Digitalising Sarawak Energy

sarawak energy

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1. About this Booklet

Sarawak Energy aspires to become a sustainable digital utility by 2025, as part of our Sarawak Energy Excellence 2022 roadmap. Digitalisation continues to play an important role in enabling the company to drive excellence in our operations, advancing our sustainable growth agenda and delivering value to all our stakeholders and customers. This booklet details the steps, challenges and issues of our digitalisation journey.

Our Foundation

Sarawak Energy is a vertically integrated power utility and energy development company with a vision to achieve sustainable growth and prosperity for Sarawak by meeting the region's need for reliable, renewable energy. The year 2021 marks a century of growth and transformation from our beginnings as a unit in the Public Works Department during the Brooke era.

Building on this foundation of 100 years as Sarawak's primary provider of electricity, our growth has been powered by our people's adaptability and agility; we were always willing to leverage new technologies or adopt new methodologies. In contemporary times, this has become part of our alignment with continuous improvement to enhance operations and processes.

Our transformation is more important than ever in the present with digitalisation fundamentally changing the world, especially in reshaping how businesses operate to cater to a global digital economy and provide opportunities to grow.
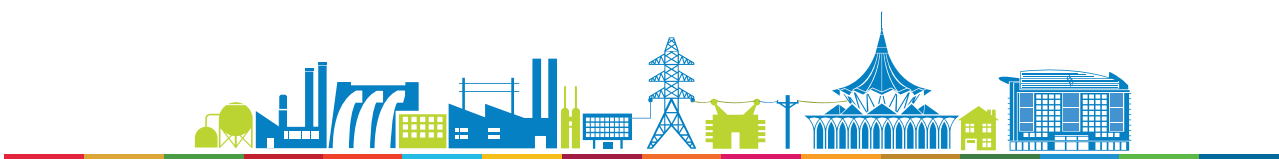
Sarawak Energy is learning and adopting new technologies to maintain our relevance and grow value, leveraging on digital technologies to stay competitive in this age of rapid change.

1.1 Organisation Profile

Sarawak Energy generates, transmits, distributes and retails electricity, serving our customers across Sarawak and beyond through a dedicated and diverse workforce of 5,400. Our generation mix is predominantly renewable hydropower with indigenous coal and gas to provide added security of supply.

Generation

- Main Grid connected capacity comprises 61.2% Hydro, 17.8% Gas, 19.6% Coal, 0.7% Off Grid Diesel and 0.8% Alternative Energy.

- Total installed capacity of 5,643MW.

Transmission

Sarawak State Grid comprises 2,389.5km of transmission lines.

Distribution

- Distribution lines comprise 33kV, 11kV and 415V lines.

- Distribution Overhead Lines = 27,634km

- Distribution Underground Cables = 9,540km

- Total Distribution Circuit Length = 37,174km

Retail

- Number of Customer Accounts

1.SCORE: 15
2.Domestic: 607,029
3.Commercial: 102,648
4.Industrial: : 1,065
5.Public Lighting: 11,617

As of June 2021

1.2 Group Chief Executive Officer's Message

In response to an increased global focus on sustainability and rising economic, social, environmental and governance concerns, rapid changes have occurred in the business landscape. While this has presented challenges, it has also provided Sarawak Energy with opportunities to continue building on our 100-year legacy to ensure a sustainable energy future for all by meeting the region's need for reliable, renewable energy to achieve growth and prosperity for Sarawak and beyond.

Information and Communications Technology and by extension, digitalisation, has become a necessity in today's business climate. Having the right systems in place can ensure increased efficiency, optimised resource allocation and reduced overall costs. Indeed, integrating technology from end-to-end in our business supply chain will yield multiple benefits for our Company.

To achieve this integration, Sarawak Energy has embarked on a digital transformation and modernisation journey to enable the Company to achieve its ambition of becoming a digital utility by 2025 and advance us towards our Vision 2022 regional powerhouse aspirations. Five strategic pillars were identified to empower the Company's digitalisation journey, including:

- A robust and fit for purpose digital foundation.
- Data as strategic assets.
- A modernised, new way of working.
- Smart business.
- Staying ahead of the curve.

In line with this, we have introduced new technologies, processes and initiatives that cultivate excellence in our six Key Focus Areas (KFAs) and facilitate improved system performance, enterprise modernisation and process automation across the organisation. These investments into digitalisation have enabled us to transform into a more lean, agile and efficient corporation.

This transformation was one of the primary reasons that we were able to continue operating when the COVID-19 pandemic struck Sarawak, as our adoption of digital collaboration platforms enabled us to transition to working from home relatively seamlessly. We were able to leverage on the opportunities presented by the pandemic to further accelerate Sarawak Energy's digitalisation journey.

Under our Digitalisation Roadmap, we will identify opportunities for enhancement in our operations and facilitate effective value-based decision making by using data. In doing so, we will be able to maximise our resources, cultivate excellence across the business and strengthen our bottom line.

The Company is also supporting Sarawak's digital economy agenda in collaboration with the Sarawak Multimedia Authority (SMA) and Sarawak Digital Economy Corporation (SDEC). As part of this, we are building Sarawak's digital competencies and leveraging on new technologies to facilitate the cultivation of a vibrant economy.

Sarawak Energy will continue to drive digitalisation in our organisation to future proof our company, achieve our sustainable growth agenda and deliver value to all our stakeholders.

Thank you.

Datu Haji Sharbini Suhaili
Group Chief Executive Officer
Sarawak Energy

1.3 Case for Change

Our digital grid transformation aligns with the Sarawak Government's five-year Sarawak Digital Economy Strategy, and it is a step towards becoming a digital leader in the utility industry.

Our power grid has been the backbone of Sarawak's growth for the last four decades, with the first State transmission backbone built to evacuate power from Batang Ai Hydroelectric Plant (HEP) to Kuching. The traditional architecture of the grid was based on large-scale generation that was located remotely from consumers; hierarchical control structures with minimal feedback; limited energy storage and passive loads. To ensure that we will be able to continue keeping the lights on for Sarawak while simultaneously accelerating its economic growth, we must modernise and improve the current grid structure and system.

Many utilities are starting and accelerating their digitalisation journeys, especially during the COVID-19 pandemic. This involves building in-house applications and attracting new profiles with the ultimate aim of transforming core business processes and modernising our grid.

The second International Digital Economy Conference Sarawak (IDECS) Kuching held from 14 to 15 May 2018 was officiated by the Chief Minister of Sarawak, with the theme "Data to Fuel Economic Growth and Quality of Life" .

The following five trends are key to Sarawak's grid transformation:

- Increased distribution towards clean renewable energy in electricity generation.

- Growing supply and demand, presenting side opportunities for customers to participate in the electricity market.

- Growing demand for a more resilient and reliable grid, safeguarded from weather disruptions as well as cyber and physical attacks.

- Emergence of interconnected electricity information and control systems.
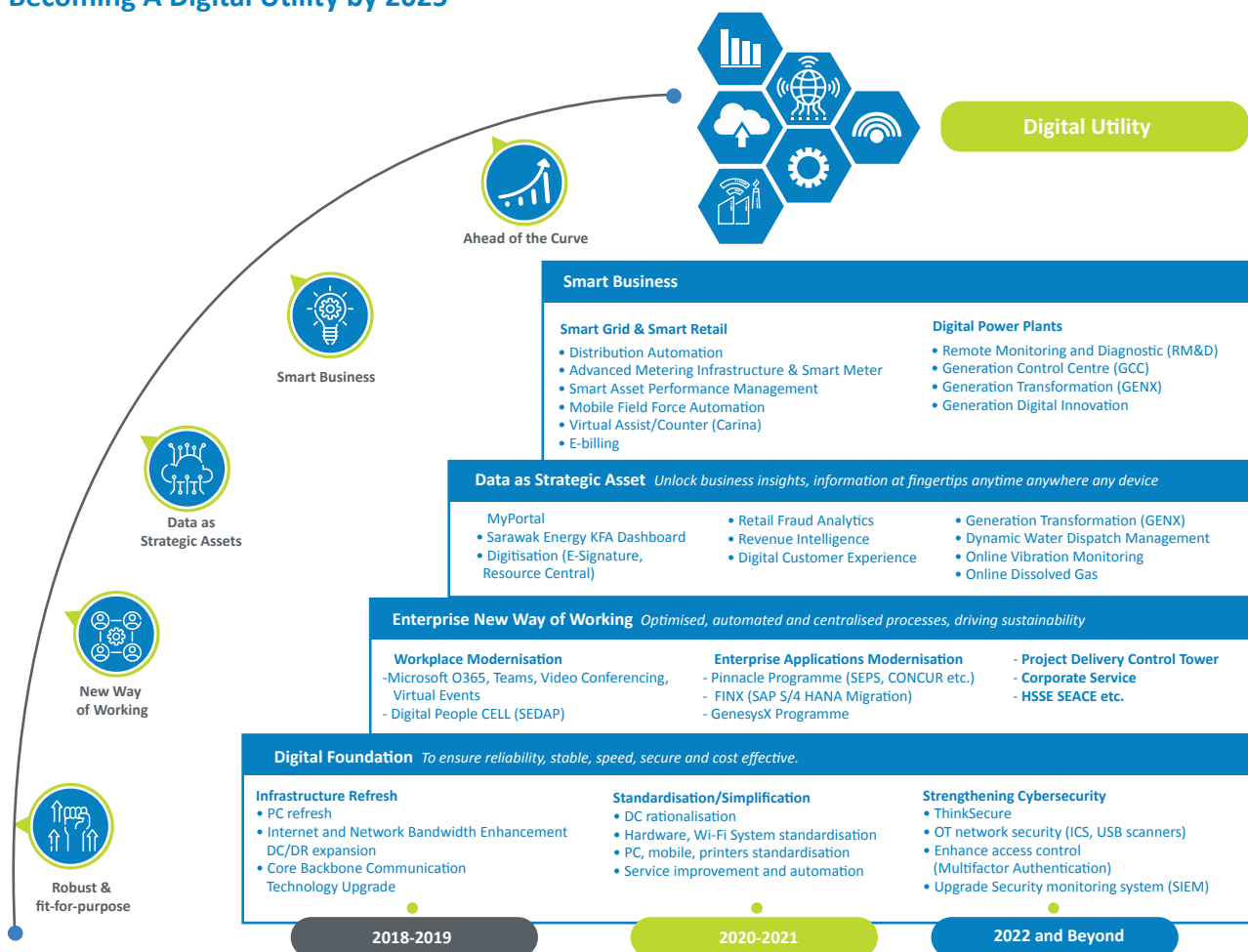
- Ageing electricity infrastructure.

To respond effectively to these trends required us to adopt a systematic approach in digitalising and modernising processes, technologies, skillsets and competencies throughout our core business and support functions. This led to the development and implementation of our Sarawak Energy Digitalisation Blueprint in 2018.

2. Sarawak Energy Digitalisation Blueprint and Roadmap

The Sarawak Energy Digitalisation Blueprint was implemented in 2018 and aims to achieve the following:

- Assesses the value gained from and provides a guideline for becoming a digital utility.

