〈Attachment 1〉Challenge-Proposing City And Statement

Challenge-Proposing City：Selangor, Malaysia.

Representative Agency：Selangor Information Technology & Digital Economy Corporation (Sidec)

No	Challenge
1	Green Smart Library Transformation -PPAS
2	Low-Carbon Data Center (Malaysia Semiconductor IC Design Park)

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#1</th><th>Green Smart Library Transformation -PPAS</th></tr>
<tr><td>Statement</td><td><u>Background</u>

Selangor is a rapidly developing state with a strong commitment to sustainable urban growth and green initiatives. In the public sector, libraries and community centers present an opportunity to showcase smart, eco-friendly practices. The Selangor Public Library (Perpustakaan Awan Tun Raja Uda), one of initiative under Rancangan Selangor 1 (RS-1) and supported by government policies, is poised to serve as a model for eco-friendly, smart public facilities. Traditional library operations can be resource-intensive – from high energy usage for lighting and air conditioning to extensive paper use in catalogs, forms, and records. This challenge leverages Selangor's innovative ecosystem to transform library operations into a digital, energy-efficient system that significantly reduces energy consumption and paper use while enhancing the user experience. By creating a green and smart library pilot in Selangor, the state can demonstrate how technology and sustainability converge to modernize public services, providing a blueprint for other facilities statewide.

<u>Issues and Challenges</u>

Key Focus Areas

To achieve the above aims, the Green Smart Library Transformation will concentrate on several key focus areas:

1. Digital and Paperless Operations: Upgrade library operations with digital technologies to reduce or eliminate paper usage. Deploy RFID tagging for all books and library cards to enable quick, contactless check-outs and inventory tracking. Integration with the existing mobile app and self-service kiosks that allow users to search the catalog, reserve and borrow books, receive due-date reminders and notifications, and handle membership matters electronically. By moving to digital workflows, the library will improve efficiency and user convenience while cutting paper consumption (e.g. digital receipts instead of paper, online forms instead of paper applications).</td></tr>
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2. User Experience and Community Engagement: Leverage smart library technologies to enhance the patron experience and promote a culture of sustainability. Ensure the mobile app and kiosks are user-friendly and accessible to people of all ages and abilities such as with features like multi-language support, large text etc. Provide interactive displays or dashboards in the library that show real-time metrics to educate and engage visitors about the library's green features. The library can also host workshops or demo days to involve the community in its digital services and sustainability initiatives, turning the library into a living lab for green technology awareness in Selangor.

Objectives

1. Digital Transformation: Implement RFID technology, a dedicated mobile application, and self-service kiosks to transition roughly 40% of traditional paper-based processes (book lending, membership management, record-keeping) to digital workflows. This will create a nearly paperless system and improve service speed and convenience for users.

2. Scalability and Replicability: Develop a successful proof-of-concept that aligns with RS-1 goals and can be scaled across other public facilities in Selangor. The pilot should produce a model that other libraries or community centers can adopt with minimal customization.

Expected Effectiveness

Expected Outcomes

By the end of the Green Smart Library Transformation challenge, we anticipate the following outcomes and benefits:

1. Paperless Operations and Improved Service: Establish an operational digital management system that replaces most paper-based transactions.

	For example, library membership registration, book lending/return records, and notifications will be handled electronically. The expected result is a more efficient workflow (e.g. faster check-out times, automatic inventory updates) and an enhanced user experience, as patrons benefit from self-service and remote access to library services. Success will be measured by a significant drop in paper consumption (target at 70% reduction in paper use for the services converted to digital) and positive feedback from library users and staff regarding convenience and accessibility. 2. Model for Green Smart Public Facilities: Deliver a replicable POC model that is aligned with RS-1 objectives and ready to be scaled statewide. The pilot will produce a template of technologies, practices, and lessons learned that can guide similar transformations in other public libraries, government offices, or community centers in Selangor. This outcome ensures the impact of the challenge extends beyond a single library — it creates a blueprint for wider digital transformation and sustainability in public infrastructure. The project's alignment with RS-1 means it directly contributes to the state's strategic goals and can attract support for further rollouts. 3. Increased Awareness and Engagement: An indirect but important outcome is greater awareness among stakeholders and the public about green technology. The library, as a community hub, will have demonstrated visible improvements (like digital kiosks, energy dashboards) that can inspire visitors and other government departments to adopt similar initiatives. The challenge thus serves an educational purpose, positioning Selangor as a forward-thinking state that embraces innovation for sustainable development.
POC testing field and Scope	**Pustaka Raja Tun Uda , Seksyen 13 , Shah Alam** **Book rack: Chinese book and Children Story book (at least 3 book racks)** **Functional Scope**

