of this magnitude.

When economists started to think that more countries – dubbed “tiger cubs” – could be joining the club, they turned their attention to Southeast Asia. Thailand, Vietnam, Indonesia, Malaysia and the Philippines were considered hot prospects due to their economic growth. But the boom was already over by 1997 due to a financial crisis that pulled the rug out from under them. Foreign money had been flowing into these

markets in large quantities, triggering a boom in lending. But when Thailand’s real estate market ran into difficulties, the loans could no longer be serviced. Investors lost confidence and withdrew their investments. This situation was compounded by currency speculation that caused the Thai currency to crash. The crisis in Thailand spilled over into other countries. High debt loads, bank failures, corporate bankruptcies and unemployment spread across the region, with International Monetary Fund policies tending to intensify the crisis instead of mitigating it.

The crisis hit Thailand and Indonesia especially hard. Stock market shares collapsed. In just nine months, they lost 50 percent or more in value. The gross domestic product (GDP) in Thailand fell by 13 percent and in Indonesia by 10 percent. Malaysia and the Philippines suffered similar blows. The financial crisis thus destroyed much of the region’s capital. Southeast Asian countries, which were once the beneficiaries of so much hope, were forced to re-evaluate their economic structures and reform their financial sectors.

➡ Charting Their Economic Course

The crisis promoted the view that closer regional cooperation was needed. Still, it was only in 2015 that the Association of Southeast Asian Nations (ASEAN) committed to the elimination of nearly all duties on the cross-border transport of goods within the region. At least ASEAN succeeded in forging a free trade agreement with China and

India much earlier. Even with the European Union (EU) and ASEAN proclaiming their desire to cooperate more closely in 2022, there still has been no breakthrough. At this point, only Singapore and Vietnam have a free trade agreement with the EU, and only Singapore has one with the United States.

But in 2020, ASEAN stirred the pot. It reached an agreement with China, Japan, South Korea, Australia, and New Zealand on the Regional Comprehensive Economic Partnership (RCEP). The 15 signatory countries want to strengthen their economic cooperation, reduce customs duties, and dismantle trade barriers. If carried out systematically, the accord would create a huge regional market encompassing 30 percent of the world's population and 30 percent of its gross domestic product. The economic integration of the ASEAN countries would continue. Some experts see RCEP as an opportunity for a more effective division of labor, with greater industrial specialization in the individual countries.

Promising Outlook

In any case, RCEP could give Vietnam, Thailand, Malaysia, Indonesia and the Philippines a sustained push to expand their economies, especially as key performance indicators send out positive signals. Based on the 2022 Global Innovation Index, all the tiger cubs, apart from Indonesia, clearly rank in the top half of the 132 countries evaluated. After the pandemic shock, economic growth in the ASEAN zone had already climbed back to 3.4 percent in 2021. The projections for the next few years exceed that percentage. And inflation increased less than in many industrialized Western countries during 2022, when the war in Ukraine began. The share of the population of working age is about 70 percent. Production costs continue to be low, and a growing middle-class promises to breathe life into the domestic economy. All the same, the infrastructure and the level of training could be expanded.

And now? In light of the unforeseeable crises of the last few years, any projections must be viewed with caution – especially with ASEAN's realization that it is susceptible to natural catastrophes and with climate change posing yet another challenge. The tense relationship between the super powers China and the US could also weigh heavily on Southeast Asia's economic development. Nonetheless, there is an opportunity for the workshop of the world to migrate to Southeast Asia, at least to some extent. Governments in the region also see the need – as well as the opportunity – to make greater use of technology and digitalization.

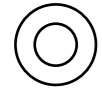
Overall, the positive signs stand out: Thailand is known for its well-developed vehicle and machine-building sector. Vietnam has evolved into an important manufacturing center for textiles, electronics and electrical devices, which has attracted international companies. Auto manufacturing could join them. Indonesia is benefiting from its mineral wealth, which is important for building batteries for electric vehicles. The government is also striving for the digital transformation of its manufacturing sector. Malaysia is also not just relying on its fossil resources – it is producing semiconductors for microchips and wants the status of a high-tech country. The Philippines are positioning themselves as a center for outsourcing services (e.g. call centers, IT and software development), while the government pours money into the large infrastructure projects. It seems the foundation has been laid for the belated pounce of the tiger cubs. ©



Key Facts

1. Southeast Asia includes 10 countries: Thailand, Vietnam, Malaysia, Indonesia, the Philippines, Cambodia, Laos, Myanmar, the city-state of Singapore, and the Sultanate Brunei Darussalam.
2. Today these 10 countries make up the Association of Southeast Asian Nations (ASEAN), which was established in 1967. The organization wants to strengthen political, economic, and cultural cooperation.
3. Roughly 9 percent of the world's population – about 670 million people – live in the region.
4. About 11 percent of the world's foreign investment is flowing into Southeast Asia.





High-energy Nutrition

Upheaval in the food industry. Rising prosperity, growing populations, and climate change are leading to more processed foods, higher risks for agriculture, and greater inequality.

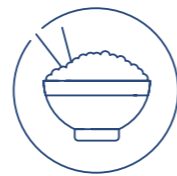
Rice and fish. These two foods have been the foundation of Southeast Asian nutrition for centuries and remain so today. Out of the roughly 160 million tons of fish and other seafood consumed each year worldwide, Asia accounts for about three-quarters of the total, even though it only represents about 60 percent of the world's population. And rice meets about half of the caloric needs of Southeast Asians. The region's levels of consumption are appreciably higher than those in China and Korea. With its emphasis on rice, fish and other seafood, the region's eating habits have been highly stable for hundreds of years.

A Region of Contrasts

And yet there have been massive changes. Here Southeast Asia is again a region of contrasts. On one hand, there is more food available than ever before. According to the Asian Development Bank (ADB), every country in the region (with the exception of Cambodia), averages more than 2,500 calories per inhabitant. (Germany comes in at about 3,500 and the United States at about 3,800 calories.) Especially in Vietnam, Laos and Myanmar, the figure has risen dramatically over the past 20 years. The population not only has more food available – it is higher-energy, more convenient food. With the rapid growth of a pros-

perous middle-class, the demand for prepared meals and highly processed foods has increased. As early as 2035, the region's food industry expects to reach a level of sales common in advanced industrial nations.

This in turn increases the risks from unhealthy foods containing too much fat and sugar. But the awareness of – and interest in – healthy nutrition is growing among the educated middle-class. This is especially clear from beverage industry



40%

is Southeast Asia's share of the world's rice export market.



A traditional fish market (left) and a modern bottling facility for drinking water (below). Southeast Asia is a region of many contrasts.



figures. Medical recommendations for the minimum consumption of fluids have only been part of a public discussion for several years, but they have taken hold in several countries. This has increased the sales of bottled beverages. Consumers are also buying more bottled water due to a lack of trust in public sources of drinking water. Tastes and habits are changing as well. Global food and beverage brands are making inroads. Among other foods, the consumption of dairy products has risen considerably.

These products have not traditionally been part of the Southeast Asian diet, but many governments are promoting and subsidizing them heavily for health reasons. The consumption of coffee and international brands of alcoholic beverages has grown as well.

Climate Change as a Risk Factor

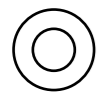
Still, a relatively high share of the region's population continues to live in poverty, sometimes with too little to eat. There is often a contrast between cities and the

countryside. In Vietnam, for example, a higher percentage of city-dwellers consumes highly processed foods, with a 10-point difference in the share of these foods in their diets compared to rural residents. The highly processed foods represent 40 percent of the urban diet versus 30 percent in the countryside. This is related to the increase in prosperity. It is one of the region's paradoxes that the farm sector will continue to depend on a workforce from an economically disadvantaged social class.

Climate change is another factor: Rising sea levels are salinizing and muddying soil that has been fertile until now. Droughts and typhoons have led to crop failures. This is increasing the pressure on the local food industry, which is being asked to produce more for a steadily growing population and meet the demand for basic nutrition. It is clear that there is a growing need for industrial farming, technological innovation and greater efficiency in the food industry. The region has certainly made considerable progress in rice production in recent years. (Southeast Asia not only consumes great quantities of rice – it is responsible for 40 percent of the crop's global exports.) But experts are already warning that Indonesia and the Philippines will soon be unable to produce enough rice to feed their populations. The situation in aquaculture seems to be similar. Four ASEAN countries are among the world's top 10 fish exporters: Indonesia, Vietnam, Thailand, and the Philippines. The segment is expected to continue to grow, but rising sea temperatures pose a risk. Rice and fish are still important as basic foods but will not be sufficient in the future. So, a change in eating habits could prove helpful. ©



Today an estimated 70 million motor scooters are registered in Vietnam alone. They dominate its cityscapes, as shown here in Hanoi.



The Reign of the Two-wheeler

Anyone staying in a Southeast Asian city is quickly struck by the different kind of traffic on the streets: Motor scooters are everywhere. That's not expected to change with electrification either.

To many, the memory of an extraordinary feat is still vivid: It was the opening ceremony of the Olympic Summer Games in London in 2012 when a stand-in for the Queen jumped from a helicopter with a parachute. Six years later, Indonesian President Joko Widodo followed suit at the opening ceremony of the 18th Asian Games. Only his double did not float through the air into a stadium – he roared through the streets and alleyways of Jakarta on a high-performance motorcycle. The politician's relationship with motorized two-wheelers was no fabrication. Four months earlier, Widodo had taken a motorcycle trip with two cabinet ministers and a few other companions. The media came along for the ride.

Three Motorbikes for Every Car

Widodo is a symbol of his countrymen's close ties to motorcycles, motorbikes and motor scooters. The statistical portal of the Association of Southeast Asian Nations (ASEAN) puts

the number of registered, motorized two-wheelers in Indonesia at nearly 118 million in 2021. The indisputable conclusion is that one out of every two inhabitants of the region's most populous country owns a motorized two-wheeler. By contrast, only a little more than 22 million cars are registered in the country. The predominance of two-wheelers can be seen in most Southeast Asian nations. Cars are only in the majority in the tiny Sultanate of Brunei Darussalam, the city-state of Singapore and in Malaysia, where they hold the thinnest of edges. At the beginning of this decade, consolidated data from all the ASEAN nations showed more than 240 million motorized two-wheelers compared to barely 75 million cars.

The statistics come to life in the cityscapes of metropolises like Jakarta, Hanoi, Manila, Bangkok and Kuala Lumpur. Motor scooters, in particular, snake their way through dense city traffic. These small, agile vehicles make quicker progress than

the mass of traffic and can even take shortcuts through alleys. Finding a parking spot is easier as well. Moreover, the average income in many ASEAN nations is still comparatively low. The bulk of the population cannot afford to buy and maintain a car. That's not the case for the less expensive motor scooters. They are considered a sturdy everyday vehicle in Southeast Asia, and not a toy for recreational use. People use them to haul shopping purchases, family members and much more in the countryside as well as the cities. So, it comes as no surprise that more than 85 percent of all households in Thailand, Vietnam and Indonesia own at least one motorized two-wheeler.

