# 11 SUSTAINABLE CITIES AND COMMUNITIES

Make Cities and Human Settlements Inclusive, Safe, Resilient and Sustainable

Sustainable Cities and Communities

The idea of a "Smart Compact City" has emerged as a critical element in the contemporary narrative of urban development, particularly for city campuses where land and space are limited. NIDA Smart Compact City (NIDA S2C) has integrated technology and urban design to increase urban areas' effectiveness, sustainability, and livability. As we navigate the complexities of Sustainable Development Goal 11 (SDG11), aiming to make cities and human settlements inclusive, safe, resilient, and sustainable, the role of smart city initiatives and the preservation of arts and heritage become integral to this discourse.
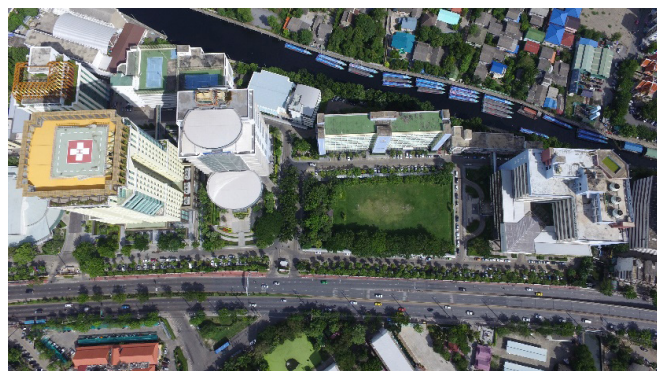
SDG11 is not a standalone objective but is intricately woven into the broader fabric of global development goals. It underscores the necessity of holistic urban development that not only addresses infrastructural and environmental challenges but also fosters cultural vibrancy, social inclusivity, and heritage preservation. In this dynamic interplay, 'smart city in action' emerges as a keyword, epitomizing the convergence of technology, policy, and community engagement to transform urban spaces into sustainable, resilient, and inclusive habitats.

Infrastructure and Data Connectivity
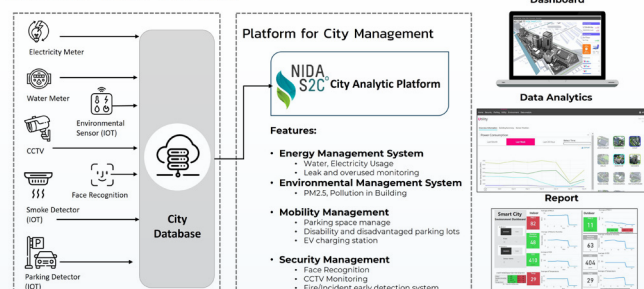
Establishing the NIDA Smart Compact City (S2C) Center within an Institute setting is a strategic and pivotal initiative that aligns with the broader objectives of the Sustainable Development Goals (SDGs). As hubs of innovation, research, and learning, universities are uniquely positioned to drive the transformation towards smart, sustainable, and inclusive cities. The center offers the academic ecosystem and its crucial function in advancing the SDGs. For instance, the following illustrates how the center and SDG11 operations are progressing:

NIDA Smart Compact City (S2C): Bridging the Gaps with the Community

The NIDA S2C Center is dedicated to fostering the development and implementation of smart city initiatives through comprehensive training programs. We bridge the gap between theoretical knowledge and practical implementation, offering hands-on experiences and insights integral to the evolution of smart, sustainable, and resilient cities. The smart projects that have been implemented in the Institute include:

Smart Energy

The Smart Energy Management System is recently used to monitor real-time electricity and water consumption, assisting the operator in managing the energy efficiently. NIDA also provides EV charging stations inside the campus to accommodate the electric campus shuttle and is open to the public. This year, the solar cells will be installed in 2 buildings, Malai and Ratchaphruek Building, to reduce electricity usage. The Net Zero Energy building concept is our long-term aim and the tool necessary to transform power consumption in the university.

