EPISODE 7:
FUTURE PROOFING BUILDINGS WITH GREEN INNOVATIONS

Solar PV Solution for Commercial & Industrial Buildings

19th January 2022

Presented by:

HASILWAN
POWER GRID . RENEWABLE ENERGY . AUTOMATION

In collaboration with:

GreenRE

INTRODUCTION

Illustration purposes only

We are a qualified & experienced power engineering company established 30 years ago providing the following services:

- Construct **electrical power grid infrastructure** to enable a secure & reliable transmission & distribution of electricity supply to consumers
- Construct, develop & invest in **Renewable Energy (Solar PV Systems)** to generate green energy
- To design, retrofit, install, develop/invest in products & solutions to enable **Energy Efficiency systems and Electric Mobility infrastructure**

Source: https://electricalacademia.com/wp-content/uploads/2019/05/Electric-Power-Transmission.png
Source: https://news.yale.edu/2015/10/08/west-campus-solar-array-generate-16-million-kilowatt-hours-electricity-yearly
Source: https://www.tomsguide.com/news/ev-charging-has-a-big-problem-and-it-has-nothing-to-do-with-recharge-time

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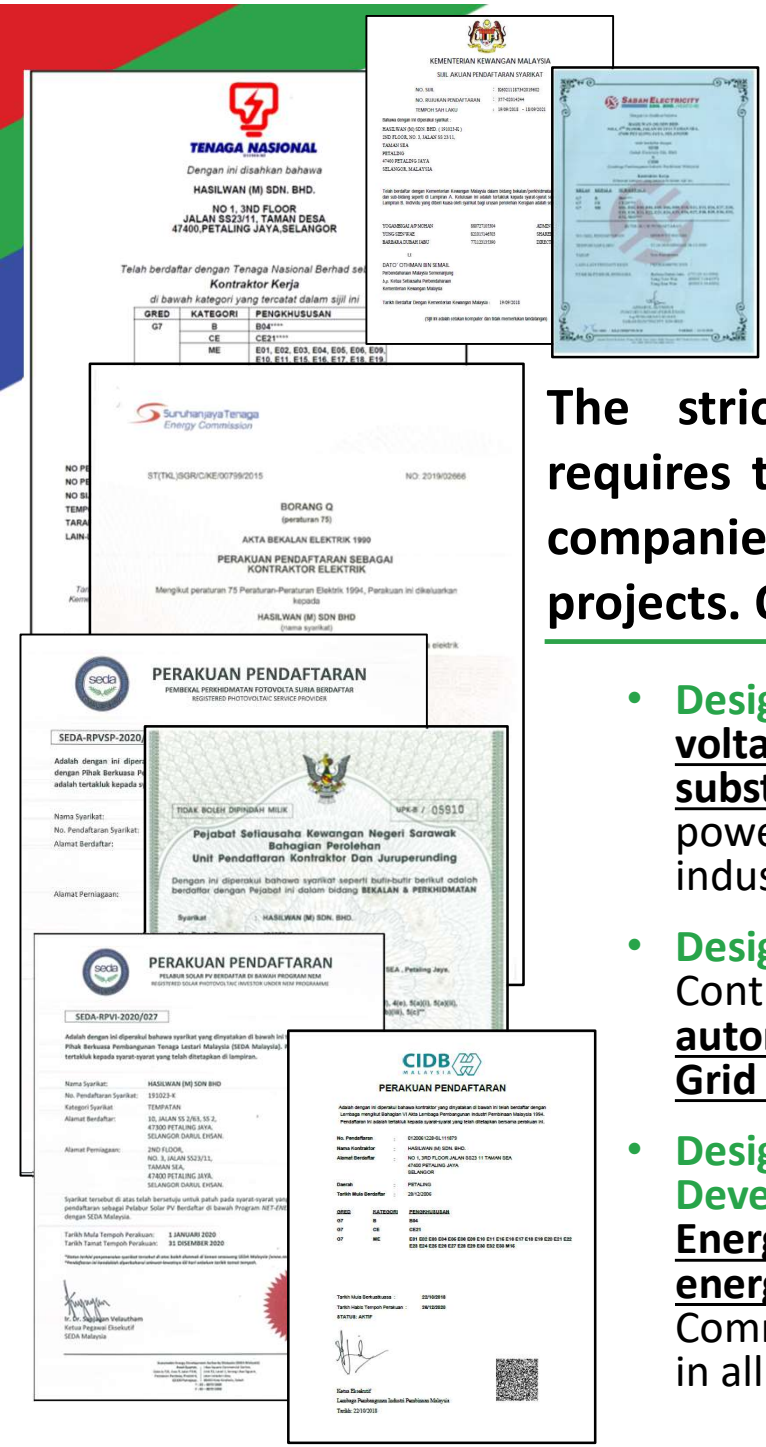
QUALIFICATION & CAPABILITIES