Greater Wealth Builds Hope for the Auto Industry

The region's economic upswing will likely lead to greater prosperity and a growing middle-class. That's why a study by the Japanese consultancy, Abeam Consulting, Ltd., assumes that various Southeast Asian countries will move away from two-wheelers to automobiles. In the authors' view, this already applies to Thailand, as the gap between the number of motorized two-wheelers and cars continues to close. Indonesia and Vietnam will follow suit, the study says. The prospects for automobiles will improve as prices become more affordable, and the local auto industry grows.

But it should not be assumed that motorcycles, motorbikes and motor scooters, in particular, will become less important to the region. Various experts say electrification is on its way and will take hold in two-wheelers first, and automobiles will follow. The smaller vehicles are still practical in city traffic, and their prices and maintenance costs are lower than those for cars. Based on modeling in 2022, the consulting firm, McKinsey, came to the conclusion that about 36 percent of all motorized two-wheelers in Southeast Asia could be electrified by 2030. It is an optimistic outlook, even if two popular taxi and delivery services, Grab and Gojek, have announced their plans to electrify their fleets over the next few years. They are made up of motor scooters to a great extent.

A Key Factor: Battery Exchanges

Batteries are an important factor for the wide-ranging success of motorized two-wheelers. In 2021, several international vehicle



Everyday transport:
For many Vietnamese, the family vehicle is a motor scooter.



240

million motor scooters and other motorized two-wheelers are registered in the ASEAN countries of Southeast Asia.

manufacturers came together in a consortium to develop a standardized battery exchange system. As soon as a battery runs low on energy, it would be swapped manually and relatively easily for another. Honda recently introduced its electric scooter EM1 e. The model already has an exchange battery and should be available in Japan before year's end, although it is explicitly aimed at the Indonesian market. Indonesian President Widodo seems to be ready for the next generation of vehicles. At the Indonesia International Motor Show 2023, he was one of the first visitors to climb onto an EM1 e. Like other well-known manufacturers, Honda has announced that it will soon bring out high-performance electric motorcycles. That means Widodo's stand-in could soon be filmed cruising Jakarta's streets and alleyways on an electric motorcycle. ©



INSIDE

Shock Absorber Seal

When it comes to motorcycles, motorbikes and motorized scooters, a good shock absorber seal at the front wheel is crucial for safety and comfort. The less friction caused by the seal, the more the bike's full road contact is assured. This applies even to riding on irregular or stony terrain. Freudenberg Sealing Technologies uses a high-tech elastomer that it developed in-house for its low-friction seals. Not only does it withstand tremendously high stresses, it is long-lasting, weatherproof, and resistant to ozone. The seal's low-friction design can be adapted to customer specifications and has already proven itself millions of times over in the Indian two-wheeler market.



Diameters up to

54 millimeters

Mileage up to

50,000 kilometers (31,000 miles)

More on seals for shock absorbers at [FST.com](https://www.fst.com)





STRATEGY-TALK

Market Entry

Southeast Asia is the scene of rapid growth. In the food and beverage, chemical, and automotive sectors, among others, the demand for high-quality seals is increasing. How is this kind of market developed? Bernard Low, General Manager in Malaysia, explains why the work takes stamina – and why he is optimistic about the future.



MR. LOW, IS IT POSSIBLE TO SUM UP SOUTHEAST ASIA IN JUST A FEW WORDS?

That is challenging, even for me as a Malaysian. Southeast Asia is diverse. We have thousands of dialects and languages and several hundred ethnic groups. The landmass of Southeast Asia alone is huge – and the region is even larger if you count its maritime territory. We are talking about everything from the northwest of Thailand to the southeast of Indonesia, across a distance of more than 5,000 kilometers (3,100 miles). It takes about six hours to cross the region by air. In the same amount of time, you can fly from America's East Coast to Europe.

AND YET THERE ARE COMMONALITIES.

Yes, for example, respect for elders, and a certain amount of hierarchical thinking that comes with it. It is easier to grasp the commonalities by making comparisons to other regions. Take punctuality, for instance: It is not fashionable to be late, but it is acceptable for meetings to be delayed.

WHERE DOES FREUDENBERG SEALING TECHNOLOGIES SEE OPPORTUNITIES IN THE REGION?

It is a growth region of the coming decade. The population is becoming more prosperous. The middle class is growing. Consider Indonesia: The consumption of soft drinks today stands at 23 liters per person annually, and the amount is increasing. It is still far behind countries like Germany at 120 liters or global front-runner Belgium at 270 liters. But we are talking about 270 million people in Indonesia, which works out to more than 6 billion liters per year. That's already double the Belgian market. So, Indonesia offers plenty of potential for the food and beverage industry – and thus for us. This applies to other populous countries such as Thailand, Vietnam and the Philippines as well.

DOES THE HIGH QUALITY AND THE ASSOCIATED HIGHER COSTS OF FREUDENBERG'S SEALING TECHNOLOGY POSE A CHALLENGE?

We look for customers who value a level of quality appropriate to their needs. Food and beverage is a promising segment since hygiene allows no compromises. The chemical and petrochemical sectors, where highly specialized materials are often needed, are in a similar situation. Singapore, Malaysia and Indonesia are all focusing on these areas. We know how and where to find the right customers. We know the market, and it is sizeable. We don't have to compete with every local competitor.



Bernard Low

Born in Malaysia, General Manager Bernard Low studied chemical engineering at the University of Malaya and mechanical engineering and economics at Monash University in Australia. He has worked at the automotive OEM Schaeffler and held other positions with responsibilities for Southeast Asia. He joined Freudenberg Sealing Technologies in Kuala Lumpur in 2014. Low is an avid badminton player.



But in Southeast Asia, people can soon find themselves misinterpreting behaviors. After all, we don't even understand each other sometimes.

HOW DO YOU GET STARTED IN A MARKET LIKE SOUTHEAST ASIA?

Ideally with the help of an established local distributor. A company that knows the local market as thoroughly as it knows our products. Apart from that, we want to focus on customers who need the appropriate level of quality. Otherwise, we would have to compete solely on price, and that's hard to do in this region. But, as I mentioned, it is a large market, and we can't do it all by ourselves. We are going to need business partners. There will naturally be customers requiring our personal involvement, perhaps because they need technical support or an innovative technology. We also have to position ourselves based on value, total costs and lifecycle. And we are good at that.

YOU ALREADY HAVE EXPERIENCE WITH SCHAEFFLER IN RE-POSITIONING YOURSELF IN A MARKET. WHAT DID YOU LEARN FROM THAT?

That it takes perseverance. Sometimes you don't succeed in winning a customer over right away – but if you build your position on quality, you may succeed later. On the other hand, we should never give a customer a reason to be unhappy with us. It may sound banal, but communication is important. If customers are arguing with you, at least they are still talking. It's worse if a customer stops speaking with you.

FREUDENBERG SEALING TECHNOLOGIES CANNOT RELY ON BEING A WELL-KNOWN BRAND NAME IN SOUTHEAST ASIA.

No, our brand is not well known in this part of the world. Competitors from China or Japan have been dominant so far. But we are not starting from scratch. We already have a presence. And companies with global operations are familiar with us. The fact that we have many local employees can work to our advantage as well. We know the region and the business culture. But in Southeast Asia, people can soon find themselves misinterpreting behaviors. After all, we don't even understand each other sometimes. The various aspects of

correctly interpreting a smile require empathy and context. In Vietnam, for example, many different things are expressed with a smile.

IS IT ESSENTIAL TO MANUFACTURE LOCALLY?

Yes and no. Business customers do not necessarily expect us to manufacture in their country. We have a plant in Batam, Indonesia, so we have a local presence. The advantage of Southeast Asia is that each of the countries in the region has good air and sea connections. Since 2015, customs duties within the ASEAN community have been very low, giving us flexibility. But what I said at the outset still applies: Southeast Asia is a very large region. It does take time to ship raw materials from a mine on the Indonesian island of Sulawesi to northern Thailand.

YOU'RE BASED IN KUALA LUMPUR. IS MALAYSIA WELL-SUITED AS A CENTRAL REGIONAL OFFICE?

Yes. For example, there are many people in Malaysia who speak English well. There is no shortage of talent. The cost of living is also affordable. And there are good flight connections to anywhere in the region. Another advantage is that our standard language, Bahasa Malaysia, is very similar to the official language of Indonesia. If you master one of the two languages, you can roughly understand the other. That is very useful.

BUT SO FAR YOU HAVEN'T BEEN VERY ACTIVE IN INDONESIA APART FROM MANUFACTURING OPERATIONS.

No, but we want to change that. Malaysia is a good springboard for entry into the market. The Indonesian economy has long had a very local character. There has been a great

deal of manufacturing within the country for the domestic market. Countries like Vietnam and Thailand are more export-oriented.

THAILAND IS POSITIONING ITSELF AS A HUB FOR ELECTRIC CARS, AND VIETNAM FOR CHEMICALS, AMONG OTHER AREAS.

Both are good for us. European automakers already know us as a reliable source of thermal management technology and seals for electric motors. And many of them already have a presence in Thailand, as do manufacturers from Japan and China. Here, we should take advantage of our expertise. It is striking that Vietnam has so many hard-working young people. It is a generation that would like to become better off. Many chemical, petrochemical, motorcycle and steel companies have established themselves in Vietnam. These are attractive sectors for us.

SINGAPORE, FOR ITS PART, IS OFTEN SEEN MERELY AS A FINANCIAL CENTER AND A PORT.

That's definitely a mistake. Singapore has a lot of chemical companies. Shipbuilders and pharmaceutical companies have settled there, too. These are sectors that represent opportunities for us. Many companies have set up research and development departments in Singapore. It is good place to exchange ideas and information.

HOW IMPORTANT IS THE ISSUE OF CLIMATE CHANGE TO SOUTHEAST ASIA?

People are increasingly aware of the issue. We are seeing a growing number of storms, droughts and flooding. Temperatures have reached record highs everywhere this year. Indonesia is even planning to relocate its capital Jakarta because it is too close to the coast. Climate change is a very serious problem for Southeast Asia. That's why investments are being made in green energy in many countries. Vietnam wants to reduce its dependence on coal. Singapore is converting its transportation to electric mobility.

YOU ARE STILL OPTIMISTIC?