Smart Mobility

The campus's smart and efficient environmental management plays a critical supporting role in SDG-responsible consumption and production. NIDA has set up several separate waste disposal points within the Institute. The staffs are responsible for sorting waste before sending it to the waste center. The biogas system with IoT smart gauge, installed in December 2022, could help reverse the food waste from the canteens to gas used for the shop cooking.
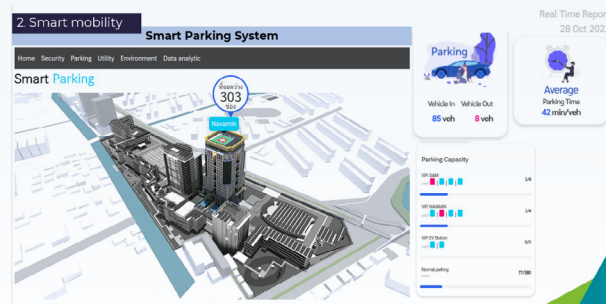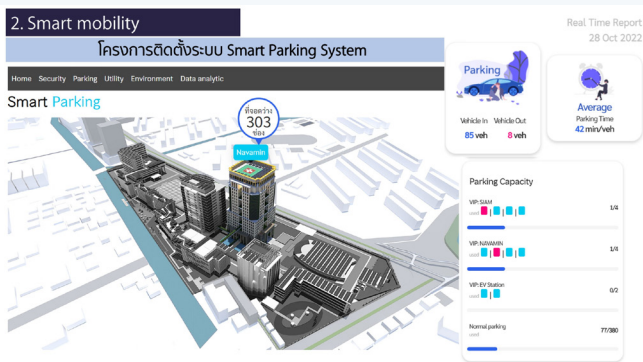

Smart Environment

The campus's smart and efficient environmental management is critical in SDG-responsible consumption and production. At NIDA, pollution sensors are crucial in monitoring and managing air quality within indoor and outdoor environments. By integrating $PM_{2.5}$ sensors into a building's air quality management system, occupants and managers can be alerted in real-time to elevated levels of particulate matter, enabling immediate action to improve air quality and seek ways to mitigate the impact in the long term. The same applies to water quality as well. NIDA actively monitors the quality of water prior to its release into the canal near the NIDA campus.

Water quality sensors before discharge to canal

$PM_{2.5}$ detectors in different locations in NIDA buildings

Results of different environmental variables detected by IOC inside NIDA buildings.

Dashboard to show results of environmental variables detected by IOC inside NIDA buildings.

Smart Building

NIDA installed several types of smart and IoT sensors, including 1) temperature sensors, 2) water flow sensors, 3) smart electricity and thermostat sensors, 4) wireless smoke detectors, 5) CO_2 and $PM_{2.5}$ sensors 6) parking sensors, and 7) face recognition system in the Navamintratiraj Building. The real-time data from these sensors are collected and analyzed at the Intelligent Operation Center (IOC) in the NIDA S2C° Center to support short-term building operation and management, and a long-term efficient, safe, and environmental-friendly building. The IOC has served as both a technical visit destination and a training ground for government and state enterprise officials (i.e., National Housing Authority) to learn about the most recent technology to manage and address urban problems. Besides, the buildings in NIDA have also followed the green building standard based on Thai Energy and Environmental Sustainability Assessment Criteria for Buildings.

Smart Community

NIDA has a long-time role in contributing to the social elements of sustainability via its community partnership. Because the dimension of sustainable communities remains an essential cluster of priorities for the SDG, community support and capacity building are one of NIDA's agenda.

The National Housing Authority (NHA) personnel training program, which covered the subject of "Modern Real Estate Development and Developing Strong, Sustainable Communities in the Digital Age," is one instance of the center's work with the community. The goal of the workshop and debate on housing design for the elderly, disabled, and low-income individuals was to equip NHA staff members to address the requirements of the community's underprivileged members by improving current physical and digital infrastructure and designing for the future.

The primary goal of the center is to foster cooperation between the public and private sectors as well as academia to construct a community that is smart, safe, and sustainable. The center has received a number of technical visits from both domestic and foreign visitors, such as the local MP, the deputy governor, and the deputy secretary general of the Bangkok Metropolitan Administration (BMA). Their primary focus is on utilizing the Internet of Things (IoT) to facilitate smart communication and disaster relief plans for communities affected by floods and fires. They are interested in and may expand to the community level with the Internet of Things smoke detectors installed in every NIDA building. The alert data from these detectors can be transmitted to security via the Line application so that the disaster can be mitigated in a timely manner. Individuals, particularly those residing in high-risk areas (such as ghettos or high-rise condominiums), stand to gain a lot from its application.