PEA

PEA and Moxa Power Up Economic Growth for a Smart City in Thailand

AT A GLANCE BUSINESS CHALLENGE SOLUTION RESULTS

AT A GLANCE

Energy 4.0—

Moving Towards a Low-carbon Economy

Over the past several years, Thailand has devoted much effort and many resources to economic development. The resulting economic growth has greatly increased Thailand's competitiveness in the global economy, which in turn has put additional challenges on Thailand's economic performance. The next phase of growth requires a new paradigm for the power sector. The goal is to develop a low-carbon economy while ensuring energy security, affordability, sustainability, and the wellbeing of its citizens. Thailand's government launched the "Energy 4.0" platform for electric vehicles, energy storage, renewable energy, energy management systems, and a national control center. All of these technologies are part of the blueprint that supports the Energy 4.0 platform.

Through Energy 4.0, Thailand is aiming to double the use of renewable energy and become a power hub for ASEAN by the year 2036. PEA, which serves 99% of Thailand's population, is supporting this magnificent blueprint. To realize this goal, PEA is collaborating with Italthai Engineering, the leading engineering contractor in Thailand for a wide range of engineering, procurement, and construction (EPC) services.

Energy Mix

- Double the use of renewable energy
- Increase power purchases from neighboring countries

Energy Efficiency

- Reduce electricity used by 89,000 units
- Reduce the construction of power plants by 10

Energy 4.0 Targets for 2036

Thailand has planned four phases to enhance smart grid development:

- **Preparation** – completed in 2015 and 2016
- **Short-term projects** – started in 2017 and expected to continue through 2021
- **Medium-term projects** – planned for 2022 to 2031
- **Long-term projects** – planned for 2032 to 2036

Central Market

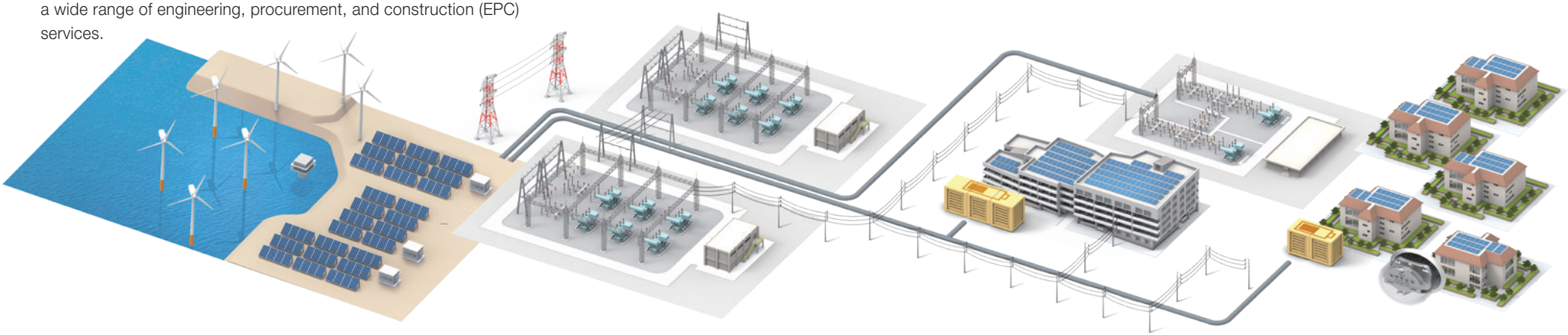
- ASEAN Electricity Hub
- Competitive electricity tariff compared to other ASEAN countries

Provincial Electricity Authority (PEA)

Founded: 1960
Industry: Utilities
Website: https://www.pea.co.th/en/

Italthai Engineering Co.,Ltd.

Founded: 1967
Industry: Utilities
Website: http://www.italthaiengineering.com/



BUSINESS CHALLENGES

Delighting Pattaya—

A Shining Star in Thailand's Eastern Economic Corridor

Cities generally need to consume a lot of electricity; to power manufacturing plants, public transportation, security lighting, catering, entertainment, and various commercial activities. A stable energy supply that emphasizes energy efficiency is what enables today's cities to sustain all of their energy needs.