We definitely need to do more as a region. But if we meet this challenge, the future looks bright. The region's gross domestic product (GDP) is expected to rise from US \$3.3 trillion today to US \$10 trillion. By comparison, Germany took nearly 30 years to double its GDP to US \$4 trillion today. The Southeast Asian middle class will expand, spurring growth in consumption, and there will be a great deal of direct foreign investment. I believe Southeast Asia will be the next factory of the world, and I will be here to see it. ©



NOW IT'S MY TURN

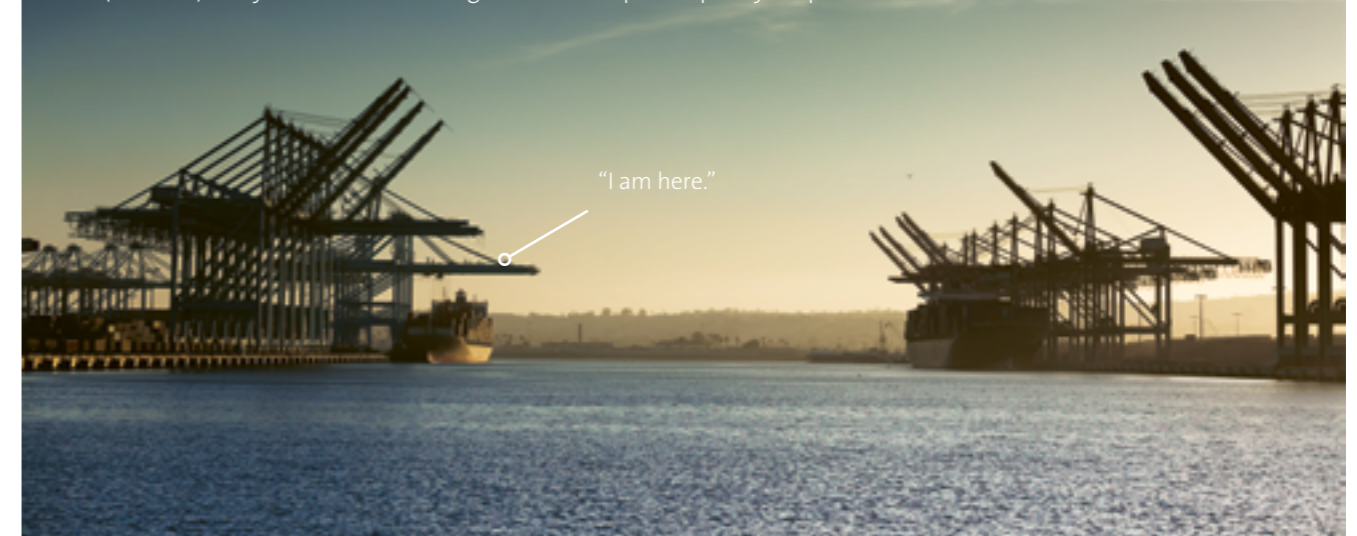
Port Crane

There were fewer of us in the past. The total now stands at 59. That's 59 cranes of the super-post Panamax class, no less. We are the world's largest container cranes. Our port in Tanjung Pelepas has grown tremendously over the past two decades. At the start, it handled no more than a million containers annually. Today that figure has climbed to more than 12 million. From my vantage point, I can look across the entire port, all the way to the mouth of the Strait of Malacca, one of the most traveled sea passages in the world. Large container ships maneuver into our port every day.

What I can't see are my colleagues in the neighboring harbor. The Port of Singapore lies just 30 kilometers (19 miles) away. It is the second largest container port

in the world, trailing only Shanghai. It had long enjoyed a monopoly position in the region. But with Southeast Asian economies growing rapidly, it has been pushing against the limits of its capacity. Its fees are rising each year and, if a container ship doesn't reach the port at the prescribed time, it had better be prepared for a long wait.

This is where the Malaysian government sees an opportunity for us. In our harbor, the fees are lower, and the waiting times are shorter. Furthermore, a large free trade zone adjoins the port. Companies with headquarters in Singapore can expand their warehouse capacity there. Unlike the large port of our small neighboring state, we have plenty of room to grow – and plenty of space for more cranes. ©



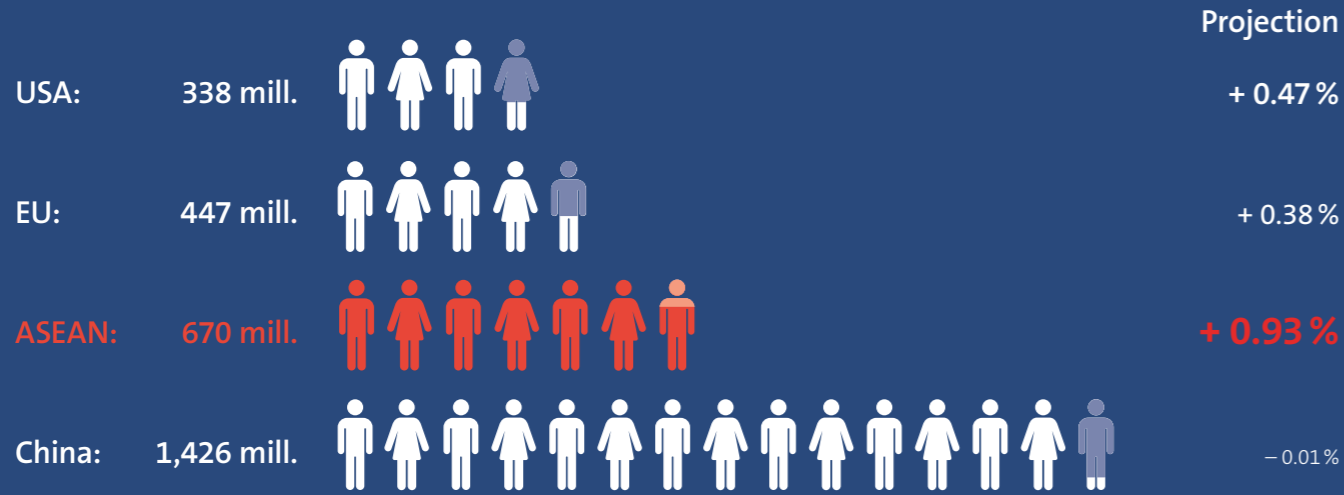
The text and video of the interview can also be found at:
<https://qr.de/EssentialLowEN223>



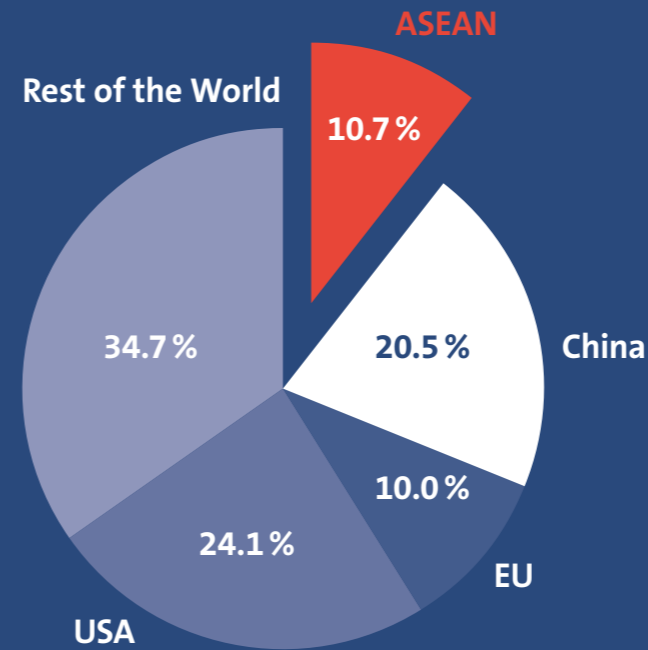
ASEAN: How Does It Compare?

Total population (2022, Statista)

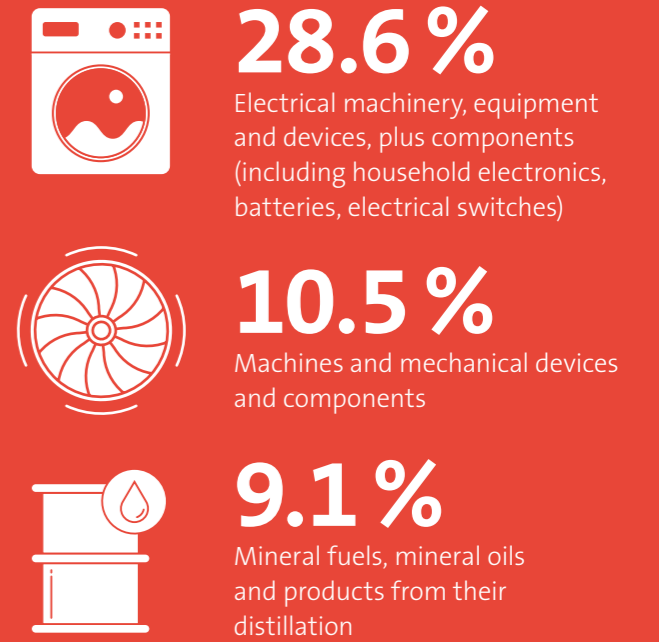
Population growth (compared to the previous year 2022, Statista)



DFI: Global share Direct foreign investment (2021, OECD, ASEAN)

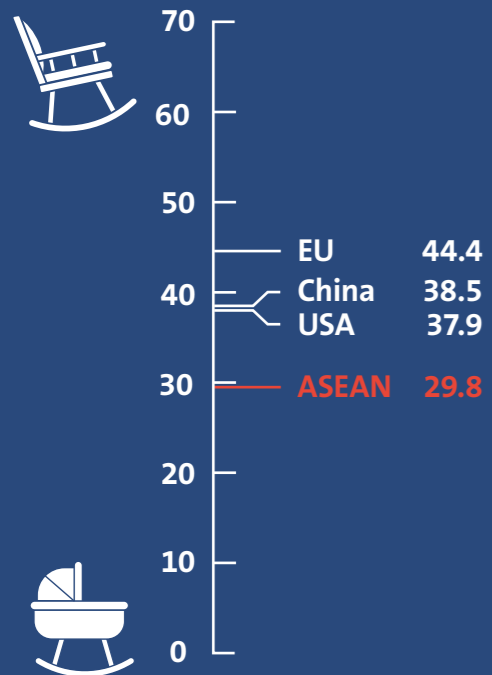


ASEAN main exported goods (2021, ASEAN)

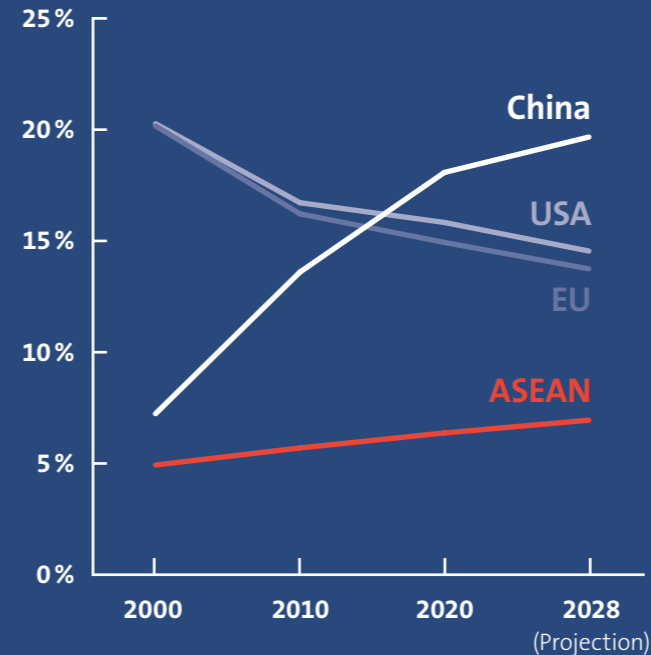


Average age (Median age, 2022, Statista, UN)

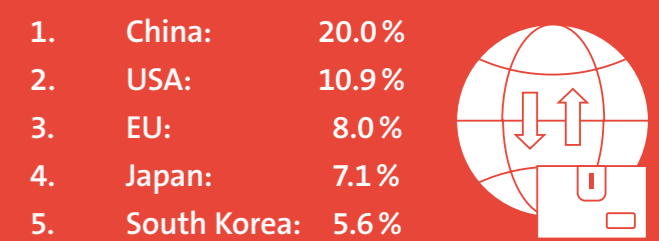
Average GDP per capita (2023, International Monetary Fund)



GDP: Global share adjusted for purchasing power (2023, IMF)



ASEAN Trading partners Trade in goods per trading partner, (2021, ASEAN)



ASEAN Trade balance in goods per trading partner in million US\$ (2021, ASEAN)

	2012	2016	2021
EU:	3,406	21,593	35,688
China:	-34,309	-80,636	-107,683
USA:	15,851	50,342	145,856



© A Sustainable Source of Protein

Eating insects has a long tradition in Southeast Asia. But the demand for them is even growing elsewhere as people embrace sustainable alternatives to meat. A report on a working cricket farmer.