- Illuminates what a transformation at scale looks like.

- Explains the thrusts and traits of a successful digital transformation.

Towards World Class Operational Excellence
Becoming A Digital Utility by 2025

Digital Utility

Ahead of the Curve

Smart Business

Data as Strategic Assets

New Way of Working

Robust & fit-for-purpose

Smart Business

Smart Grid & Smart Retail
- Distribution Automation
- Advanced Metering Infrastructure & Smart Meter
- Smart Asset Performance Management
- Mobile Field Force Automation
- Virtual Assist/Counter (Carina)
- E-billing

Digital Power Plants
- Remote Monitoring and Diagnostic (RM&D)
- Generation Control Centre (GCC)
- Generation Transformation (GENX)
- Generation Digital Innovation

Data as Strategic Asset *Unlock business insights, information at fingertips anytime anywhere any device*

MyPortal
- Sarawak Energy KFA Dashboard
- Digitisation (E-Signature, Resource Central)

- Retail Fraud Analytics
- Revenue Intelligence
- Digital Customer Experience

- Generation Transformation (GENX)
- Dynamic Water Dispatch Management
- Online Vibration Monitoring
- Online Dissolved Gas

Enterprise New Way of Working *Optimised, automated and centralised processes, driving sustainability*

Workplace Modernisation
-Microsoft O365, Teams, Video Conferencing, Virtual Events
- Digital People CELL (SEDAP)

Enterprise Applications Modernisation
- Pinnacle Programme (SEPS, CONCUR etc.)
- FINX (SAP S/4 HANA Migration)
- GenesysX Programme

- **Project Delivery Control Tower**
- **Corporate Service**
- **HSSE SEACE etc.**

Digital Foundation *To ensure reliability, stable, speed, secure and cost effective.*

Infrastructure Refresh
- PC refresh
- Internet and Network Bandwidth Enhancement DC/DR expansion
- Core Backbone Communication Technology Upgrade

Standardisation/Simplification
- DC rationalisation
- Hardware, Wi-Fi System standardisation
- PC, mobile, printers standardisation
- Service improvement and automation

Strengthening Cybersecurity
- ThinkSecure
- OT network security (ICS, USB scanners)
- Enhance access control (Multifactor Authentication)
- Upgrade Security monitoring system (SIEM)

2018-2019	2020-2021	2022 and Beyond

These five strategic thrusts are key to Sarawak Energy's digital transformation:

- A robust and fit for purpose **Digital Foundation** which involves upgrading our network, hosting, communication services as well as an end-user PC refresh.

- A modernised **New Way of Working** comprising application and process optimisation, platform modernisation and automation through a series of centralised and integrable systems.

- **Data as Strategic Assets** to establish a single source of truth, information at fingertips and unlock business insights through advanced analytics.

- Cultivating a **Smart Business**.

- Fostering a **digital culture and empowering digital people**.

2.1 Enterprise Building Blocks

Digital Foundation

Our efforts to strengthen our digital foundation are centred on building a robust and fit-for-purpose digital infrastructure that:

- scales as needed;
- is secured from physical and cyber threats;
- can be sustainably maintained and grown.

Fibre, Wide Area Network (WAN) and Wi-Fi Network Refresh

Regional Offices

- 8 sites upgraded to 1000Mbps

Power Stations

- WAN upgraded for 4 sites to 100Mbps and 3 sites to 50Mbps

Branch Offices

- 15 sites upgraded to 10Mbps
- 4 sites in progress

Remote/ Rural Locations

- 16 sites Mobile Wireless Internet Broadband
- 4 sites VSAT services in progress

Technology Upgrade

OPGW SDH 2.5Gbps STM-16 Backbone Trunk

100Gbps Backbone OTN Network

We conducted a network refresh exercise to upgrade our ageing optical network equipment and increase our Wide Area Network (WAN) switching and routing technology, which is now able to support up to 100Gbps capacity. This allows us to meet growing corporate data traffic needs and enable internet connectivity from all our premises. In addition, we also improved our Wi-Fi infrastructure at various locations to extend network coverage for our mobile workforce in Sarawak Energy premises.

We also incorporated the latest security protections into our ICT system, resulting in a two-tier layered network perimeter protection strategy which safeguards our Operations Technology space through an Industrial Control System firewall, mitigating the risk of cyber security attacks.

Our ICT infrastructure now comprises a high-speed fibre communications backbone, resilient internet gateways, and next generation firewalls, all of which deliver optimal bandwidth and coverage to securely meet current needs and future demands.

Hosting System Enhancement & Cloud Adoption

In 2019, Sarawak Energy adopted the hybrid cloud strategy which empowered us to leverage the benefits of cloud technology of agility, scalability, security, flexibility, accessibility, and cost effectiveness. Through this strategy, we can extend the reach of our services with affordable hosting, storage capacity and managed services beyond on-premises data centers.
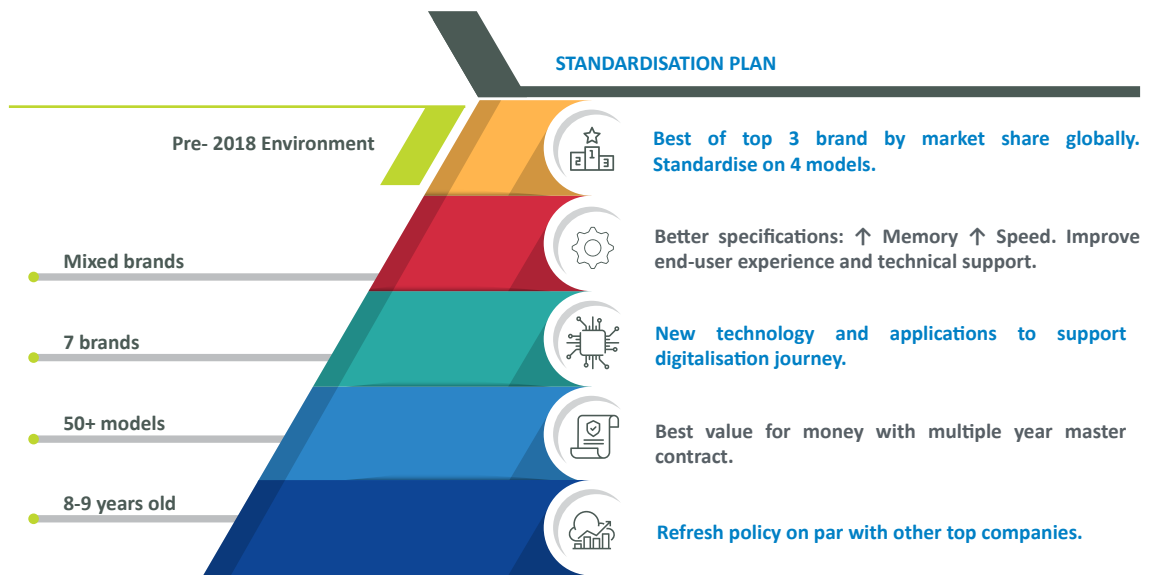
With the increasing importance of data as a strategic asset, it is vital to have a scalable hosting and server system to store and analyse data. We also periodically upgrade our computing resources. New data backup technology is being adopted to ensure all high business impact applications and data are recoverable should an unexpected incident occur.

With these initiatives and technologies in place, we have set our sights on other building blocks to support our business smart transformation.

Personal Computer (PC) Refresh Programme

To fully benefit from our digitalisation drive, our employees must be equipped with the necessary tools to use our new digital platforms and applications. As such, we embarked on a personal computer (PC) refresh programme to standardise the make, type and life cycle of all our end-users' PCs.

- By reducing the number of makes from seven to one and fixing on a shorter life cycle, we reduced end-user support overheads.

- Our focus on volume purchasing enabled us to improve cost and administrative efficiencies.

- Standardising laptop PCs for our users has also proven to be beneficial, as the portability enabled them to be more mobile, productive and efficient.
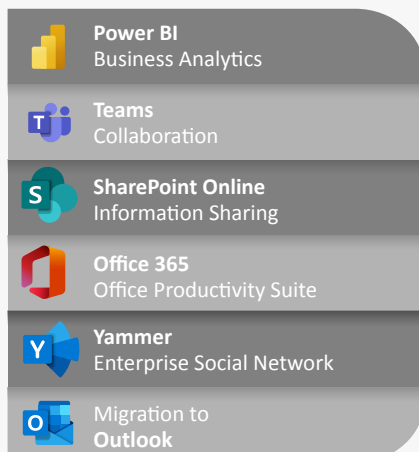
Pre- 2018 Environment

Best of top 3 brand by market share globally. Standardise on 4 models.

Mixed brands

Better specifications: ↑ Memory ↑ Speed. Improve end-user experience and technical support.

7 brands

New technology and applications to support digitalisation journey.

50+ models

Best value for money with multiple year master contract.

8-9 years old

Refresh policy on par with other top companies.

New Way of Working – Workplace Modernisation

We have taken steps to modernise our workplace by equipping end–users with the right tools, work processes, knowledge and culture. In doing so, we encourage smart working, agile collaboration, and the new way of working across the Company.

Productivity, Collaboration and Communication Platform

As part of this, we collaborated with Microsoft to upgrade our legacy productivity suite and communication tools with an enterprise grade productivity, communication and collaboration platform that supports real time interactive work teams, and large–scale video conferencing and virtual meetings. To help our workforce adapt to these new tools, we have engaged with Microsoft to expedite learning in our people.

This enables our users to work remotely and securely, accessing and sharing information as well as engaging with each other and external parties anywhere, anytime.

Power BI
Business Analytics

Teams
Collaboration

SharePoint Online
Information Sharing

Office 365
Office Productivity Suite

Yammer
Enterprise Social Network

Migration to Outlook

Menara-Bakun Functio
Western Conference Ro
Sibu-Conference Room
Bintulu-Conference Ro
Batang Ai HEP-Office
Miri-Conference Room
Bakun HEP-Office
Menara-Auditorium
Sri Aman-Conference
SESCO-Conference Roo
Murum HEP-Office
Sarikei-Conference Roo

Modernisation, Process Improvement, Automation for Corporate Functions and Project Delivery

We see many opportunities for improvement across our various corporate and project delivery functions, which Sarawak Energy can capitalise on by adopting best practices and replacing manual processes with automated ones.

One-Stop Service Management

To improve ICT service delivery to our end-users, Information Technology Infrastructure Library (ITIL) best practices were adopted and automated into our IT service management processes. This reduced the turn-around time for responses to and resolution of ICT issues and service requests, improving the availability of our business services for customers.
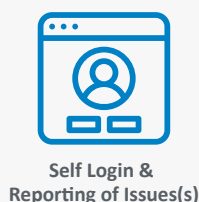
| Self Login & Reporting of Issues(s) | Incident Verification & First Level Support | Second Level Support | Incident Closure |

High Level Incident Management Workflow

e-Procurement System

The Sarawak Energy e-Procurement System (SEPRO) is our new e-procurement solution which provides cloud-based procurement, spend management and supply chain services that enable vendors and buyers to connect and do business globally. This technology has helped Sarawak Energy to negotiate better agreements with vendors and provided better visibility and control over our spending.