In the short term, PEA is proceeding with various pilot projects. In this article, we highlight the project being deployed in Pattaya. The goal of the pilot project is to test the technical suitability and investment feasibility of smart grid technology. The city of Pattaya was selected as the first pilot city for two reasons. It is a destination for tourists from around the globe and it has an advanced manufacturing sector. With its highly developed economy and need for a stable energy supply, Pattaya is the perfect location. In addition, Pattaya is a shining star in Thailand's Eastern Economic Corridor (EEC), which is the country's flagship economic zone. The area is quickly becoming a major hub for trade, investment, and regional transportation. In addition, it is a strategic gateway for Southeast Asia.

User-centric: smart meters are the key

The pilot project includes a 1-billion-baht advanced metering infrastructure (AMI) project that enables PEA to understand consumer behavior. The data is used to improve service delivery. As part of the project, PEA will install 120,000 smart meters in homes and construct a data center to process the information it receives from the devices.

Modern grids: smart substations are the infrastructure

As PEA delivers more smart city services, it is also shifting its internal operations. Energy 4.0 requires faster processes that are flexible, efficient, and automated. PEA's transformation also improves power delivery and minimizes unstable voltage during power outages. The key to this process is to upgrade its substations. To provide the best possible service to customers, the substations must "talk" to the smart meters located at homes and businesses. The information received determines adjustments needed within the smart grid.

The flexibility and efficiency of the power grid is optimized through communication, monitoring, and management of the overall network. Although PEA is an electricity expert, they are not that familiar with this type of critical network communication. Pongsakorn Yuthagovit, assistant governor for PEA, stated. "In implementing and maintaining a digital substation communication system, we need an expert we know we can trust." That's where Moxa's expertise comes in.

SOLUTION

The Digital Difference

To ensure a smooth transition from the previous substation system to the current one, Moxa provided support in the form of consulting, solutions, and training. Moxa's experience in developing more than 7,500 substation transmission and distribution power systems worldwide makes it well suited to providing these services. The systems range from low-voltage (35 kV) to high-voltage (750 kV) substations.

Moxa provided expert assistance in topology design to help PEA transition from a 30-year-old system with a wide variety of equipment brands, models, and types to a system with a simplified and standardized design.