The street markets in Thailand's major cities offer a broad selection of edible insects.



> 2,000

There are more than 2,000 edible species of insects worldwide.

The scene is a shed in northeast Thailand containing three long rows of brick stalls. The farmer walks along the rows spreading shovelfuls of feed, moving past walls as high as his hips. What looks like a chicken coop, at first glance, is home to a protein source of an altogether different sort. Instead of chickens, thousands of crickets descend upon the fresh feed. Instead of loud cackling, a steady chirping fills the air. These crickets could be an answer to a major global challenge.

Insects as an Alternative

The world's population is growing at a rapid pace. Based on current projections, there could be 2 billion more people in the world in 2050 than there are in 2023. That represents a major challenge for the food sector. The meat industry, in particular, is being put to the test, since it requires large amounts of farmland, both for the animals and for the crops to feed them. Sustainable growth is almost inconceivable in this industry. The bottom line: The world needs a less resource-intensive alternative with roughly the same nutritional value as meat.

Insects could be that alternative. In all, there are more than 2,000 edible insect species worldwide. Even today, eating insects has a long tradition in about 140 countries. "You can get all the ingredients of meat by eating insects," said agricultural engineer Florian Berendt. He is the founder of EntoSus, Europe's first bio-cricket farm. "When they are fresh, both meat and our crickets contain about 20 percent protein," he said. The nutritional value of crickets is also comparable to meat. "They contain all the essential amino acids, high-quality fats, and vitamins B12 and B2, basically everything that you would now get from meat," he said.

Cricket Breeding as an Income Source

People in Thailand and other Southeast Asian countries have been putting insect breeding to good use for centuries. Insects have long been a food source in the region. They were originally fare for poorer people who gathered the insects to eat, an important, affordable source of protein. But now edible insects are equally popular at every level of society. The demand in Thailand can hardly be met with insects collected in the wild,



Risks to Biodiversity

Only 2 percent of the insects consumed worldwide are bred in farms. Most are gathered in the wild. But the aggressive pursuit of popular insect species is endangering the biodiversity of the areas where they are native. This puts more strain on insect populations living in habitats already severely threatened by climate change.



and some species are superbly suited to breeding. One is the house cricket, also known as *acheta domesticus*. People in Thailand began to breed them on a large scale back in 1998. The species is not native to Thailand, but farmers prefer it to indigenous varieties since it grows faster and is thought to taste better.

Raising crickets is also a good source of income since few workers are required. Just two people can handle a medium-sized cricket farm. “We have five people at EntoSus at the moment,” Berendt said. The company produces 10 tons of crickets per year. By comparison, the harvest is about 4 tons for a medium-sized farm in Thailand with just two employees, generating the equivalent of 1,000 euros (US \$1,095) in profit annually. “Our crickets can be harvested

after 4 to 6 weeks,” Berendt said. The exact timeframe depends on the ambient temperature and humidity. Unlike Thai farmers, he keeps his crickets in large plastic boxes in a heated room. That isn’t necessary in Southeast Asia where conditions for cricket breeding are ideal. The stalls in Thailand and the boxes at EntoSus are open on top. “We have found that they stay in their boxes as long as they have everything they need,” he said.

Scraps as Fodder

That includes the right food. While the Thai farmers mostly use chicken feed and lettuce, Berendt has found another source of food for his crickets: “To a great extent, we use scraps from the food and agricultural industries,” he said. That is not the only factor boosting crickets as a sustainable food source. “To produce an

equivalent quantity of crickets, we only generate about 1 percent of the greenhouse gases that it would take to produce a kilogram of beef,” Berendt said. Crickets are also more sustainable than meat in other ways. About 80 percent of their bodies are edible, while the figure is barely 55 percent for a pig or a chicken. This is the rationale for the insects’ market value, he added. “Our products are bought by people who want to continue to eat a balanced diet while reducing their ecological footprint.”

Edible insects have so far been a niche product in Europe and North America. Many consumers are disgusted at the thought. But the advantages of this unusual food as a form of sustainable nutrition will make it increasingly popular. Thailand is preparing its cricket farmers

for the export of a large portion of their harvests and subjecting the product to increasingly strict quality and hygienic standards.

Growing Demand

The demand for the tiny six-legged creatures is growing: Market researchers put the industry’s global revenues at more than US \$1 billion in 2023. By 2030, that figure should rise to US \$8 billion. At EntoSus, Berendt and his team are also processing the crickets on-site. “After the harvest, they are frozen to stun them and then blanched,” he said. Then the crickets are transformed into roasted snacks, cricket burgers or even pâté. “We want to establish crickets as a normal food in Europe as well,” he said. If consumption takes off, Southeast Asia would be ready to pick up the slack. ©

In Thailand, the *acheta domesticus* is equally popular among breeders and consumers.



Florian Berendt

Florian Berendt, an agricultural engineer, studied insects as alternative sources of protein for his bachelor’s thesis. After spending several years in international agricultural management, he founded Europe’s first bio-cricket farm in 2019.



Thailand Is Car Country

Thailand has become Southeast Asia's automotive hotspot, but still needs more in its portfolio: electric cars and the capacity to innovate, for example.

The first electric taxis and all-electric buses are on the streets of Bangkok.

Anyone traveling through Bangkok at rush hour has to allow plenty of time for the trip because traffic will barely be moving through the city. Small and mid-range Asian cars move in densely packed formations next to ever-present pickups loaded with food, animals, and people. Thailand ranks second in the world in pickups, trailing only the United States. Among other things, these multi-purpose vehicles serve as public transport – some official, others not. All manner of motorbikes and auto rickshaws romp between the cars. If you were ever to zoom out and look down from up high, you would see a network of canals as well as a web of roads. On the so-called khlongs, narrow boats travel as far as Chao Phraya, the river flowing through the city's center, and carry passengers between urban hubs. On top of all that, there is another mode of travel floating over city streets: the Skytrain.

Automotive industry as Economic Lever

Bangkok's transportation network highlights how Thailand has developed over the past few decades: More and more, the modern is paired with the traditional. This applies to its modes of transportation as well as its overall economy. For example, services and tourism account for the largest share of the country's gross domestic product, namely 60 percent. Industry, at 30 percent, has clearly surpassed agriculture at 10 percent. The Thai government indeed subsidizes agriculture to maintain social stability and fight poverty – after all, roughly half of



18%

was the growth rate for Thailand's auto industry in 2021.

the population lives in the countryside and about one-third works in agriculture. But it is unmistakable that Thailand is making the transition from an emerging market to an industrial nation. Auto manufacturing is a key lever for making this possible.

Success Despite Crises

Thailand produced 1.9 million cars in 2022, surpassing the figures for Indonesia and Malaysia and holding the top spot in the ASEAN region. The Southeast Asian automotive hotspot has been impressive in international comparisons as well. Thailand ranks 10th among manufacturing countries worldwide. But the road forward has been rocky. Thailand began the second half of the 20th century with a booming economy. The government started to import cars, along with car parts that could be assembled in the country. In the process, it also founded what remains the only national car manufacturer: Thai Rung. The company initially assembled the vehicles of other

brands before bringing its own models to market. In the late 1990s, a financial crisis gripped Thailand, and disastrous flooding hit the country in 2011. It managed to withstand these setbacks, thanks in large measure to major companies that increasingly transferred production to Southeast Asia and began to operate complete assembly lines in Thailand and other countries. Japanese manufacturers, in particular, bet on the market's potential – and those wagers are now paying off. Toyota ranks first among them, with Isuzu and Honda in second and third place.

The Future Drives Electrically

In the future, the vehicle industry should continue to accelerate – likely under battery-electric power. That, at least, is what the Thai government is planning: Electric vehicles are supposed to be sold exclusively as of 2035, and they should account for half of registrations starting in 2030. Purchase bonuses and tax breaks are envisioned as incentives, and infrastructure is due to be expanded. The country's central location in the ASEAN region is one of the initiative's strengths, along with its proximity to Indonesia and its important mineral resources for battery manufacturing. The demand for electric cars is growing fast. The country is now facing the challenge of developing its own technologies and innovations so it can join the ranks of industrialized nations. If it succeeds, Bangkok's traffic won't calm down, but it will certainly be quieter and generate lower emissions. ©



Life with Windmills



The Philippines has superb conditions for wind energy, experts agree. So far, however, all the wind turbines have been built on land. A visit to Burgos, the village adjoining the largest wind farm in Southeast Asia. What is it like to live “under the wind”?

Joegie Jimenez says: “This is a land of windmills. A place where they greet the wind from the sea.” Jimenez is one of the village chiefs of Burgos Town in Ilocos Norte, a province in the northern Philippines. He is standing atop a hill overlooking a collection of humming wind turbines. It is a perfect tableau of tall, white windmills rotating against a backdrop of different shades of green. To the side, the sea is lapping onto the sand. This once was pastureland where cows and goats were grazed. Today, it is an altogether different kind of farm.

There are 23 wind turbines in his village alone. Along the shoreline, 50 of the gigantic steel pillars rise the equivalent of 17 stories into the air, each with three rotating blades at their peaks. “The turbines occupy a total of more than 680 hectares (1,680 acres),” Jimenez explains. They are spread out across three villages.



We thought that our electricity would be free if we had this wind farm here. But we quickly realized that is not how it works.”

Wind turbines seem to be everywhere at this end of the country. They are part of the Philippines’ wind corridor, which had eight wind farms as of 2023, half of them in the province of Ilocos Norte, at the northeastern edge of the country’s main island, Luzon. The region, a tourist destination, is known for its beaches.

A Glimpse into the Philippines’ Future

Energy consumption in the Philippines has risen sharply over the past few decades. The share of oil in the energy mix has fallen from 70 percent in the 1990s to about half of that figure today, but coal has largely replaced it. That means there is still a huge opportunity for green energy. At the moment, wind power is only covering about 1 percent of the country’s energy needs. Completed in 2015, the Burgos wind farm, with its 150-megawatt capacity, is still the largest of its kind in Southeast Asia, though it will soon be surpassed by a 160-megawatt wind farm in neighboring Pagudpud. It was recently launched at half capacity and is set to be at 100 percent by December 2025. These huge projects offer a glimpse into the potential future of the country’s energy mix.

Village leader Joegie Jimenez in front of the wind farm in Burgos. The wind turbines are a major change for the small community.