Human Resources (HR) System

We have digitalised our HR processes to become modern and agile. Since this transition, we have achieved:

- **~20% productivity improvemen**t across all HR processes.

- **2.6x greater** number of applications screened for recruitment.

- **3X growth** in benefit claims processing, with lesser team members.

Travel & Expenses Management System

Since the deployment of our Travel & Expenses Management System, we now have better user interface, more accurate data capturing, and richer reporting functionality to facilitate more informed decision making. The solution is also embedded with validation and control features to save time, minimise manual checks and manage team spending for budget owners.

Additional benefits include:

- Insights on historical approved, requested and claimed data.

- Booking for preferred hotels.

- Flexibility of approval flow.

- Accessibility anywhere and anytime via any platform.

Health, Safety and Environment System

The Health, Safety and Environment System consists of compliance programmes and management systems, data analytics and visualisations that focus on the three core behaviours of HSE Culture: Assess, Comply and Empower. Using an integrated Tableau reporting engine, this system can generate multi-dimensional performance analytics with customisable reports, dashboards, and innovative charting options.

These features will enable us to analyse trends, rates & key performance indicators (KPI) through scalable data reporting, charting and metric calculations. This software is vital to establishing a Generative HSE Culture in Sarawak Energy.

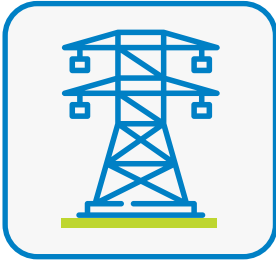## Corporate Administration Digitalisation

Our corporate administration function is also leveraging on digitalisation to transform their practices, processes & procedures, policies & guidelines as well as people. These initiatives will better support the entire organisation with a focus on:

• Value creation.

• Sustainable solutions.

• Customer delight.

Value Creation

Requesting for Services
- Self-Service Portal
- Concierge (Over the Counter Services)
- Service Desk

Sustainable Solutions

Processing Request
- Centralise database for all regions
- Tracking the service status and updates

Customer Delight

Service Delivered
- Meeting Refreshment & Equipment booking
- MFP Maintenance
- Mail Room
- Office Supplies
- Uniform & Safety Shoes
- Tenancy Mangement
- Other CA Services

Corporate Administration Digitalisation Programme

Project Delivery (PD) Digitalisation

Our PD Digitalisation programme is a comprehensive, value adding solution to support Sarawak Energy's goal of achieving world class project delivery. Digitalisation enables cost savings in various areas through a combination of cost avoidance strategies and cost efficiencies that:

- Facilitate higher quality Front End Loading (FEL).

- Enhance project controls.

- Support historical cost databases.

- Ensure Standard Method of Measurement (SMM).

- Provide cost estimate validation as well as cost target setting techniques.

- Optimise contract strategy with economy of scale.

- Provide a more efficient platform for engineering design and standardisation.

Facilities Management System
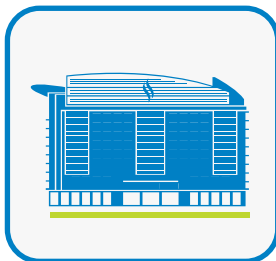
An integrated workplace management software that enables all Sarawak Energy employees to make service requests on "Non-Core Business" (NCB) building defects, services and projects. It is integrated with our HR System and SAP Enterprise Resource Planning (ERP) for optimum service efficiency and cost transparency.

Benefits include:

- Improved user experience for Sarawak Energy employees to lodge service requests through a user-friendly interface and predefined request categories.

- Ability to efficiently allocate, plan or schedule resources to where they are required.

- Generates various levels of data statistics for better decision making, cost optimisation and service delivery performance.

Finance Transformation

Finance Enterprise-Wide Transformation Project (FinX) kicked-off in April 2019 to advance our Finance Department towards becoming value managers.

In line with operational excellence to realise the values created through our "Value Optimisation" project, Return on Assets (RoA) has been identified as a way to measure value optimisation, setting a target of >3% RoA by 2022.


Finance Master Data
Enhanced organisational elements & master data governance framework

Finance Manual of Authority
Improvised delegation of work by introducing sensible thresholds of approval

Finance & Tax Processes
Introduced efficiency & governance controls by enhancing the process flows

PROCESS
PEOPLE **FIN** DATA
TAX

Finance Target Operating Model
Formalised roles of Finance Business Partners, Centres of Excellence & Shared Service Centers based on industry best practices

Change Management
Ongoing. Knowledge sharing sessions are planned for the operationalisation of Finance Processes

Overview of FinX Deliverables

To meet this target, we are migrating from a classic to new SAP General Ledger (GL) Migration for our existing SAP Finance and Cost (FICO) controlling module. This will enable segmented financial reporting, allowing us to better identify areas of improvement.

By learning from our experiences, challenges and achievements over the course of our digitalisation journey, Sarawak Energy will continue to drive digitalisation and enterprise modernisation across our entire value chain.

2.2 Data as Strategic Assets

Managing data as an asset requires a systematic approach in both governance and the realisation of data value. Sarawak Energy established a Data Management Framework that includes clear governance roles and responsibilities to facilitate the adoption of best practices and standards, which is key to achieving quality data.

By harnessing our data value, we were able to visualise information related to Sarawak Energy's key performance metrics across our Key Focus Areas (KFA). This enabled us to derive actionable insights to deliver more efficient and optimised operations.
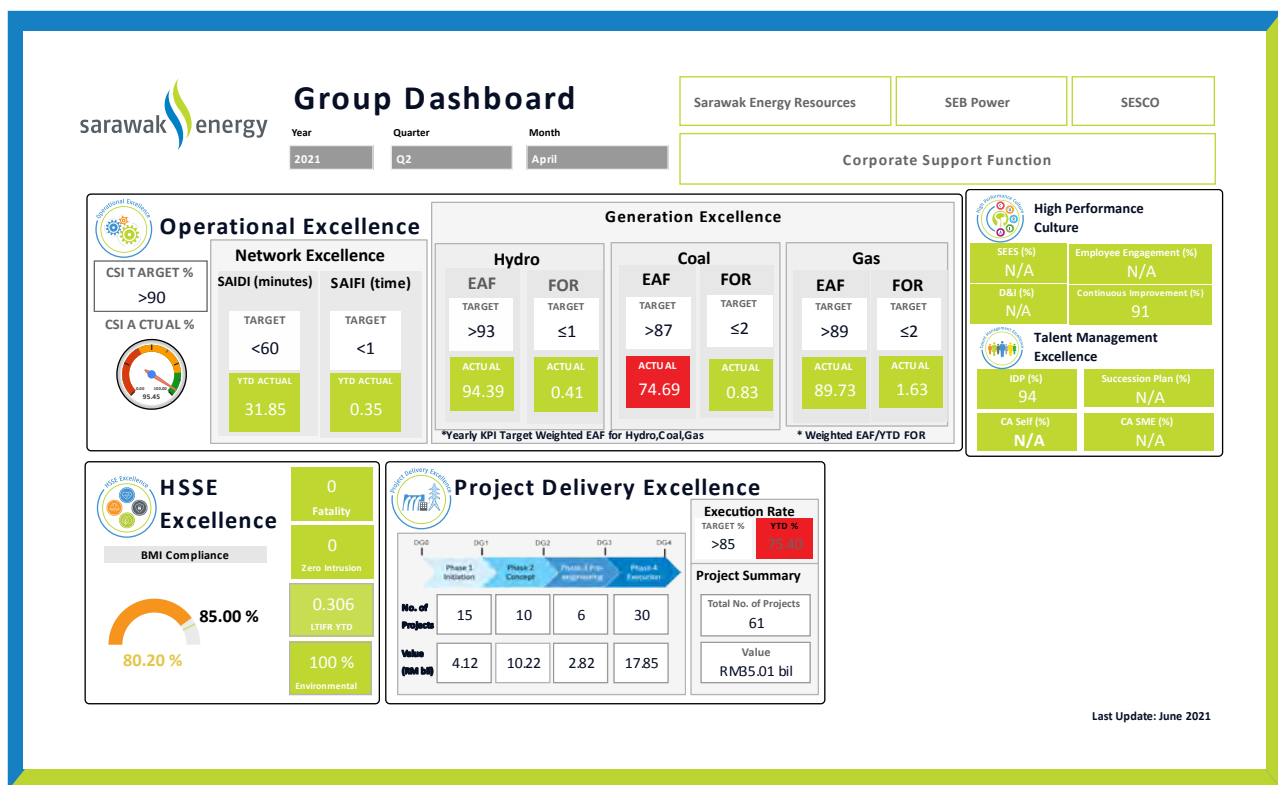
Our Dynamic Water Despatch Management system allows us to model water released from hydroelectric plants by incorporating predictive weather patterns and providing more accurate inflows and forecasted reservoir levels up to six months or more. This enables us to operate and run our hydroelectric plants more efficiently.

To continue leveraging on data and analytics in our digitalisation journey, Sarawak Energy will focus on developing our capabilities in these fields: our people, processes and technologies shall all be data-centered.

Optimising Weather and Inflow Forecast using Dynamic Water Dispatch Management System for Efficient Hydro Operations

In line with this, data will be made available via self-service on our data analytics platform and data analysis will be incorporated into Sarawak Energy's business operating model to encourage data use in the following:

- Solving business problems.
- Gaining new business insights.
- Producing actionable insights for decision making.

To further promote data analysis among our people, we will be providing them with learning opportunities through the aforementioned data analytics platform. These opportunities will become particularly important as data continues to grow; data analysis will become more complex and so will the required level of competencies and underlying technologies.