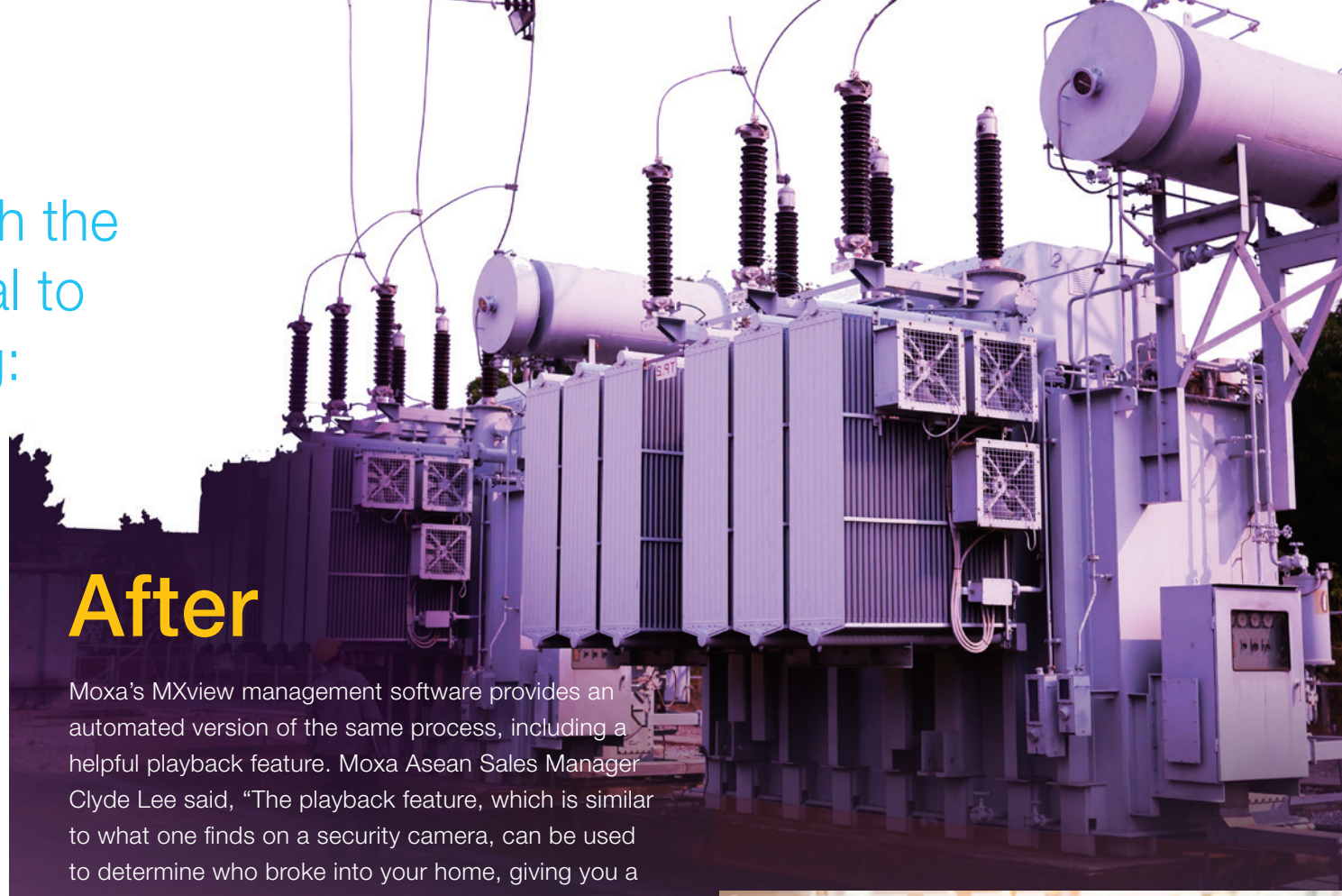
The upgrade consisted of a Moxa IEC 61850 PRP/HSR redundant network, which enables substations to operate automatically and achieve real-time communication. This process makes it possible, for example, for one substation to take over if another one is disabled due to severe weather or an automobile collision. The resulting network dependability ensures reliable communication with zero packet loss and zero-time recovery.

SOLUTION

Moxa also assisted with the transition from a manual to a digital way of working:

Before

Before the PEA-Moxa collaboration each substation was equipped with more than 30 cabinets. When there was an issue, operators had to manually check the LED indicators on each cabinet for temperature, current, and other sensor readings. This time-consuming process was used to determine the location of the problem. The operation required several operators to be available at all times to ensure that operations were back up and running as quickly as possible.



After

Moxa's MXview management software provides an automated version of the same process, including a helpful playback feature. Moxa Asean Sales Manager Clyde Lee said, "The playback feature, which is similar to what one finds on a security camera, can be used to determine who broke into your home, giving you a headstart on determining how to handle the situation."

The solution can help find problems quickly without human involvement, and once it identifies the source of the issue, it quickly corrects it. The new process requires only one operator to be present at any time. Now PEA can easily identify where issues occur drastically reducing the time required to resolve power supply problems. This streamlined system helps prevent shutdowns and reduces restoration time when they occur.

Moxa provided training and support so that operators could understand how to use the MXview playback function and the display alarms to troubleshoot problems.

RESULTS

Powering the Next Generation

As of this writing, 70,000 smart meters have been installed in Pattaya, with a total of 110,000 planned by the end of 2020. In addition, 10 automated substations are in operation. These installations were implemented by PEA's partner, Italthai Engineering, allowing PEA to realize its Energy 4.0 dream. The improved flexibility of the smart grid permits greater usage of highly variable renewable energy sources. PEA is depending more on distributed energy resources (DERs), including solar, to deliver power and reduce carbon emissions.

As it learns from this process, PEA is developing best practices that can be deployed in the development of additional pilot cities. PEA is proud to be spearheading the Energy 4.0 initiative that's helping to drive the energy transformation that is contributing so much to Thailand's economic success. According to Telecom Asia, "With these plans, Thailand is quickly stepping into the future of energy consumption, and is setting an excellent example for countries in the Asean region who seek to move from passive consumption of fossil fuels to the smart, active consumption of electricity."

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