How does village life change when a huge wind-farm is erected nearby? It took four to five years for the wind farm at Burgos Town to be completed. The land for the turbines had to be leased, and that required consultations with residents. Then the turbines had to be installed, with some residents hired for the work. “We thought that our electricity would be free if we had this wind farm here,” Jimenez says. “But we quickly realized that is not how it works. In fact, we might pay more for electricity now. But I’ll have to recheck my bill,” he adds with a chuckle.

Problems with the Feed-in-Tariff

The power from the windfarm is sent over a 115kV single-circuit transmission line to a substation of the National Grid Corporation of the Philippines (NGCP) in Laoag City about 43 kilometers (26 miles) away. From there, the Luzon grid takes the power to an estimated 2 million households. The government knows fossil fuels are not the answer for the future, not least because it has to be imported for the most part. The country will face a loss of almost 30 percent of its current fuel supply in 2024 when the Malampaya natural gas fields are expected to be depleted. In response, the government enacted the Renewable Energy Act in 2008 to promote new options. Among its key provisions is the Feed-in-Tariff system that provides a guaranteed fixed price to investors for 20 years for the development of renewable facilities. Power from the Burgos Wind Farm was initially sold for 8.53 Philippine pesos (US \$0.15) per kWh. The amount was later increased.

The Feed-in Tariff fell short of expectations, a paper at the Ateneo School of Government noted. It pointed to “a fairly wide gap between good intentions and actual results.” The subsidies were much less efficient than expected, as the cost of renewable energy fell sharply soon after the program’s implementation. Unlike other countries such as



The largest wind farm in Southeast Asia towers over the landscape on Luzon, the Philippines' main island.



200,000

is the number of tons of CO₂ that the wind farm removes from the country's ecological footprint.

Canada, Germany and China, the rate was set by the government and not with auctions. With electricity prices higher than they have to be, the Feed-in-Tariff is weighing heavily on Filipinos in the short-term.

Financial Wealth for the Town

A total of US \$450 million was spent to build the Burgos wind farm, according to Asian Development Bank records. This includes the construction of a 43-kilometer (27-mile) transmission line, a substation in Burgos, the expansion of an existing substation in nearby Laoag in Ilocos Norte – and the installation of 50 Vestas V90 wind turbines at 3 megawatts apiece. Denmark-based Vestas Wind Systems is one of the companies that seized an opportunity by shifting their focus to a completely

new class of product. The company started out with household appliances and entered the wind turbine market in 1979. It has produced wind turbines exclusively since 1989. Their giant wind-harnessing rotors in Burgos are supposed to erase about 200,000 tons of CO₂ emissions from the country's balance sheet.

Notwithstanding the shortcomings of the Philippines' renewable energy policies, the Burgos wind farm is a success. A success that generates wealth, as the people of Burgos can testify: "Our village only gets around 1.8 million Philippine pesos (US \$32,700) from the internal revenue allotment yearly to help fund projects and everything," village chief Jimenez says. "So, when we got around 7 million pesos (US \$127,000) from the wind farm's real property

taxes for its first year here, we were really happy." The village used the money to buy land and build a two-story commercial building, among other spending. There are about 1,800 households in the village and most of the buildings are one-story, testifying to the province's modest existence. "But of course, there is depreciation, so taxes were only high for the first year," Jimenez adds.

Well-considered Policies Will Be Needed

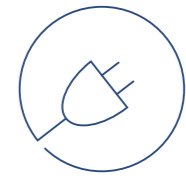
Not everyone was thrilled with the projects. Complaints came from fishermen and farmers. "The fishermen have complained that there are fewer fish in the area now that the wind farms are in place," Jimenez says: "Also, the wind turbines are on pastureland. People have had complaints about the cows not reproducing as they regularly did."

The country's official plan is to have 15 gigawatts of renewable energy installed by 2030. An ambitious goal, as the total energy capacity is currently 23 gigawatts. Demand is expected to double in the next 20 years. According to studies, new wind and solar power plants, alone, could theoretically bring more than 150 gigawatts to the table. But the experience with the Feed-in-Tariff shows that the country's policies will have to be prudent to tap into this potential. "My only wish is for our small village and Burgos Town to be propelled to the future," Jimenez says. "That all our constituents can enjoy the fruits of this venture." He is now standing on a precipice overlooking the tall white towers with their endlessly turning blades, watching massive amounts of power being harnessed. A tremendous force is moving silently through his land and that of his ancestors. ©



A Hybrid of Sun and Water

The Thai sun shines down on millions of tourists every year. It simultaneously generates large amounts of electricity. Thailand is currently home to the world's largest hydro-solar park.



10%

is the boost in output that results when solar cells are installed on water instead of land.

Sunshine, water and solar cells. Visitors to the Sirindhorn reservoir in Thailand see a huge, floating photovoltaic system about the size of 70 football fields. A walkway with panoramic views and souvenir shops highlights the importance of tourism to Thailand. But the Sirindhorn reservoir is more than a travel attraction. It is currently the world's largest hybrid-solar park.

Photovoltaics as Far as the Eye Can See

The very name of the power plant highlights its special feature: Hydropower and solar energy have combined their forces. The facility taps into two sources of energy at one location. It is also more stable when weather conditions change. The solar cells mainly produce energy during the day, while the hydroelectric turbines meet the demand at night. Furthermore, the photovoltaic panels leave part of the lake in shade, reducing evaporation. If there are long periods of hot weather, the system can compensate for low water levels and the corresponding decline in hydropower output.

That is an important advantage since Thailand is increasingly grappling with extreme weather conditions and the impact of climate change. In April, temperatures rose to 45°C (113°F), breaking records. Officials warned people not to leave their homes. Thailand is not alone. Exceptionally high temperatures, accompanied by heat-related deaths, were recorded in the entire region as well as in China and India. These conditions are not only harmful for people and nature – they cause the demand for electricity to soar as air conditioners and other appliances run full blast. Efficient sources of energy are in greater demand than ever.

High Output from a Small Space

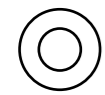
The Sirindhorn dam has faithfully served Ubon Ratchathani province for more than 60 years; the reservoir is the largest in the region. Its electrical output flows into the domestic market. The floating solar cells boosted capacity to 45 megawatts in 2021 – without taking up additional land. The photovoltaic park takes up relatively little space since the solar modules cover barely 1 percent of the lake's surface. According to the public electrical utility, that leaves plenty of space for the ecosystem and a local fishery.

The Special Effect of Solar Cells on Water

The solar modules are designed to be as environmentally friendly as possible. Their floating substructure is made of a special plastic that is resistant to ultraviolet light. That means the high-density polyethylene does not decompose, thus preventing more microplastics from harming the underwater world. The floating solar cell's greatest contribution is its capacity. The systems sit high on the water, and the cool environment boosts their electrical output up to 10 percent higher than land-based solar power systems. There are also no buildings around casting shadows on the panels. But floating power plants do have a weakness: They are relatively complicated and expensive to install. So, it is recommended that hydropower plants with reservoirs be retrofitted with them to take advantage of the existing infrastructure and connection to the grid. This was the approach taken at the Sirindhorn reservoir.

Floating Gigawatt Projects for Southeast Asia

Sunlight, water and solar modules – hydro-solar plants are a promising energy solution for sundrenched countries. It is no accident that Thailand is planning to build other hybrid plants – 15 of them at this point. By the year 2037, a total capacity of 2.7 gigawatts should be available. The country's neighbors have been paying attention for a while: In nearly every ASEAN country, projects are underway in the three-digit megawatt – or even gigawatt – range. Southeast Asia plans to use its combination of water and sunlight for more than just tourism and agriculture. ©



Indonesia's Unicorns

Indonesia is home to more than 10 unicorns, that is startups valued at more than US \$1 billion. Many of these owe their rise to its population of 270 million. We present three of these companies.



Gojek

From an idea ...

Gojek is the most successful Indonesian unicorn so far. One of the country's first startups, Gojek began capturing the market with an app for motorbike taxis. The app's fleet had just 20 drivers at first. But the total number didn't stay that low for long. With investors like Google, Tencent and Mitsubishi Corporation behind it, Gojek soon added courier services (GoSend), food delivery (GoFood) and shopping services (GoMart) to its offerings. More and more services joined them over the years, including electronic payment services (GoPay) and car rental (GoCar), until Gojek became a kind of "super app". Its portfolio features more than 20 services today.

... to a business worth billions

Just 11 years after its founding, Gojek reached the US \$10 billion threshold, achieving the status of a so-called "decacorn." One of its decisions is largely responsible for this: In 2021, Gojek merged with another extremely successful startup, Tokopedia. At nearly the same time as Gojek, it rose to become the most popular online seller in the country. Under the name GoTo, the unicorn combination offers an extremely wide array of online ordering options. At times, GoTo is even said to account for 2 percent of the country's gross domestic product. In 2022, the successful duo was listed on the Indonesian stock exchange, officially bidding farewell to its life as a unicorn.

Kopi Kenangan

From an idea ...

In 2022, the coffee chain, Kopi Kenangan, became Indonesia's first food and beverage company to achieve unicorn status. Its innovation was the idea that customers could preorder their coffee by app so they could pick it up in the nearest shop or have it delivered. On one hand, the "grab and go" system is part of the trend toward an expanded digital economy in the region. On the other, Kopi Kenangan is filling a gap with products whose prices lie between those of international coffee chains and the instant coffee sold at street stands and kiosks.

... to a business worth billions

After it was launched in 2017, Kopi Kenangan began growing its business in Indonesia. The range of products expanded at the same time as it added soft cookies and a "chicken to go" brand to its coffee business. Starting in 2022, the startup reached a value of US \$1 billion with the help of well-known investment firms. Among the investors was a firm owned by American rapper Jay-Z and tennis star Serena Williams. In the future, the unicorn plans to expand its activities beyond Indonesia's borders, using "Kenangan Coffee" as an international brand name. Its goal is to become the most popular coffee chain in Southeast Asia and bring its Indonesian coffee brand to the world. Malaysia is the first stop on that journey.