Our ability to make data an asset is dependent upon balancing the availability of expertise and the business value provided by modern data and analytics technologies.
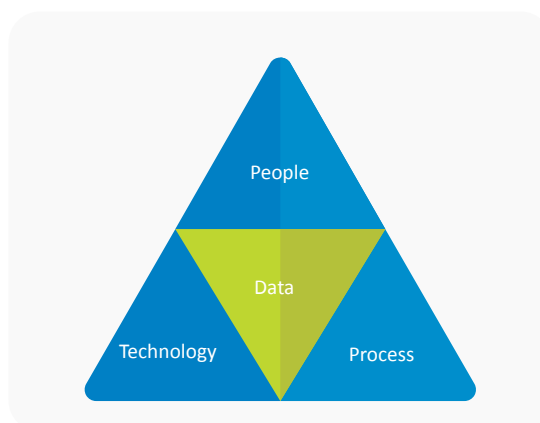
In support of these aspects, Sarawak Energy will explore data and analytics, with a focus on modernising existing IT architecture and improving customer experience. To enable this, the Company has and is continuing to invest in foundational capabilities such as cloud computing, digital people competencies and design thinking.
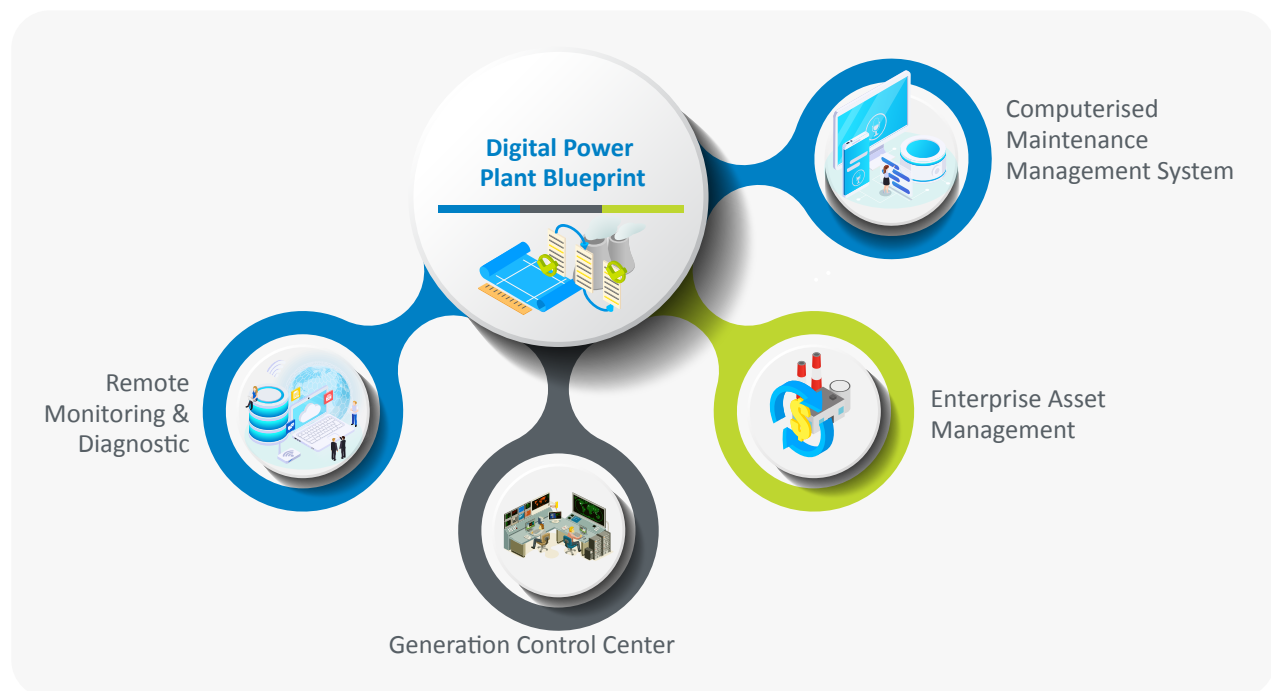
2.3 Accelerating Smart Business

Smartening the business revolves around transforming business operations using state-of-the-art technologies to achieve reliability, affordability, sustainability and growth of Sarawak Energy's business and services. To this end, we developed business digitalisation blueprints and roadmaps for each of our core lines of business including:

• Digital Power Plant

• Smart Grid

• Smart Retail

Digital Power Plant

In pursuit of our ambition to become a best operator and the renewable energy powerhouse of the region, we have embarked on a journey to achieve Generation Operation Excellence through Generation Transformation by improving workforce and asset productivity while mitigating risks through the deployment of innovative digital technologies. This involves:

• Improving plant operating hours.

• Analysing plant operating data to understand and enhance plant performance and health.

• Monitoring operational safety through new technologies.

Digital Power Plant Blueprint

Computerised Maintenance Management System

Remote Monitoring & Diagnostic
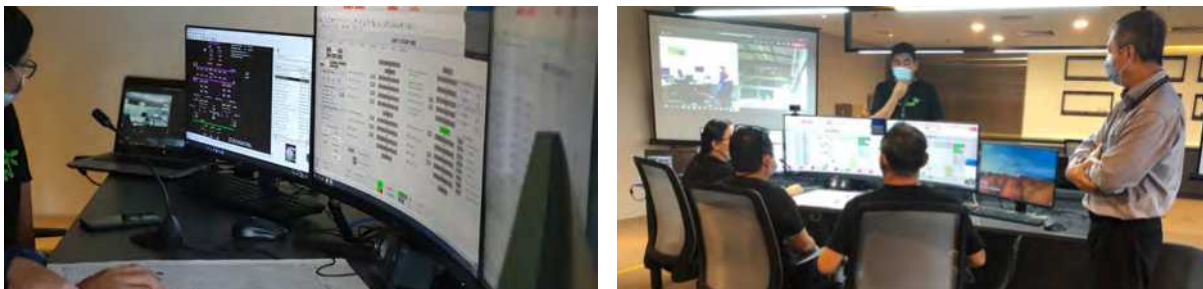
Enterprise Asset Management

Generation Control Center

To realise our Digital Power Plant aspiration, we will be implementing:

- A **Remote Monitoring & Diagnostic (RM&D)** centre, serving as a one-stop centre to connect all power stations. This facility will be powered by advanced analytics tools and supported by Subject Matter Experts (SMEs). RM&D will enable plants to reach peak performance by ensuring greater reliability, agility, efficiency, productivity and profitability.
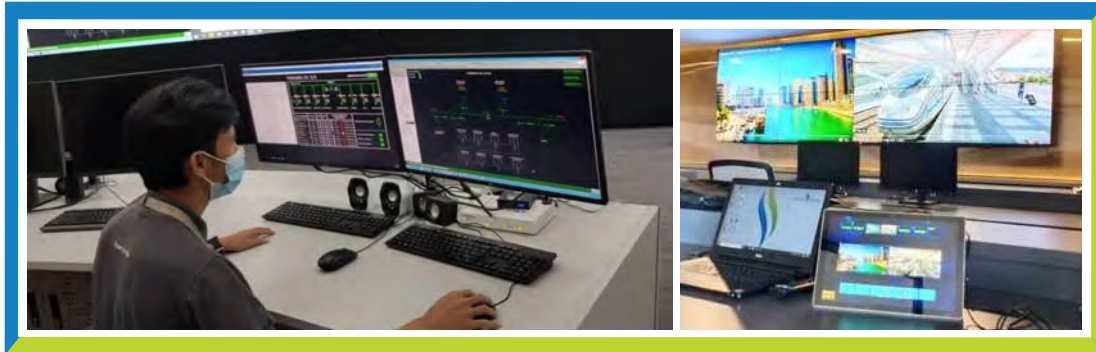
- **Generation Control Centre (GCC)** to unlock remote possibilities through new technologies. With the increased automation of our power plants, control-room operators will be able to manage them remotely from one site. Ultimately, GCC advancement will enable further workforce optimisation and cultivate greater agility.

- **Enterprise Asset Management (EAM)** system to elevate our existing business processes by developing a digital asset management strategy that will ensure that an asset's life cycle is aligned with ISO55001 Asset Management standards.

- **Computerised Maintenance Management System (CMMS)** to enable better decision making through reporting and dashboarding with business intelligence tools.

"Back then, the operators used to record log sheets on an hourly basis. Now the facilities at power plants have been upgraded with automated systems and sensors. Information and data are easily captured, stored and centralised."

– James Ung, Chief Executive Officer of SEB Power.

Smart Grid

Increasing peak demand has raised the complexity of grid operation – it is no longer cost–effective and efficient to manually operate, monitor and secure the network and our assets. Hence, we are committed to modernising our grid and operations through digitalisation to cultivate a smart power grid that is safe, secure and reliable.
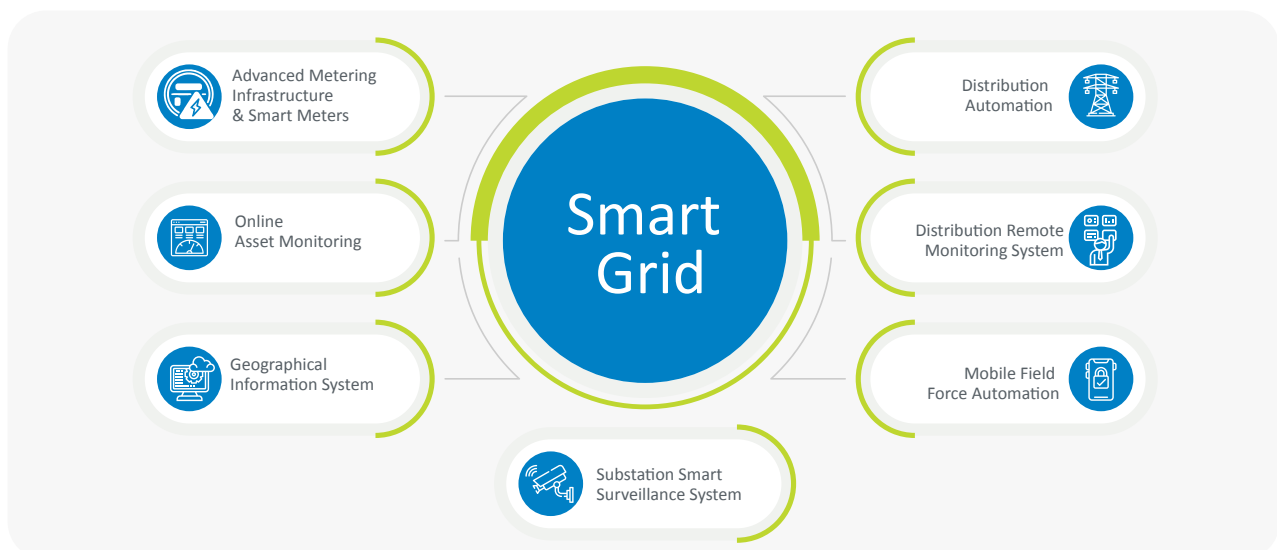
While the digitalisation and automation of our network system and operations have been centered on our Transmission network since 1998, we shifted our focus to our Distribution Network in 2016. Our Smart Grid development is guided by five of the seven key dimensions of the Smart Grid Index (SGI):

Smart Grid Focus

Data Analytics
Smart Meter Coverage, Data Analytics Application

Monitoring & Control
SCADA, DMS / ADMS

Security
IT/OT Cyber Security

Supply Reliability
SAIDI, SAIFI

Customer Empowerment & Satisfaction
Real-Time Data to Customers, Customer Satisfaction Feedback

We are leveraging on and integrating key smart grid technologies to:

- ensure a safe, secure and reliable grid and supply system;

- enhance operational safety and efficiency;

- protect our assets and achieve optimum asset performance;

- empower our customers.