	a. Digital and Paperless Library Services • Implementation of **RFID tagging** for books and library cards. • Deployment of a **mobile app** (basic version) with capabilities to: ○ Search catalog ○ Reserve and borrow books ○ Manage membership ○ Receive reminders/notifications • Setup of **self-service kiosks** with digital check-in/check-out functionality. • Replacement of paper forms with **e-forms** and **digital receipts**. **b. User Experience & Community Engagement** • Interface design focused on **usability and accessibility** (multi-language, large fonts, etc.). • Installation of **interactive dashboard displays** showing real-time metrics (energy/paper saved). • Community engagement features: workshop/demo scheduling, feedback collection via app or kiosk. **Deliverables** • **Integrated the** mobile application (Android or cross-platform) and kiosk interface. • **RFID integration system** for a subset of books (Children or Foreign language book). • Functional **digital user workflows** for membership, borrowing/return, and notifications. • **Usage dashboard** accessible via kiosks or central display. • **Report and documentation**: ○ Feedback summary (users/staff) ○ Business case for scaling. **Success Metrics** • At least **40% digital transformation** of target services. • Minimum **70% reduction in paper usage** for converted workflows. • **User satisfaction score** (survey-based) ≥ 80% for convenience/accessibility.

	• **Operational stability** of systems with <5% error rate during live testing.
Duration	Middle August to early October

Challenge #2	Low-Carbon Data Center (Malaysia Semiconductor IC Design Park)
Statement	**<u>Background</u>** The Malaysia Semiconductor IC Design Park aims at positioning itself as a Lead Strategic Center for high-tech innovation and chip design. While the semiconductor and data center industries are growing, energy efficiency and sustainability requirements for those two industries have become much more stringent due to rapid growth. Considering that data centers are fundamentally high energy users and chip design processes also take significant computational power; this is very much a response to a need for low-carbon and energy-efficient solutions centered around IC Design Park within the context of national and state objectives of incepting a green high-tech industry. The development also falls into the broader vision of enhancing the Malaysian semiconductor industry — which includes the dream of coming up with the country's first locally designed semiconductor chip — in such a way that a balance between the gains and the environment is struck. The innovative ways applied to reduce power and carbon footprints on data center operations and chip design activities in Selangor can also play an imperative role in upholding new standards on green industrial movements. The challenge of Low-Carbon Data Center will be a demonstration of how contemporary electronics, as well as IT infrastructure technologies, will be able drastically to cut energy consumption, reduce costs of operations, and cast a cupreous shadow over the carbon footprint of the surging tech industry of Malaysia. **<u>Issues and Challenges</u>** 1. Low-Carbon Data Center Challenge Objectives Several key focus areas chip design and data center operations will target within the project are as follows: 1. Advanced Low-Power Design Techniques: Attention will be