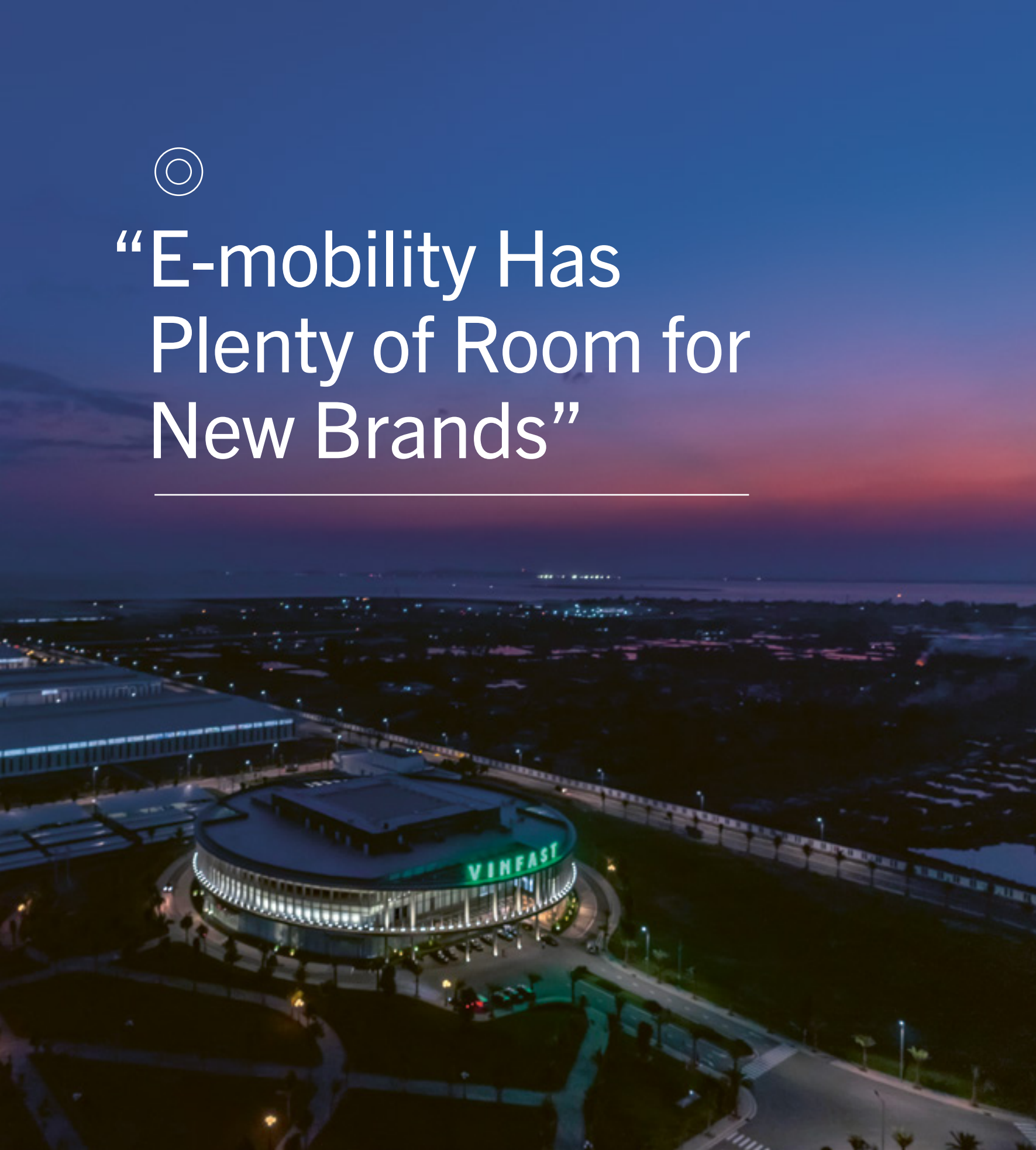
J&T Express

From an idea ...

J&T Express is one of the fastest delivery services in Southeast Asia. The unicorn took on a complicated job: After all, the region is home to quite a few islands and entire island-nations in the bargain. Indonesia alone, with its 17,500 islands, is the largest archipelago-nation on the planet. J&T Express has served the country since its founding in 2015, making package deliveries via cargo transport. It has literally spread its wings into the entire region as well. It has recently been particularly active in Singapore. Its residents can soon expect even better service than same-day delivery. Packages are expected to arrive within four hours.

... to a business worth billions

Even before the COVID-19 pandemic, J&T Express said it was shipping a million packages a day. Those exceptional circumstances encouraged the convenience of online shopping. In 2021, the daily pace of package shipment was 2.5 million. At that point, the unicorn reached an estimated value of US \$7.8 billion. J&T Express now operates in the Chinese market and is preparing to be listed on the Hong Kong Stock Exchange. ©



©

“E-mobility Has Plenty of Room for New Brands”

Southeast Asia is a region with great potential for e-mobility. The young Vietnamese company VinFast is making giant strides and already offers a broad range of electric vehicles.

VINFAST WAS FORMED JUST FIVE YEARS AGO. WHAT WAS THE ENVIRONMENT LIKE WHEN IT WAS LAUNCHED?

It was full of opportunities and challenges. The vision of an independent automotive industry with a global value chain had been powerful for decades. Many nations had clearly enjoyed its benefits. But there was no automotive industry of that stature in the country until recently. A number of companies were active here, but they imported and assembled vehicles with a low localization rate, and their production costs were higher than those in Southeast Asian countries like Thailand and Malaysia. Supporting industries were rudimentary. It was not an easy environment.

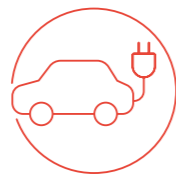
HOW DID VINFAST GET STARTED?

The potential of the Vietnamese auto market is considered one of the highest in the world. About five years ago, the car ownership rate was only 23 cars per 1,000 people and has only grown marginally since then. This has opened up a huge opportunity to shape the country's mobility. Vingroup accepted the challenge. The decision was made to start from scratch and introduce a new vehicle brand with the right products. The result was VinFast.



Le Thi Thu Thuy

Le Thi Thu Thuy, known as Madame Thuy Le, is the CEO of VinFast and Vice-Chairwoman of its parent company Vingroup. She was born in the Binh Dinh province of Vietnam and graduated from the Foreign Trade University in Hanoi. She obtained her MBA at the International University of Japan and also completed a chartered financial analyst (CFA) program. She joined Vingroup in 2008. In 2017, she assumed responsibility for opening the first auto factory in Vietnam.



300,000

EVs is the maximum annual capacity of the Hai Phong production plant.

WHAT WERE THE MOST IMPORTANT STEPS TAKEN IN THE RECENT YEARS?

It has been a time for speed. VinFast was formed in 2017 and entered the market with its first vehicles in 2018: They were e-scooters and cars still powered by internal combustion engines. E-cars followed in 2021. In January 2022, we became one of the world's first auto companies to completely switch to all-electric drive. Only five years after launching the company, we have a strong foothold in the market and have highlighted the capabilities of Vietnam's auto industry. We delivered more than 11,000 EVs in the first half of 2023.

IN THE RIGHT PLACE AT THE RIGHT TIME?

Definitely. The electrification of transportation has helped us as well. In its early stages, it allows plenty of space for new brands. We at VinFast consider electrification to be the foundation for our vision: to become a global smart EV brand.

WHAT IS MAKING VINFAST COMPETITIVE IN THIS MARKET?

Our main asset is a comprehensive and diverse electric mobility ecosystem. Our electric car lineup covers all the popular segments, from minicars to large SUVs. They are complemented by a range of

e-scooters, e-buses, advanced battery systems, and a network of charging stations across Vietnam.

HOW ARE YOU APPROACHING THE WORLD MARKET?

The first electric car produced by VinFast was a compact SUV solely intended for the domestic market. This changed in 2021 with the VF 8 model, a midsize SUV: We export it to the US and Canada. About 3,000 units have been delivered to date, which we see as a promising start. We are active in other regions as well, in Europe, for example, and have already established more than 110 showrooms worldwide.

WHAT IS THE RECIPE FOR DEVELOPING A STATE-OF-THE-ART CAR TODAY?

Several factors go into the VinFast recipe. First and foremost, a team of about 1,000 in-house R&D experts from Vietnam and abroad and a total Vingroup investment of US \$9.3 billion for business activities and infrastructure. Another factor is Vingroup's technology ecosystem: VinES researches and develops battery technology, charging and recycling. VinAI and VinBigData are doing research on AI and big data technology for use in the development of intelligent driving features.



The VF 8 model (above) is currently exported to North America from a plant in Hai Phong (left).



DO YOU WORK WITH INTERNATIONAL SUPPLIERS?

Yes, we partner with leading companies to integrate intelligence worldwide and introduce cutting-edge technologies into products while shortening development times. Some of the companies are Bosch, Siemens, Amazon and Intel. On the battery side, our partners are CATL, Gotion High-Tech and Prologium. In all, it is a recipe that allows VinFast to manufacture products that meet

global standards, with the smart features that customers are demanding, like home control or mobile office.

WHO DEVELOPS THE EXTERIOR AND INTERIOR DESIGN?

Design is one of the most important sales factors. Vehicles need distinctive, unique styles. To develop them, we have collaborated with world-renowned

A view of the Hoang Van Thu Bridge in Hai Phong. VinFast vehicles are currently manufactured in the port city.



partners, primarily Pininfarina and Torino Design, which work in the great Italian tradition of elegant car design. Our latest VF 3 is designed in collaboration with the Australian studio Gomotiv.

COULD YOU PLEASE EXPLAIN THE “V” COMPANY LOGO?

It is a combination of our own aesthetic trademark and our national spiritual values: The “V” stands for Vietnam and Vingroup. It is reinforced by the signature light strip on the front of our cars. We would love to be a symbol of the rising aspirations of Vietnamese brands.

HOW DO YOU RATE THE MARKET DYNAMICS AT PRESENT?

They will stay as they are for a while. We welcome that. VinFast is building its success on this foundation. I believe electric vehicles have a promising future. More and more countries and regions are promoting electrified vehicles and setting the goal of phasing out internal combustion engines. The environment and cities will definitely be among the beneficiaries.

WHAT DOES VINFAST WANT TO ACHIEVE IN THE COMING YEARS? HAVE THE MILESTONES BEEN SET?

We have already achieved one thing this year: the successful stock listing on the US market. Next is to complete the development of world-class smart electric vehicles with premium quality to meet the needs of global customers. Then, establish a strong position in the key markets of North America and Europe and expand the business globally. A lot to do – and a lot of opportunities. ©



VinFast

VinFast is an automotive company that was founded in Vietnam. Its legal and financial headquarters are in Singapore. Established in 2017, it is a unit of Vingroup, one of the largest private conglomerates in Vietnam. The portfolio is exclusively e-vehicles. It not only has Southeast Asia in its sights – the company sees itself as a global brand. Its production plant in Hai Phong currently has a maximum capacity of 300,000 EVs per year. VinFast sources about 60 percent of its components domestically from various suppliers and is also building up production in Vietnam, for batteries, for example. This allows it to optimize production costs and vehicle prices. Another company focus is setting up a manufacturing complex in North Carolina in the United States and looking at other factory sites in line with market needs.



BY THE NUMBERS

10 Percent



Rice is the fourth most common crop in the world. The largest share, by far, is produced and consumed in Asia. About 105,000 tons of rice were consumed during the most recent harvest year in Southeast Asia alone. Its standing is clear from various expressions in the region. In Thailand, the phrase “Gin Khao” (eat rice) means mealtime or food. In Vietnam, the phrase “Have you eaten rice?” (Ăn cơm chưa?) is a standard greeting, meaning “How’s it going?” But there is another side to this small-grain cereal. Rice is responsible for about 10 percent of the world’s methane emissions. The culprit is the “wet” method of rice cultivation: Farmers flood their fields to remove pests and weeds. This creates the ideal conditions for microorganisms to break down organic substances in an environment devoid of oxygen and to release methane into the air. Although this greenhouse gas has a shorter lifespan than carbon dioxide, it absorbs considerably more energy in the atmosphere and has an impact 25 times that of CO₂. New technologies and lower-emission cultivation methods are expected to reduce rice’s ecological footprint. More climate-friendly strains such as the “Riceberry” from Thailand are expected to be alternatives. But reservations about its violet color may slow its progress. ©



FASCINATION TECHNOLOGY

DIaVent® Highflow Pressure Equalization Element

Lithium-ion batteries are at the heart of battery-electric vehicles. Their housings protect them from dust, moisture and oil. The DIaVent® Highflow from Freudenberg Sealing Technologies improves safety by equalizing pressure in the housing – during driving and emergencies.