Key Smart Grid initiatives for the next few years

Advanced Metering Infrastructure & Smart Meters

Online Asset Monitoring

Geographical Information System

Substation Smart Surveillance System

Smart Grid

Distribution Automation

Distribution Remote Monitoring System

Mobile Field Force Automation

Benefits of Smart Grid Initiatives

Advanced Metering Infrastructure & Smart Meters

- Automatic meter reading
- Outage, tampering & energy theft detection
- Remote disconnection / connection
- Power quality monitoring
- Enhance customer's digital experience

Distribution Automation

- Remote fault indication
- Safe remote operation
- Faster fault isolation and service restoration

Online Asset Monitoring

- Real-time monitoring of asset condition
- Early detection of anomalies and alert notification

Distribution Remote Monitoring System

- Sensors for substation & pillar doors, loss of supply (transformer), remote sensing earth fault indicator, street lighting status
- Automated detection & alert via SMS & email
- Faster restoration

Geographical Information System

- Network assets visibility
- Availability of asset information linking to customer information
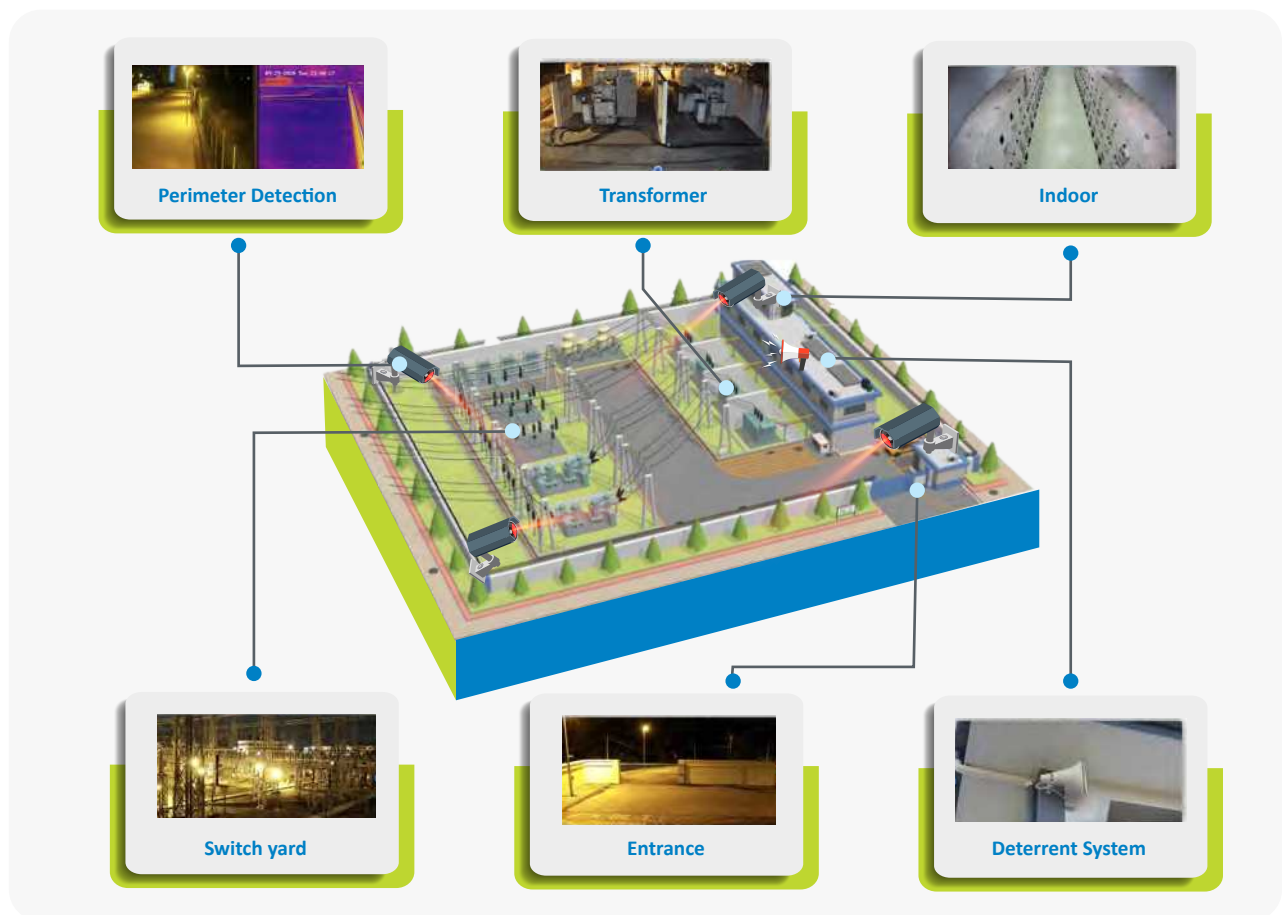
Mobile Field Force Automation

- Concise information flow between field crew (FC) and Customer Care Centre (CCC)
- Monitor work order progress
- Track FC performance on response and restoration

Substation Smart Surveillance System

- Real-time monitoring of substations & assets with alert notifications
- Theft & vandalism cases reduced significantly after installation

. **Substation Smart Surveillance System** consists of thermal cameras that are set up to enable video analytics at locations such as:

Perimeter Detection

Transformer

Indoor

Switch yard

Entrance

Deterrent System

· **Remote Monitoring Control Centre** for real time monitoring of our substations and assets.

- **Mobile Field Force Automation (MFFA)** comprises the automated processes in the diagram below, which facilitate the work of our Customer Care Centres (CCC), Technical Control Centres (TCC) and field crews (FC) from escalation to resolution.

Customer lodges reports to CCC

01

CRM CCC escalates case to TCC

02

CRM TCC assigns work order to FC

03

MFFA
FC updates job status via MFFA apps

04

SMS sent to customer to notify task resolved and request to rate service

05

TCC resolves work order and CCC closes case

06

- **Overhead Feeder Automation System**

Generation

Power
Station

Power
Transformer

Transmission

Transmission
Substation

Distribution

Distribution
Substation

Distribution Automation

Control Centre (SCADA)

- Remote monitoring & control
- Improve grid security, reliability & efficiency
- Improve safety
- Fast Restoration

Motorised Ring Main Unit (RMU)

- For underground system
- Remote switching operations

Distribution Remote Monitoring System (DRMS)

- Intrusion / theft sensors
- Street lights outage sensors
- Outage detection
- Automated detection & alert via SMS & email

Intelligent Sectionalisers

Smart Line Fault Indicators

Overhead Feeder Automation System

- For overhead lines
- Remote monitoring of fault indicators
- Remote switching operations

Underground Networks

Overhead Lines

Industrial, Commercial & Residential Consumers

Smart Retail

To provide our valued customers with the best experience, we are deploying various technological innovations to enhance our retail services.

Enhanced Customer Experience

We are taking steps to automate our customer service operations with the aim of delivering excellence in this area. As of today, we have introduced our customer self-service mobile application SEB cares, online applications for electricity supply, self-service payment kiosks and e-billing.
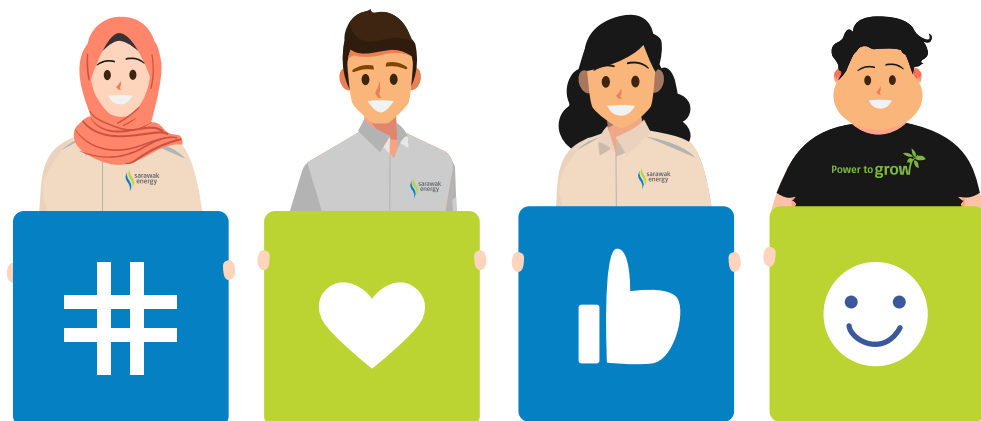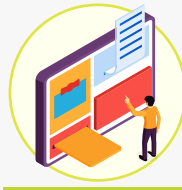
SEB cares

One-stop portal for customers to:
- Manage and pay electricity bills
- Report and track outages, faulty street lights, billing and metering enquiries

- Receive real time alerts on outages and planned shutdowns
- Find the nearest customer service centre

Online Application (eCX)

- Online submission of electricity supply application
- Online registration and renewal of consultant and contractor profile
- Easy tracking of the application milestones
- Receive real time updates on application progress
- Freedom to submit application 24/7 without going to counter – save time

Self-Service Payment Kiosks

- Another self-service payment channel
- View latest electricity bill
- Pay electricity bills and collateral deposits
- Pay other electricity bills and installment including other bills such as water bills, assessment bills etc

e-Bill

- Fast bill delivery
- Convenient, view bill anytime
- Enhance customer privacy
- Environmentally friendly

To enhance our customer experience, we have also upgraded our Integrated Customer Care Centre by introducing more omni-channels such as Carina, our first virtual customer agent and Agent Live chat to serve customers anytime, anywhere.
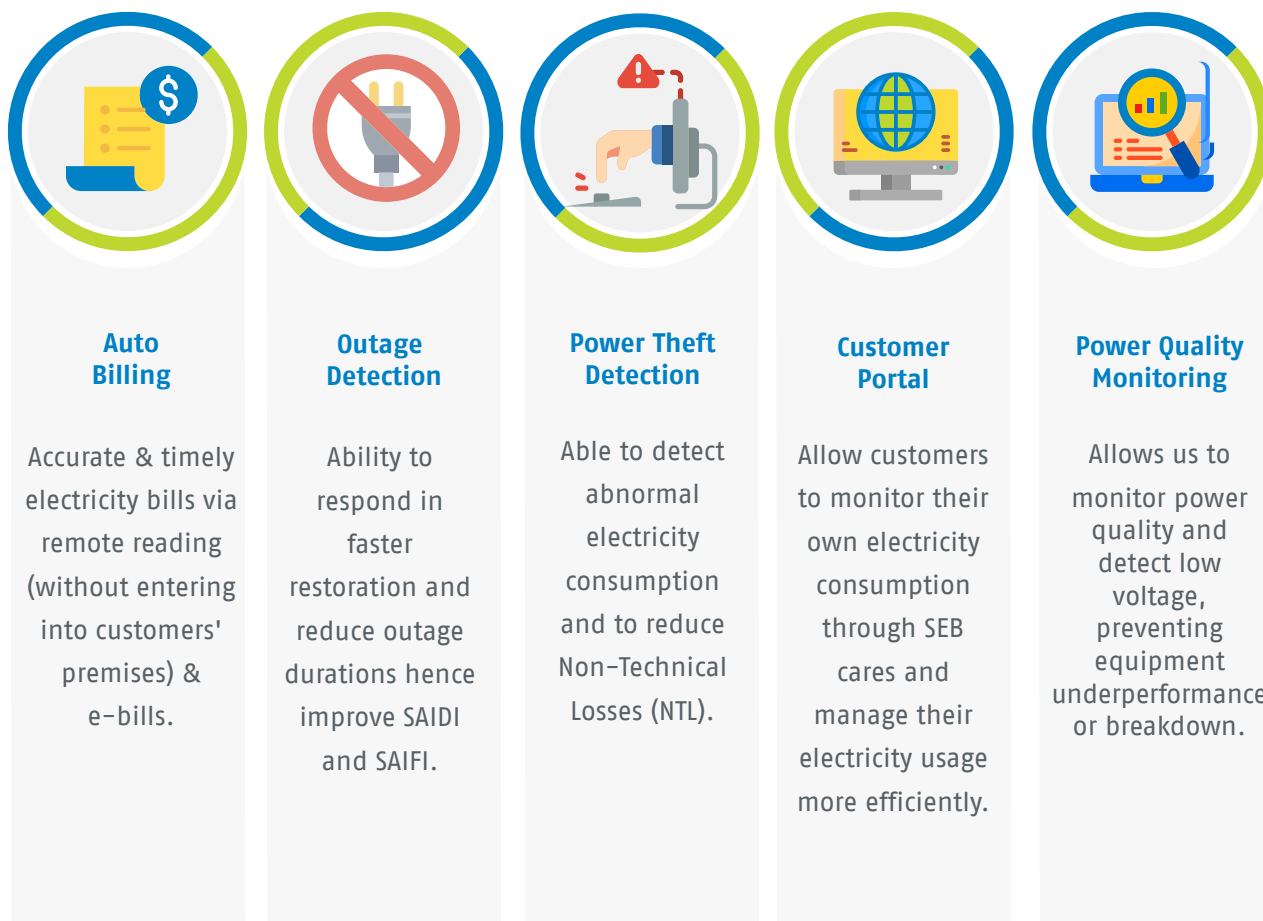
Customer Care Centre