	drawn towards incorporating the latest design strategies for reducing semiconductor device power consumption and computing tasks. 2. Power Gating & Clock Gating: To clamp dynamic as well as static power dissipation, implement techniques such as clock gating (in this scheme, the clock signal to parts of a circuit is turned off when not in use) and power gating (shutting off power to idle circuit blocks). 2. Sensor Networks for Monitoring: Integrate a network of IoT sensors on production equipment and facility infrastructure to gather real-time data on energy usage, temperature, and equipment status. Key points of monitoring include high-power machinery, HVAC systems in manufacturing areas, and heat output from machines. 3. AI-Driven Process Optimization: Develop an AI-driven control system that analyzes sensor data and automatically adjusts operational parameters. For example, the system could modulate the speed or load of certain equipment during off-peak hours, or trigger maintenance when a machine's energy use deviates from normal (indicating inefficiency). It will also manage waste heat recovery systems – for instance, capturing waste heat from air compressors or ovens and repurposing it to heat water or offices. The focus is on creating a smart factory environment where energy waste is quickly identified and mitigated in real time. 4. Green Data Center Operations: Construct and test a data center module that demonstrates best-in-class energy efficiency for IT infrastructure. 5. Virtualization & Efficient Computing: Employ virtualization and cloud orchestration within the data center to ensure high resource utilization. By running multiple design and simulation tasks on shared servers (consolidation), the number of physical machines required can be reduced, cutting power use. Implement load balancing to avoid any server running at low utilization while another is overburdened, thereby optimizing overall efficiency. 6. Smart Cooling Solutions: Introduce smart cooling technologies to the data center environment. This may include precision cooling that adjusts to server rack heat output, hot/cold aisle containment to prevent mixing of

hot and cold air, and possibly liquid cooling for high-density racks. IoT sensors will monitor temperatures and airflow, with an intelligent cooling controller adjusting fans, CRAC (computer room air conditioning) units, or chillers. The aim is to maintain safe temperatures with minimal energy. Techniques like raising the cold aisle temperature setpoint (if servers allow) and using free cooling (outside air, when climate permits) will be explored. Additionally, integrate backup power solutions that are energy-efficient (such as lithium-ion UPS systems) and explore the use of on-site renewable energy (solar panels on facility roofs or purchasing green electricity from the grid) to offset the data center's power needs.

Objectives

1. Intelligent Manufacturing Efficiency: Implement an intelligent energy management system in the semiconductor manufacturing or testing processes that run in the IC Design Park. The goal is to monitor and optimize energy usage across production lines in real time, minimizing waste. This involves deploying sensors to track equipment power draw and heat output and using AI-driven controls to adjust machine operation schedules, loads, or cooling systems dynamically. An important facet is to facilitate waste heat recovery – capturing and reusing heat generated by equipment where possible – to improve overall energy efficiency. The objective is to demonstrate a noticeable reduction in energy consumption (targeting 15% or more) in the monitored production line or facility, and to maintain stable operations with no loss in throughput or quality.

2. Green Data Center Operations: Design and operate a data center module within the IC Design Park with a minimal carbon footprint, supporting the computational needs of chip design and related activities. This involves using virtualization and consolidation techniques to maximize server utilization (reducing idle servers), implementing smart cooling solutions (like adaptive cooling, hot/cold aisle containment, or liquid cooling) to reduce HVAC energy use, and integrating renewable energy where feasible to power the data center. The objective is to achieve a model data center operation that meets high performance demands while significantly lowering power usage compared to typical data centers. Success will be measured by improved efficiency metrics (for example, achieving a Power

Usage Effectiveness (PUE) significantly better than the national average, or a ~20% reduction in total data center power draw) and by maintaining reliable service for users.

3. Scalability and Industry Impact: (Implicit in all above objectives) Ensure that the solutions developed can be scaled up across the entire design park and replicated in other industrial parks or data centers. The challenge's objectives include producing documentation and evidence that these low-carbon approaches do not only work in a pilot setting but are also economically and technically viable for broader adoption, thereby influencing industry best practices and supporting Malaysia's green technology agenda.

Expected Effectiveness

Expected Outcomes

Upon completion of the Low-Carbon Data Center challenge, we expect to achieve several key outcomes that demonstrate the value of the innovations and provide a foundation for broader adoption:

1. Significant Energy and Cost Reduction: The integrated measures are anticipated to yield a substantial decrease in energy consumption in both the semiconductor design process and data center operations. For example, the pilot production line should see energy usage lowered on the order of 15–20%, and the data center module should operate with considerably improved efficiency (e.g. a PUE significantly below the current average for similar facilities). These savings directly translate into reduced operational costs for companies in the IC Design Park. A quantifiable result such as "X kWh saved per week" or "Y RM saved per year in energy bills" will be documented, underscoring the economic benefit of green technology investments.