Initial situation

Electric cars are achieving longer ranges thanks to high-performance batteries. Manufacturers are packing battery cells more tightly to achieve this, leading to higher energy densities in battery housings. They, in turn, are becoming lighter, more pressure-sensitive and thinner-walled. These sensitive housings require systems that reliably equalize pressure in two scenarios: during regular operations, including driving at different elevations; and during emergencies such as thermal runaway, when the buildup of gas and pressure must be rapidly vented.



The problem

Until now, there have been separate solutions for each scenario in the battery housing. Both had their weak points. During normal operation, a porous PTFE film handles the pressure equalization. But it is sensitive to mechanical influences. In addition, particles and fluid media can contaminate the film, which impairs its permeability and thus the battery's "respiration." Emergency degassing employs a rupture disc in the housing. It bursts open automatically under extreme pressures. The housing then remains open, potentially leading to the creation of a flammable gas-air mixture.



The solution

DIaVent® Highflow performs both functions and can be modified for attachment to any battery housing. During normal driving, "respiring" layers of nonwovens in the umbrella valve regulate the exchange of air and pressure. They also keep water and dirt out. In an emergency or accident, a sealing lip allows the escape of large quantities of gas. Its special silicone elastomer responds precisely to predetermined pressure differences. Once the gas escapes, the elastic sealing lip springs back and closes the housing. Short-term pressure peaks can also be cushioned in this way. ©

REGULAR OPERATION:

10 l

of air exchange/minute
at a pressure difference of 100 mbar

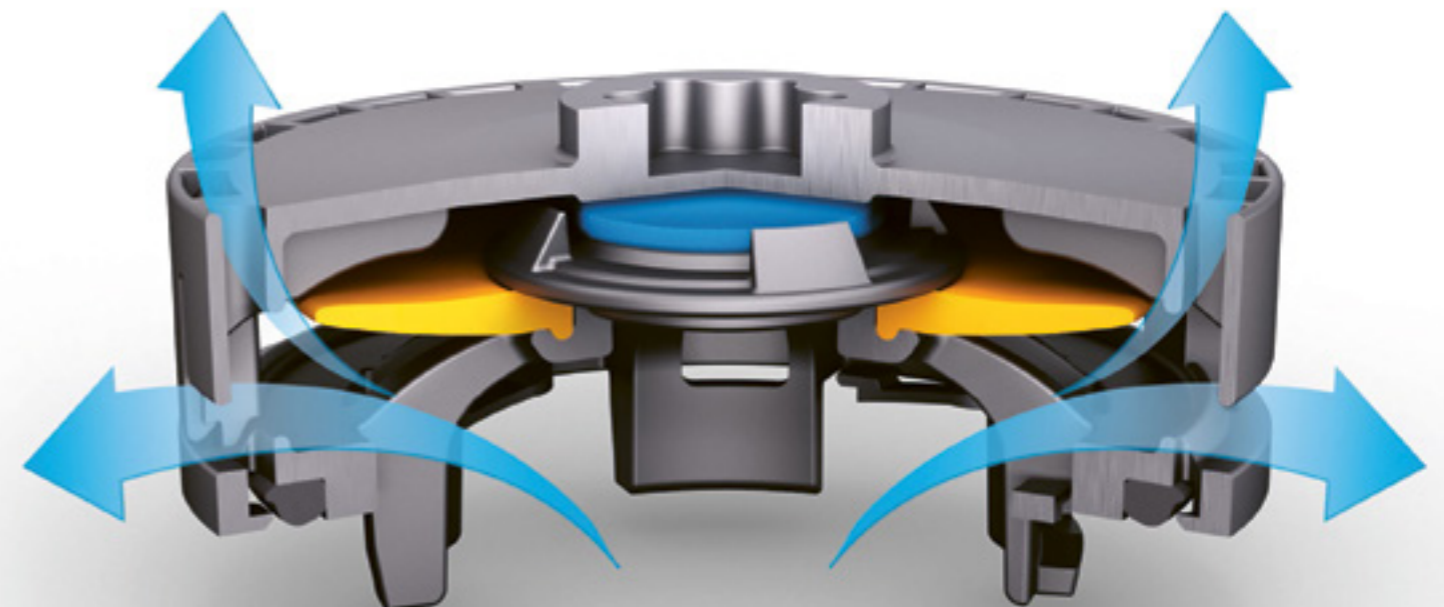
EMERGENCY DEGASSING:

120 l

of gas release/second
at a pressure difference of 500 mbar

ADVANTAGES:

Increased safety for lithium-ion batteries. More robust than earlier solutions. Easy to attach to the housing. Cost savings since a single component combines two functions.



Learn more about the DIaVent® product portfolio at [FST.com](https://www.fst.com)



Endangered Species

The Mekong region is a hotspot for biodiversity. No other region has had as many new species discovered. But its diversity is under threat – from poaching, deforestation and industry.

The discovery of a new, previously unknown animal species is always exciting news, even today. There are hardly any areas left on the planet to explore, or so it seems. So when a new animal species makes headlines, it usually lives in the most remote recesses of the ocean. But the world's most biodiverse region is not on the ocean floor – it is in Southeast Asia. Every year, researchers identify new animal and plant species along the Mekong River, in the region bearing that name. A total of 380 new species were discovered there in the past two years alone, most of them in Vietnam and Thailand.

Ideal Conditions

There are several reasons for the biodiversity of the Mekong region. The river's roughly 800,000 square-meter (0.3-square-mile) catchment basin has special geographic and climatic features: Plenty of rain and a hot, moist climate make it an ideal environment for a wide range of animals and plants. Regular flooding during the rainy season promotes the growth of

dense vegetation in the confined spaces of the region. Its many craggy areas ensure that populations can develop in isolation. On average, a new species was discovered every three days between 1997 and 2017. Mammals as well as insects and birds were discovered. There has long been the assumption that every mammal on the planet has been found. But researchers have found new badgers, primates, and bats there in the last three decades.

These descriptions of the Mekong region apply equally well to the Cuc Phuong National Park. A dense rain forest streaked with limestone crags covers 20,000 hectares (49,000 acres) about 120 kilometers (75 miles) southwest of Hanoi. Vietnam's oldest national park was founded in 1962 and is home to 137 avian, 36 reptilian and 64 mammalian species. One of them is the Delacour's langur, a rare species of monkey that lives among the limestone formations. The monkeys are distinguished by their fur's unique coloration. Their upper body is





2,500

species were discovered in the Mekong region between 1997 and 2017.

covered with black fur that stands out sharply from the white portion that extends down the lower body almost to its knees, giving the impression that they are wearing white trousers. There are only about 200 langurs of this species remaining in the wild. They were only discovered during the late 1980s and can only be found in a few areas of northeastern Vietnam.

The Greatest Danger: Poaching

The vegetation of the Cuc Phuong National Park offers the monkeys an ideal habitat. They feed on leaves, seeds and unripe fruit found amid the limestone formations. They nonetheless are endangered. Poachers are the greatest threat to the monkeys, which are still on the menu in some Vietnamese restaurants or are seized for use in recipes for traditional medicines. And there are still people who want to keep the monkeys as pets. The problem is serious because poachers target infants for this market and do not balk at killing an entire group to get to one of them.

Vietnam's steadily growing population is another threat. When the national park was founded in 1962, only about 500 people lived in the area. By 1998, the population had soared to 51,000 people, according to the census that year. About 60,000 people visit the park annually, hoping to catch a glimpse of these rare animals in their habitat. After all, no zoo in the world has a Delacour's langur. Food is the issue: The monkey's stomach contains special bacteria that allows them to consume the hard-to-digest leaves and seeds of the park's trees. If they are fed different foods, such as ripe fruit, they quickly become ill.

Local Conservation Efforts

Activists with the Endangered Primate Rescue Center (EPRC) understand this. Just outside the national park, they nurse

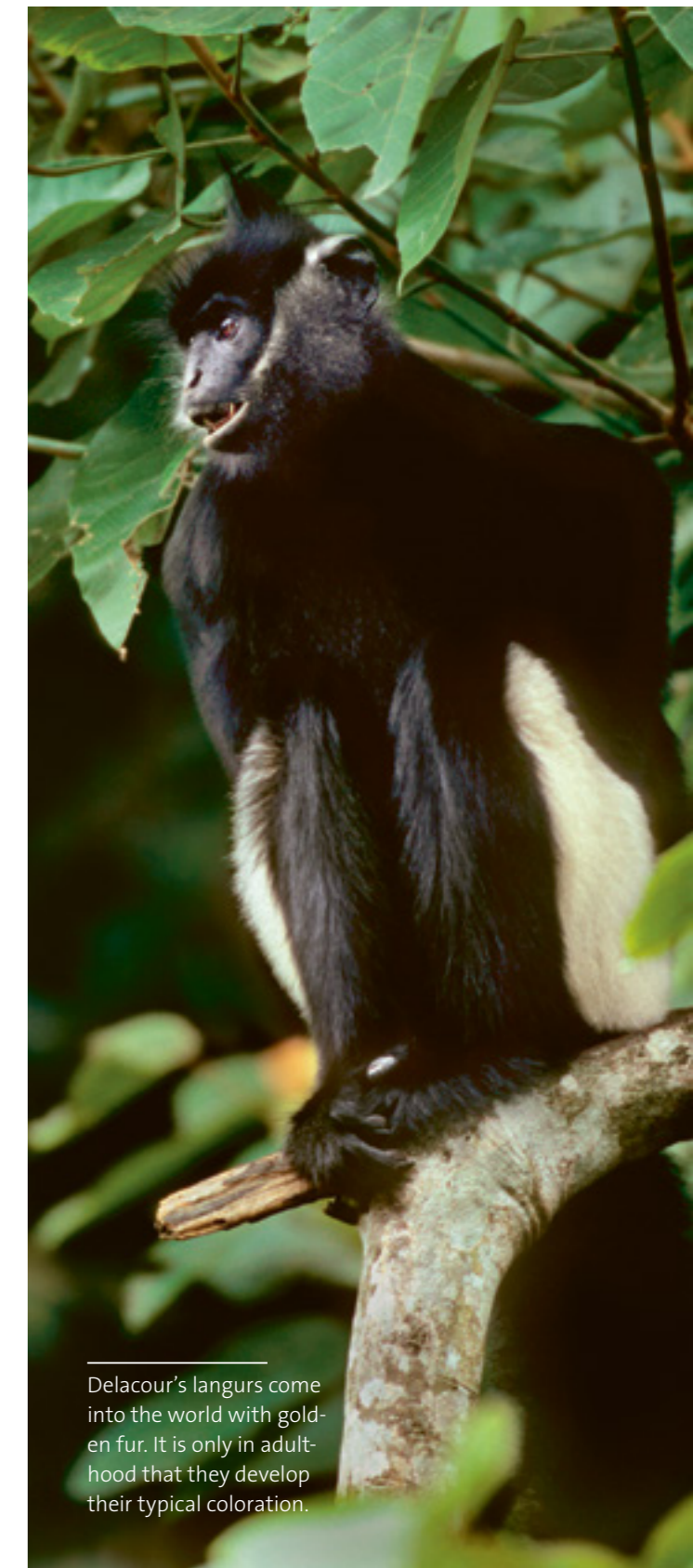
animals back to health after they are recovered from captivity. The goal is to release them into the wild to ward off their extinction. It is essential to re-acquaint the monkeys with their habitat as much as possible. That's why half of the EPRC lies in dense jungle. Every morning, the team combs through the forests of Cuc Phuong to collect the right leaves and branches to feed the langurs.