Call Centre	SEB cares	Chatbot Carina	Live Chat	Website	Email	Fax
(1300 88 3111)				(www.sarawakenergy.com/customers)	(customercare@ sarawakenergy.com)	(082 313 588)
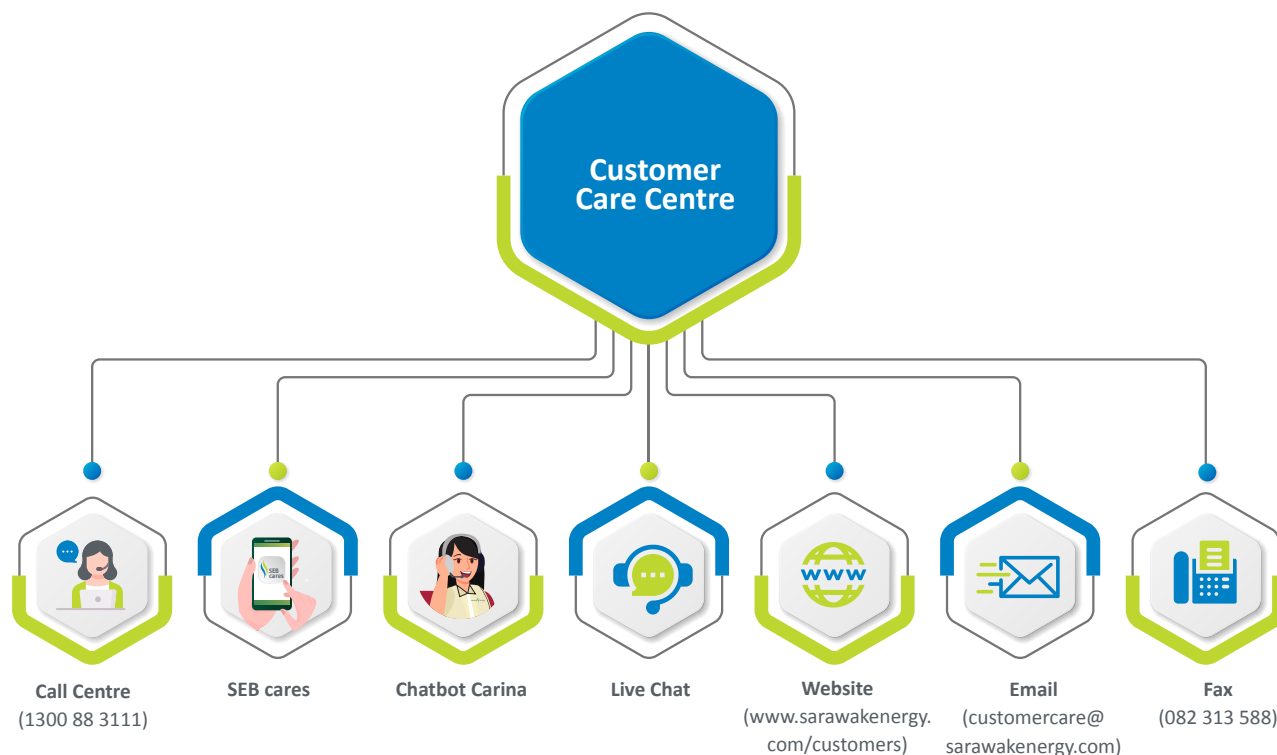
Our Carina chatbot was introduced on 25 October 2020 and it is powered by artificial intelligence to answer common customer enquiries. Through Carina, multiple enquiries can be handled simultaneously at any time of the day. Coupled with Live Chat features, customer waiting time can be reduced by providing call-routing, workflow escalation through the Integrated Customer Care Centre.

Smart Meters

The smart meter is an advanced electronic device that enables two-way communication between the meter and central system to record energy consumption and facilitate earlier outage detection. With the smart meter in place, customers across Sarawak enjoy the following benefits.
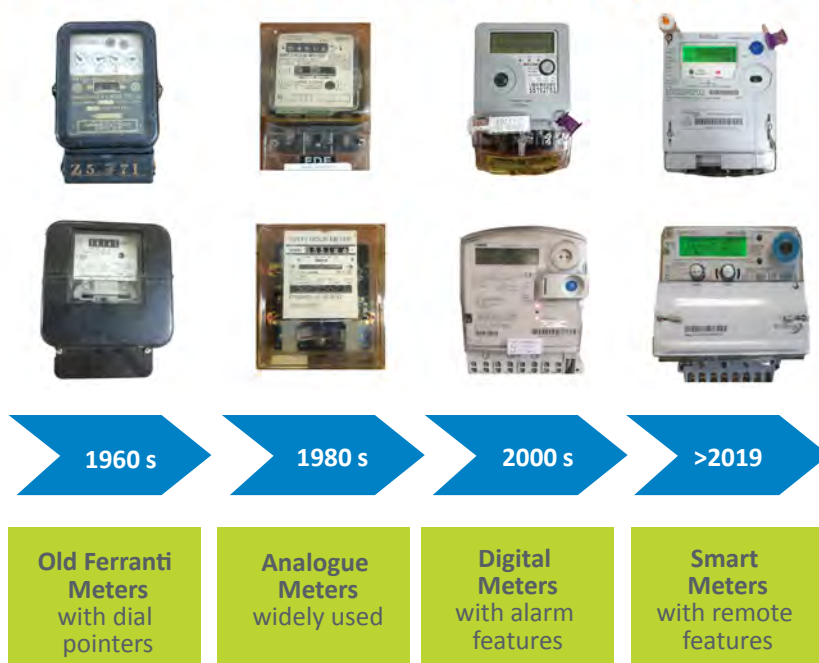
Auto Billing	**Outage Detection**	**Power Theft Detection**	**Customer Portal**	**Power Quality Monitoring**
Accurate & timely electricity bills via remote reading (without entering into customers' premises) & e-bills.	Ability to respond in faster restoration and reduce outage durations hence improve SAIDI and SAIFI.	Able to detect abnormal electricity consumption and to reduce Non-Technical Losses (NTL).	Allow customers to monitor their own electricity consumption through SEB cares and manage their electricity usage more efficiently.	Allows us to monitor power quality and detect low voltage, preventing equipment underperformance or breakdown.

*SAIDI – System Average Interruption Duration Index
 SAIFI – System Average Interruption Frequency Index

Deployment of smart meters will be extended to around 70% customers in the Kuching area by 2026, followed by Miri, Sibu, Bintulu, Sri Aman, Betong, Sarikei, Mukah, Kapit and Limbang through to 2029. To date, about 5,500 smart meters have been deployed for free to our customers in Kuching namely Kampung Gita, Tabuan Jaya Baru and Tabuan Laru.

Evolution of Electricity Meters

1960 s	1980 s	2000 s	>2019
Old Ferranti Meters with dial pointers	**Analogue Meters** widely used	**Digital Meters** with alarm features	**Smart Meters** with remote features

First Engagement with Kampung Gita Community
Engagement with State Legislative Member for N6. Tupong, YB Fazzrudin Abdul Rahman and the Kampung Gita community on the Smart Meter Pilot Project on 2 April 2019.

Kampung Gita Smart Meter Introduction
A mini carnival was held on April 2019 in Kampung Gita to launch the first smart meter pilot project for 1,700 metering points.

2.4 Digital Culture and Empowering People

To move from incremental improvements to transformative ones in Sarawak Energy, we must attract talents with digital competencies and cultivate digital savviness in our workforce. Realising this goal requires us to provide meaningful experiences centred around three aspects:

• Adopt digital ways of working.

• Build up our digital workforce.

• Empower our digital people with digital toolsets.

Cultivating a Digital Workforce

Sarawak Energy is building our workforce into Digital People by focusing on the four building blocks below:

Digital People's C.E.L.L. – The Building Blocks of Digital People

(Culture, Experience, Literacy, Leadership)

Ability to use information and communication technologies to find, evaluate, create, and communicate information, requiring both cognitive and technical skills.

An engaging and intuitive change management programme consisting of governance, activities, and events, aimed at boosting workforce dexterity in the use of digital technologies.

Leaders equipped with the necessary traits (innovative, change embracing, agile, etc.) and skills (remote learning, virtual coaching, etc.) of a digital leader to successfully drive the organisation forward in our digital transformation journey.

Integration of digital solutions and technologies into our day-to-day operation and communication to enhance functionality, reach and convenience.

DIGITAL **Literacy**

DIGITAL **Culture**

DIGITAL **Leadership**

DIGITAL **Experience**

The Sarawak Energy Digital Acculturation Programme (SEDAP) was launched in 2020 to nurture our Digital People's C.E.L.L. The programme consists of governance, activities and events that are designed to boost workforce skills related to the use of digital technologies.

To ensure that our employees can adapt to the new technologies and processes that we have adopted, we established a number of ongoing initiatives under each C.E.L.L. building block:

(C)ulture

- Employees are reminded and encouraged to make full use of mobile devices and office productivity tools for daily virtual communication and collaboration as well as corporate virtual events.

(E)xperience

- Digital solutions and technologies are deployed to enhance the current way of doing things and the digital experience in areas such as visual communication of information, training, operations surveillance and tracking.

(L)iteracy

- Learn and Share clinics are held fortnightly to educate employees about new technologies and processes introduced under the digitalisation programme.

- Online Upskilling Programme that promotes the use of online learning to bridge existing digital competency gaps.