2. Green Data Center Prototype: The data center pilot will result in a green data center prototype that showcases how efficient hardware utilization and smart cooling can drastically reduce power needs. Expected outcomes

	include a measurable drop in cooling energy (for instance, cooling systems using 30% less energy than baseline thanks to optimization) and a portion of data center power being met by renewable sources (if solar integration is done, e.g. supplying 5–10% of energy). This prototype can be used as a template to upgrade the larger data centers in the park or design new facilities with low-carbon principles from the start. As an added recognition, the project could pursue a green certification or at least meet criteria for energy-efficient data center design, giving it demonstrable credibility. 3. Scalable Low-Carbon Model for the Industry: Perhaps the most important outcome is a replicable POC model for low-carbon, sustainable high-tech operations. The documentation and lessons from this challenge will form a playbook that can guide full-scale implementation across the entire Semiconductor IC Design Park. Moreover, this model can be shared with other industrial parks, data center operators, and the broader semiconductor industry in Malaysia. It proves that economic growth in high-tech sectors can be coupled with environmental responsibility. In line with RS-1 and national sustainability agendas, the project sets a precedent that can drive policy (such as incentives for energy-efficient designs or requirements for green building standards in tech facilities) and encourage other companies to follow suit. The end result is not just a single park's improvement, but a catalyst for industry-wide shifts toward greener practices. Enhanced Reputation and Innovation Capacity: By completing this challenge, Selangor and Malaysia demonstrate a commitment to innovation in climate tech. The successful outcomes – whether it's a new low-power chip design or a smart-managed production facility – can be publicized in conferences, case studies, or media, bolstering the reputation of the IC Design Park as a cutting-edge, sustainable tech hub. Additionally, the project builds local expertise: engineers, researchers, and managers involved will gain hands-on experience with green technologies, which increases the region's capacity to undertake further innovations beyond this challenge. This human capital development is an

	intangible but valuable outcome, aligning with the goal of creating a knowledge-based, future-ready economy.
POC testing field and Scope	Scope of Work *1. Assessment & Baseline Establishment* • Audit an existing or test data center module for: ○ Current Power Usage Effectiveness (PUE) ○ Energy consumption by servers, HVAC, and backup systems ○ Server utilization rates and cooling system performance • Identify high-energy-use systems and underutilized resources *2.Design & Implementation* • **Virtualization & Server Consolidation**: ○ Deploy cloud orchestration platforms to virtualize workloads ○ Ensure optimal server utilization through load balancing • **Smart Cooling Solutions**: ○ Install IoT sensors for real-time monitoring of temperatures and airflow ○ Implement adaptive cooling (e.g., hot/cold aisle containment, liquid cooling) ○ Explore use of free cooling and raise cold aisle setpoints, where viable • **Energy Monitoring System**: ○ Integrate a dashboard-based energy analytics platform ○ Real-time tracking of: ▪ Server workload vs. power draw ▪ Cooling system efficiency ▪ Backup systems & UPS battery health *3. AI-Driven Optimization* • Implement an AI control system that: ○ Modulates cooling based on predictive temperature patterns ○ Schedules non-critical compute loads during off-peak hours

	◦ Issues alerts for abnormal energy patterns (indicating inefficiencies) *4. Measurement & Validation* • **Success Metrics**: ◦ Achieve ≥20% reduction in total power consumption from baseline ◦ Reduce cooling system energy use by ≥30% ◦ Achieve a PUE lower than the national average (e.g., <1.5) ◦ Meet or exceed uptime/reliability benchmarks
	POC Testing Environment • One modular data center unit, size 360 sqf • Located within the IC Design Park or an equivalent test facility
Duration	Duration • **Phase 1: Setup & Baseline (1 weeks)** • **Phase 2: Implementation (1 weeks)** • **Phase 3: Monitoring & Optimization (2 weeks)** • **Phase 4: Evaluation & Reporting (2 weeks)** **Total POC Duration**: **1.5 months**