But it is no simple matter to reintroduce the monkeys to an independent life. If they have been in captivity for too long, they have to become accustomed to a life without human support first. This is a gradual process. At EPRC, it takes place in a 7-hectare (17-acre) "semi-wild" facility where they are observed, but no longer fed. The choice of the right spot for the release is important as well. Delacour's langurs live in groups with an average of 10 animals. An extra individual in a group's territory could put all the monkeys at risk. There is also the danger that edible plants will be in short supply if too many monkeys live in too small a space.

From Poachers to Wildlife Officers

The EPRC is not just devoted to Delacour's langurs. About 180 animals representing 14 species, including gibbons and loris, now live on the center's grounds. The activists have already released more than 100 animals into the wild. The project is also taking aim at poachers, sometimes creatively, capitalizing on the poachers' knowledge of nature and animals. They are being retrained to become wildlife officers and are paid a salary greater than what they would earn by selling monkeys. Their job is to protect the animals from poachers and observe them from a safe distance. Furthermore, it is mainly people from nearby villages who work as the EPRC's animal caretakers. The more they earn a decent wage, the less the temptation to turn to poaching for income.

The EPRC's efforts are already showing the first signs of success. The number of Delacour's langurs is slowly increasing. But the species still has a long way to go to achieve a stable population. And these monkeys in white trousers are not the only species in the Mekong region that is hunted and whose habitat is being destroyed. Deforestation, cement mining and huge hydropower plants on the river have joined poaching as threats to the biodiversity of the region. That means some previously unknown species could die out before it is even discovered. ©



Delacour's langurs come into the world with golden fur. It is only in adulthood that they develop their typical coloration.



Ambitious Hydrogen Plans

Brunei is currently the largest per capita emitter of CO₂ in the region. But its wealth of natural gas represents a path to the future: hydrogen. It is already being exported to Japan. What else could be possible?

Brunei's energy footprint is not exactly stellar. It is a small country on the island of Borneo with just 400,000 inhabitants. But it is wealthy, with its gross domestic product, adjusted for purchasing power parity, coming in at about US \$68,000 per capita, matching the United States and well ahead of countries like Germany and France. Brunei's prosperity is mainly based on two resources, oil and natural gas. The sultanate is superbly positioned in both of them. Raw materials represent more than half its economy, and more than 90 percent of its exports and state revenue. Brunei is dependent on fossil fuels. This has consequences.

Brunei's energy sector is currently Southeast Asia's largest per capita emitter of CO₂: The country meets nearly 99 percent of its need for electricity with natural gas, and the rest with oil.

The green energy from its single solar power plant meets 0.05 percent of its supply. But Brunei has another option, hydrogen, which could be its path to the future.

Enormous Potential for Hydrogen in Asia

Governments across Asia are looking at hydrogen. Japan would like to be the world leader in the field. South Korea is investing in hydrogen filling stations. China and India also have ambitious national hydrogen strategies. All of these countries are hoping that hydrogen can reduce CO₂ emissions if substituted for oil and natural gas in steel mills and long-haul trucking, industries where electrification is not viable. Hydrogen is considered an important element of an emission-free future: When it is combusted, only water vapor is released. But it still takes energy to

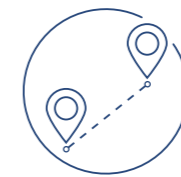
produce the gas. While so-called "green" hydrogen is generated with renewable energy, "gray" hydrogen involves something called a steam reforming process, usually starting out with natural gas. The approach is energy-intensive: About 10 tons of CO₂ are produced per ton of hydrogen.

Brunei has been delivering gray hydrogen to Japan since 2019. The initial project caused a stir because it was the first time that hydrogen was exported internationally, in this case, over a distance of more than 4,000 kilometers (2,500 miles). Although the hydrogen from Brunei certainly reduced emissions in Japan, the gas, itself, is not currently being produced, using carbon-neutral processes. Brunei points out that companies have gained a tremendous amount of experience with the fuel in recent year, making the switch to more sustain-

able hydrogen easier. Brunei now has two options: significantly expand solar energy for the production of green hydrogen, or invest in carbon capture with the goal of either storing the CO₂ or separating out the carbon for industrial uses.

Ideally Positioned for Expansion

A research report from the Economic Research Institute for ASEAN and East Asia (ERIA) puts the production and savings potential from the use of hydrogen at 2.75 million tons of oil units, the usual measurement unit for energy consumption from the combustion of a ton of oil. Brunei would mainly benefit from generating its hydrogen with natural gas from relatively small gas fields that would otherwise be uneconomical. There have also been technological breakthroughs that could be used to transform the gas normally burned (flared off) at the well site into hydrogen.



4,000

kilometers is the distance that Brunei's liquid hydrogen is being shipped to reach Japan.

This puts Brunei into the ideal position to dramatically expand its use of hydrogen in its home market, the report said. Depending on the scenario, oil consumption in the transport sector would be reduced by up to 58 percent, and gas consumption in industry by about 18 percent. The entire prospect would

become even more attractive for Brunei because more surplus natural gas would be exported. The report also calculates how the production costs for hydrogen would decline and efficiencies would increase as volumes rise to certain levels. Here the current "gray" production of hydrogen using steam reforming would even work to Brunei's advantage.

Ambitious Sustainability Plans

"Brunei can make the shift to a hydrogen society," the ERIA report states. All it takes is the political will. The other elements are available in abundance. The government has already announced a range of plans, including increased solar capacity and streamlined investments in sustainable hydrogen infrastructures. "The plans are as ambitious as the current situation in green energy is modest," Asian media group Eco-Business has said. Brunei now has choices to make. ©

July 2023

New ETU Alternatives

Chloroprene rubber, also known as neoprene, is used for diving suits and in products for the auto industry. During the vulcanization of chloroprene, ethylene thiourea (ETU) serves as an accelerant. It also makes the end product more resistant to cold, grease and lubricants. However, ETU is considered a potential health hazard. That's why alternatives that exhibit similar characteristics are being sought. Freudenberg Sealing Technologies has developed new elastomer compounds that make it possible to manufacture products made of chloroprene rubber without ETU as an accelerant. The materials are now in regular production.

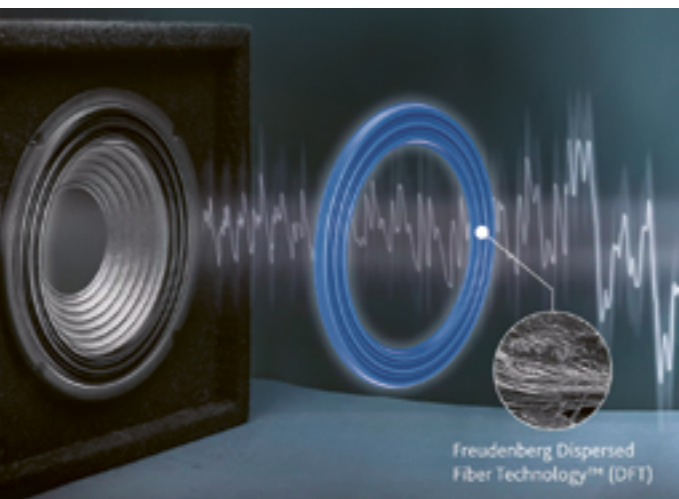
ETU-free compounds have already been used successfully in the automotive field in seal bellows for joint seals in tie rods, suspension arms and transverse links, among other components. They protect moving parts from external influences and



the loss of lubricants. With the development of new elastomer compounds, Freudenberg has not only managed to do without ETU and other worrisome accelerants, such as tetramethylthiuram disulfide (TMTD), but to improve the performance of chloroprene rubber as well. The material meets one of the most important requirements – behavior in low temperatures – extraordinarily well, measurements show. Customers who use ETU-free seal bellows see significant added value compared to other products on the market. Even parameters such as tensile strength and elongation at break are within the target specifications. ©

June 2023

Best Technology for the Best Sound



Speaker surrounds are crucial for the audio performance of loudspeakers. They attach the speaker's components to external housings and reduce pressure, vibrations and distortions. The quality of the speaker surrounds is especially important in high-end sound systems that are designed to produce crystal-clear audio experiences. Freudenberg Sealing Technologies uses a unique technology – Dispersed Fiber Technology™ – that it developed in-house to create speaker surrounds that meet the highest standards. Fiber-reinforced materials help to expand the frequency range of a loudspeaker from the deep base of a subwoofer to the high frequencies of a tweeter. Thanks to DFT, speaker surrounds for stadium loudspeakers, car speakers and premium stereo systems are achieving a new dimension of audio quality, vibration control, resistance to environmental elements, and durability. Freudenberg is now designing and testing DFT speaker surrounds to meet the demanding technical specifications of various audio manufacturers. ©

August 2023

Patented Drinking Water Seal

In devices used to treat or effervesce water, the junction between the valve of a carbon dioxide cartridge and the pressure reduction valve on the device itself must be securely sealed. Freudenberg Sealing Technologies has developed a patented seal made of high-performance polyurethane for this purpose. Thanks to its special geometry, the seal adapts to the varying valve dimensions of the different gas cartridges and provides high leak tightness under constant pressure. The EU has authorized the material for contact with foods, and it meets FDA requirements and 3-A sanitary standards. ©



June 2023

Opposites Unite in New Material

In the auto industry, a thermal interface material (TIM) from Freudenberg Sealing Technologies has proven itself in several customer projects. This silicone material is heat-conductive and electrically insulating, and it can be processed by using injection molding. It also adheres to widely used substrates such as plastic, aluminum and copper while compensating for roughness. Like all plastics, silicone is inherently thermally insulating. To create the new material, it is mixed with an inorganic filler that makes it heat-conductive. This involves the use of special non-conductive metallic compounds. The thermal interface material has been used in series production for some time, in charging connectors installed in the electric cars of a major automaker. Among other functions, it absorbs the heat flow moving through copper lines connected to the battery and conducts it to temperature sensors, enabling a quick response from the charge controller while providing the constant thermal management of the battery. ©



More news online at:
<https://on.fst.com/2PC19mR>



Feedback and Contact

More Information

Would you like to learn more about Freudenberg Sealing Technologies, our products, solutions and services? Then take a look at www.fst.com and discover our wide-ranging portfolio. On our Internet site, you can also download all the issues of our company magazine as PDFs or subscribe to the magazine at no charge.

If you no longer want to receive ESSENTIAL, simply send an email including your address to: essential@fst.com

We look forward to a dialogue with you!

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