- Let's Play and Learn activities to demonstrate how to work in a fun, flexible and engaging way using office productivity tools.
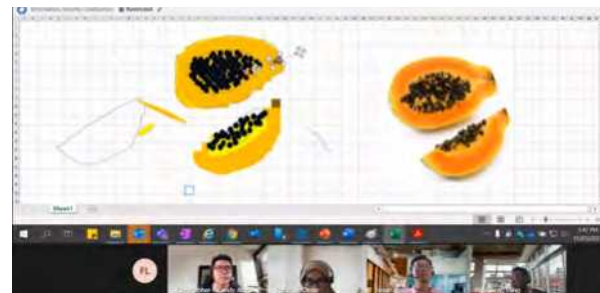
(L)eadership

- Leadership Lecture Series and Chillax are interactive sessions where Sarawak Energy employees can tune in to learn from our top leaders on the traits and skills of a digital leader.

- Chit-chat podcasts are open to our employees to discuss special interest topics in a casual yet inspiring way. These virtual events allow new leaders to learn how to leverage on digital tools for knowledge and information sharing. It is also an avenue for upcoming leaders to practise their presentation/speaking skills in a more conducive environment.
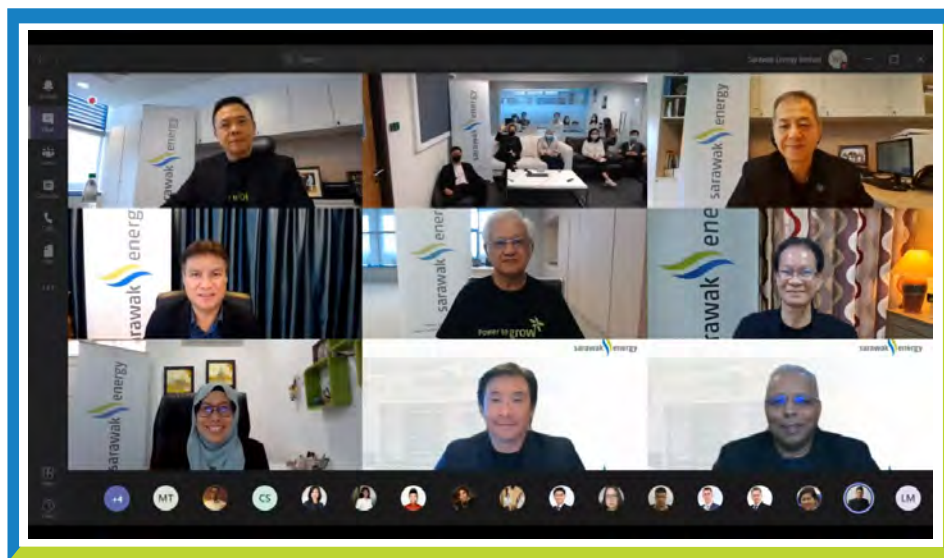
Attributes of Digital People

We have identified the following five attributes as defining characteristics of our Digital People:

E	P	I	C	T
EMPOWERED	**PROACTIVE**	**INNOVATIVE**	**COLLABORATIVE**	**TECH-CENTRIC**
We strengthen our self-leadership, develop new digital skills, and increase individual competence and capacity to make an informed decision, according to the accountability, autonomy and trust given. We possess the ability to adapt to the volatile, uncertain, complex and ambiguous (VUCA) business landscape.	We actively engage with stakeholders, colleagues and customers to understand and/or anticipate their needs and problems, both current and future. We act in advance of a future situation, by taking control of it and causing actions rather than just adjusting to it or waiting for something to happen.	We strive and advocate for continuous improvement through the application of new digital solutions and technologies to solve business problems and modernise practices for benefits realisation, and resource and risk optimisation.	We possess an increased digital readiness; i.e. the desire and ability to perform tasks, share knowledge, manage information and work with others in a digital context. We embrace enterprise-first mindset and demonstrate winning behaviours through teamwork to achieve synergy, business goals and objectives.	We pursue a digital-first mindset that prioritises digital solutions and openly explores digital opportunities. We are agile in embracing and leveraging on digital solutions in our new way of working and in delivering customer experiences.

3. Digital Governance

We have encountered challenges scaling up from digital pilots on our digitalisation journey. Adopting digital ways of working, adding talent and modernising IT will enable us to overcome these challenges and accelerate our transformation. We have identified three general issues that may inhibit our digital transformation:

- The traditional working methods of utility companies revolve around safeguarding large, long-lived assets and minimising operational risks. This mindset leads utilities to be cautious about embracing digital ways of working that involve constant experimentation, lending to unintended consequences arising.

- The popular perception of utilities as analog-era companies makes recruiting talents to fulfill digital economy roles, such as data scientists, very difficult.

- The complex legacy operations and IT environments of utility companies tend to inhibit rapid innovation.

3.1 Digital Councils and Structure

To supplement our digitalisation blueprint, Sarawak Energy also developed a business digitalisation roadmap that is constituted by a multitude of digital plans and projects from different business units across our organisation.

To bring these digital initiatives to fruition in a cohesive and structured manner, we recognised the necessity for strong and effective governance in the form of executive-led digital councils (DCs).
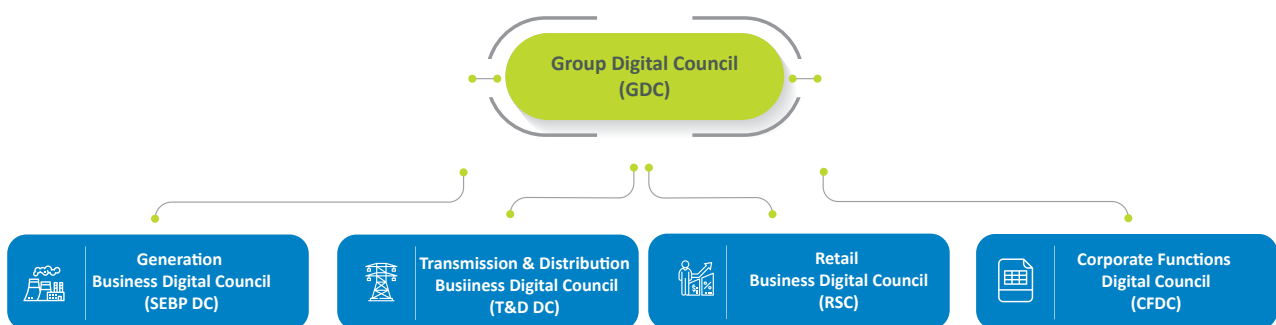
These DCs were established with the following objectives in mind:

- To drive and accelerate digital transformation in Sarawak Energy.
- To align distributed digital initiatives and resources with our overall digital transformation goals.
- To steer and set priorities on digital initiatives for implementation and investment across the organisation.

3.2 Cybersecurity

Digitalisation lends itself to an increase in cybersecurity threats and new risks. Regular updates on cybersecurity are provided to the board for the Board Audit and Risk Committee (BARC) at the highest level.

The emergence of interconnected information technology (IT) and operational technology (OT) network that was traditionally isolated from cybersecurity threats requires us to build secure systems. This necessity has led us to invest in security technologies such as industrial control systems aware firewalls and industrial secure media exchange for USB protection. We also strengthened our cyber defences through security information and event management technology to provide visibility and threat alerts in real time.

We are also enhancing our end-user awareness as our people are the first line of defence, launching the ThinkSecure programme in 2020 to embed a cybersecurity mindset across the organisation.

Cyber Security Awareness
ThinkSecure
Think Before You Click, Connect, Converse (3C)

4. Performance Outcomes

Sarawak Energy has made great strides towards transforming our business activities by leveraging on digital technologies and digitalised data. In doing so, we have been able to shape data into actionable information and knowledge. This has yielded great benefits for our customers, employees, communities and the Sarawak Digital Economy.

4.1 Empowering Our Customers

"By choosing to go digital, more people are able to stay home and this keeps more people safe. Customers gain 24/7 access to services such as bill monitoring, meter reading reports for bill adjustment and online payments via FPX (internet banking) or credit cards."

– Lau Kim Swee, Chief Executive Officer for Sarawak Energy's utility arm, Syarikat SESCO Berhad.

"To all our valued customers who have access, let's go digital – paying bills safely from home has never been easier with the various online platforms available. We also urge our customers to keep track of their bills and make prompt payments to avoid having to pay a large accumulated amount once the movement control order is lifted."

– Ng Shou Fui, Sarawak Energy's General Manager for Retail.

"SEB cares was launched to enhance the utility's customer service experience by providing an additional platform to stay connected with the company, anytime, anywhere, 24 hours a day. Through the app, customers are able to manage their bills, make e-payments, enquire on technical services and report on outages, faulty street lighting and

receive real time alerts and updates. For e-payments, customers are able to make payments for their electricity bills via online banking, credit or debit card through this app."

– Hj Yusri Safri, Sarawak Energy's Vice President for Distribution.

4.2 Supporting Sarawak's Digital Economy

To support Sarawak's Digital Economy agenda, we are supporting the development of high speed connectivity by leveraging our fibre optics infrastructure. We are also collaborating with the Sarawak Multimedia Authority (SMA) and Sarawak Digital Economy Corporation (SDEC) to increase bandwidth and connectivity coverage across Sarawak through our 500kV grid network, which will facilitate Sarawak's growth into a digital leader.
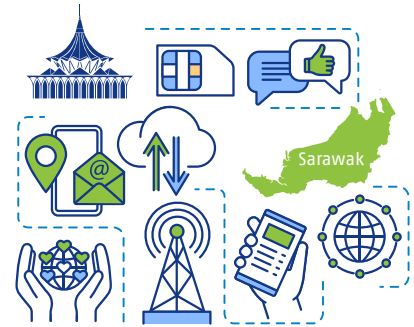
The key drivers of the Sarawak Digital Economy agenda are:

Fibre connectivity to operations in remote areas such as our Bakun and Murum Hydroelectric Plants and Baleh Hydroelectric Project site.	Increase bandwidth and coverage across Sarawak, including rural locations such as Lachau, Tudan and Lawas.	Support international gateway growth across Borneo and Southeast Asia.	Affordable tariffs and increased reliability of power distribution for customers in Sarawak.
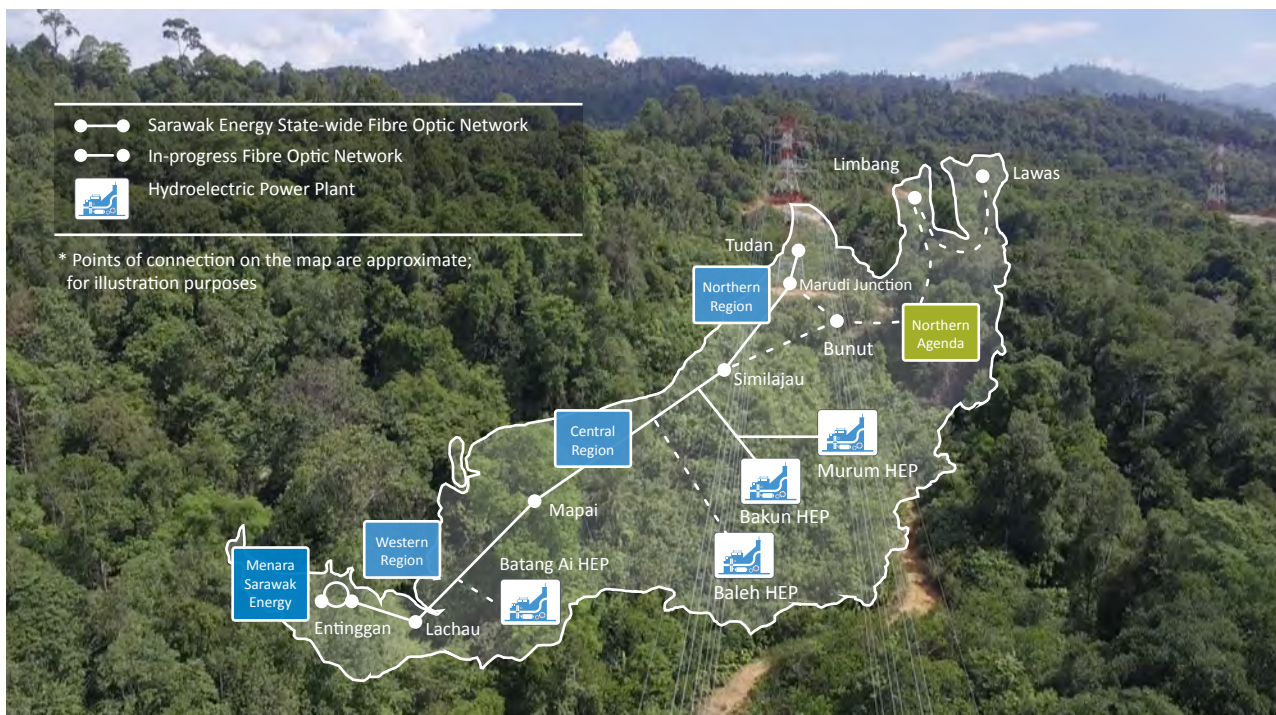
Sarawak Energy Fibre Optic Network

In 2020, Sarawak Energy has constructed over 6,500km of fibre optic connection including Optical Ground Wire (OPGW), All Dielectric Self Supporting (ADSS) and Optical Underground (OPUG) fibres, with over 6,000 transmission towers and 400,000 distribution poles.

4.3 Business Continuity During COVID-19

The COVID-19 pandemic presented us with an opportunity to accelerate digitalisation across the whole organisation, enabling us to continue delivering on our roles and responsibilities while keeping our people as safe as possible from the threat of transmission.

In line with this commitment to keeping our people safe, Sarawak Energy implemented the New Work Arrangement (NWA) to further enhance business continuity measures and safeguard our workforce for the long haul. One year on, the experiences and knowledge we gained from the pandemic have prepared us for similar disruptions in the future.

Digitalisation has also facilitated business resilience in our organisation, as our early digital investments enabled us to continue operating during the nation-wide movement control order (MCO). Sarawak Energy's workforce quickly and relatively seamlessly adapted to this new mode of working. While essential services teams continued to discharge their duties from their workstations, many employees began to work remotely from home. This led to a rapid and massive surge in usage for our digital platforms, especially virtual communication and collaboration tools such as Microsoft Teams.

These platforms proved to be invaluable and ensured continuity of operations from the initial MCO and all the subsequent restrictions. Our Retail team's Customer Care Executives were able to attend to customer complaints and enquiries from home via multiple channels during the MCO without any major disruption to our Contact Centre operations. The ability to work virtually also contributed significantly to cost and time savings across the organisation.

4.4 Enabling External Recognition through Digitalisation

2020 Malaysia Enterprise Innovation Awards

Sarawak Energy was recognised with the 2020 Malaysia Enterprise Innovation Award for our digital transformation efforts.

The award was presented in conjunction with Asia IoT Business Platform (AIBP) Insights Malaysia, a series of country-focused sessions which convene ASEAN stakeholders to discuss enterprise technology adoption topics in the region and was held from 5 to 7 October 2020.

Anugerah Kualiti Perkhidmatan Awam Negeri Sarawak (AKPANS)

Sarawak Energy was recognised with a silver award for 'Anugerah Ketua Menteri Sarawak 2019' under the 'Agensi Utama Negeri' category at AKPANS 2019. AKPANS is the highest recognition given by the Sarawak Government to deserving public agencies who achieved overall excellence in their organisational management, operation and customer services.

Sarawak Energy also won second place in the State Key Focus Activities (KFA) Award for our Mobile Field Force Automation (MFFA) and third place for the 'Anugerah Pengurusan Pelanggan' category at the State Civil Service Excellence Night in 2018. The event was graced by YAB Datuk Patinggi (DR) Abang Haji Abdul Rahman Zohari Bin Tun Datuk Abang Haji Openg, Chief Minister of Sarawak.

HR Asia Awards Malaysia

Digitalisation was also a key factor in Sarawak Energy being recognised as one of the 'Best Companies to Work for in Asia' at the HR Asia Awards Malaysia for two consecutive years since 2019.

The HR Asia Awards recognise the best workplaces in Asia based on company performance in key areas, including access to technology.

Our consecutive wins serve as further evidence of our ongoing efforts to make Sarawak Energy a great place to work. This will enable us to attract and develop the right talents to build a digital future for our organisation.

Sustainability & Renewable Energy Forum (SAREF)

The inaugural SAREF in 2019 marked the beginning of a 10-year thought leadership campaign to build our regional position as the provider of sustainable and renewable energy. Organised with the Ministry of Utilities Sarawak, the biannual conference serves as a platform to drive discourse on sustainability and the role of renewable energy providers in delivering the United Nations Sustainable Development Goals by 2030.

The discussions on hydropower and sustainability at the event revealed the important role of digitalisation and modernisation in creating a more sustainable energy future. We will continue leveraging on technology and innovation to progress sustainability and renewable energy in Sarawak.

5. What's Next

5.1 Driving Innovation

While IR4.0 has provided us with a multitude of digital innovation possibilities, it is time consuming to filter through all the possibilities to determine which new technologies add value to our business. Framing the technology selection process correctly will ensure that we can support our digital transformation journey in a timely, affordable and sustainable manner.

The approach that we have taken to select new technologies for adoption is based on the Digital Innovation – Opportunity Development Process which embeds convergent and divergent thought processes, applying both "pull" and "push" strategies to discover digital innovations with disruption potential from the market and business owners. The identified digital technologies are then assessed for their maturity and readiness for large scale adoption.

We have deployed several of the identified innovative technologies to solve business issues:

- **Virtual Reality (VR) training** to enhance technical training in a simulated work environment which replicates actual conditions and recreate various real life worst-case scenarios for the purpose of strengthening business preparedness, recovery plans and resilience mechanisms.

VR for technical training

- **Drone technology** for visual inspection and surveillance of transmission lines and towers, asset conditions in power plants, dam structure of hydropower plants and construction sites to simplify the inspection process and ensure the safety of inspection personnel.

Drone for transmission tower inspection

- **Head-mounted device compatible with safety helmet and glasses** to share the view of an on-field worker and enable remote assistance.

On-field worker with head-mounted device

Some of the promising digital technologies listed below are currently in our evaluation pipeline as we work towards igniting the digital future of Sarawak Energy.
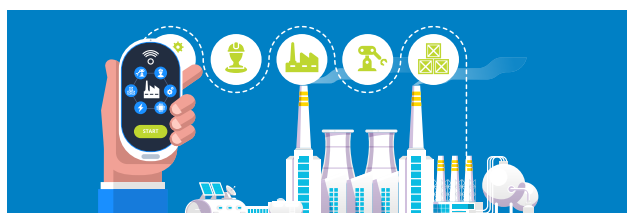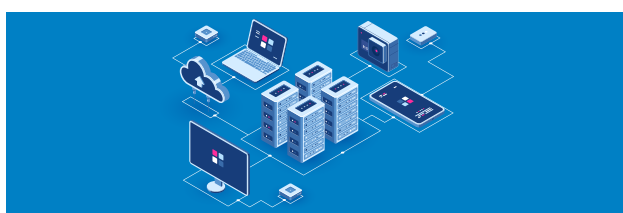

IoT & Analytics

Smart and connected IoT devices to gather data for analytical insights

Potential applications:
- Smart sensors and low-power wide area network for remote monitoring
- Body-worn cameras for field operations and inspections
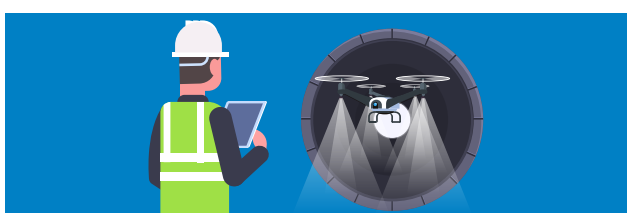- Remote surveillance with vision analytics
- AI-powered energy analytics

Digital Twins

Bridging the physical and digital worlds of assets for data-driven decision making

Potential applications:
- 3D modelling and visualisation system for power plants and substations

Drones and Robotics

Remote sensing for asset inspection and monitoring in higher level of detail

Potential applications:
- Collision-tolerant drone for confined space inspection
- Transmission line and tower inspection using drone and satellite imagery analytics

Immersive Technologies

Integration of virtual content with physical environment to improve operational efficiency

Potential applications:
- Augmented and mixed realities for collaborative problem solving
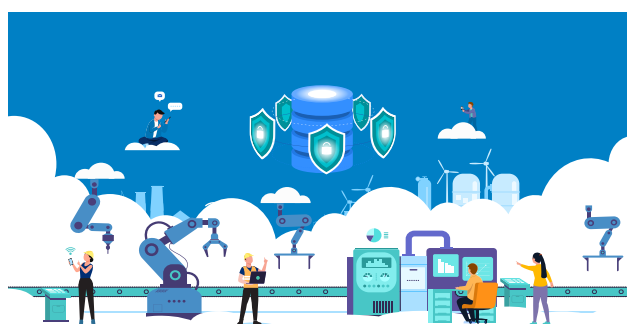
Digital Process Automation

Intelligent automation with greater transparency and data security to streamline business processes

Potential applications:
- Robotic process automation for execution of rules-based, structured and repetitive processes
- Blockchain billing and payment processing for smart metering and EV charging stations
- Blockchain-based green energy certificates

As the development of digital technologies accelerates, more advanced technologies will soon be on the horizon for future adoption, such as:

- Wider use of smart sensors to provide more actionable data for the quick resolution of technical issues, leading to highly reliable and more efficient electricity generation, transmission and distribution.

- Long range 5G-enabled drones for real time streaming of high-resolution data at base stations and greater autonomous function.

- Robotic arm for distribution line maintenance to improve safety and eliminate injury risks.

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Contributors

This booklet was jointly developed by the following business functions:

- Project Delivery.
- Corporate Services.
- Finance.
- Health, Safety, Security and Environment.
- Contract & Procurement.
- Legal.
- Corporate Communication.
- Information and Communications Technology.

Sarawak Energy's Generation Arm – SEB Power

Sarawak Energy's Operation Arm – Syarikat SESCO Berhad

sarawak energy