The strictly regulated energy industry requires technical & financially competent companies to undertake infrastructure projects. Our qualifications includes:

- **Design, Build, Supply & Maintenance** of **high voltage & medium voltage transmission lines, substations & equipment** across all Malaysian power utilities (TNB/SEB/SESB) & private industrial consumers
- **Design & Systems Integration** for Supervisory, Control, & Data Acquisition **(SCADA) automation infrastructure for the National Grid network**
- **Design, Build, Operations & Maintenance, Development/Investment** in **Renewable Energy (Solar PV Systems) to generate green energy** for Large Scale Solar (LSS) plants, Commercial, Industrial & Residential buildings in all Malaysian States

COMMERCIAL & INDUSTRIAL SOLAR PROJECT EXAMPLES:

SHOPPING MALL: KUALA LUMPUR

FACTORY: SELANGOR

OFFICE BUILDING: MELAKA

FEDERAL GOVT BUILDINGS: KUALA LUMPUR

CITY COUNCIL BUILDINGS: KUALA LUMPUR

STATE GOVT BUILDINGS & SCHOOLS: PAHANG

PROGRESS OF SOLAR PV INDUSTRY IN MALAYSIA

Net Energy Metering (NEM) 3.0

A quota of 500 MW was allocated for NEM 3.0 for the period of 1st February 2021 – 31st December 2023:

- **NEM NOVA – quota of 263.3 MWac**
- **NEM GoMEn – quota of 79.5 MWac**
- **NEM Rakyat – quota of 74.4 MWac**

Source: https://services.seda.gov.my/nem/quota/dashboard

Large Scale Solar

In an effort to reduce the Levelized Cost of Energy ("LCOE") for the ***development of large scale solar PV plants, the LSS, a competitive bidding programme***, was introduced in 2016.

- Total Offered projects worth 2,356.8 MW
- Operational (856.8MW) as of Q4 2020
- LSS 5 will be launched soon

Self-Consumption

- SELCO applies when ***electricity is being generated for own usage and any excess is not allowed to be exported*** to the grid
- Guidelines on the Connection of Solar PV Installation for Self-Consumption (SELCO) was launched in 2017 by Suruhanjaya Tenaga (ST)

FAQs WHEN DEVELOPING SOLAR PV FOR COMMERCIAL AND INDUSTRIAL (C&I) BUILDINGS

01 Identify a qualified and SEDA registered Solar PV services provider with relevant and sufficient experience

02 Recognizing the government incentives available that is applicable:

- NEM 3.0 Program
- Green Investment Tax Allowance (GITA) Program
- Green Technology Financing Scheme (GTFS)

03 Recognizing the relevant government bodies involved, i.e. Suruhanjaya Tenaga (ST), SEDA, TNB, MIDA etc.

04 Various solar investment options, e.g.
Outright Purchase or Solar Power Purchase Agreement (PPA)

05 Savings on Electricity Bill and Carbon Offset level will be subjected to solar capacity (roof size availability and TNB Bill consumption)

Source: https://www.legal500.com/developments/thought-leadership/legal-updates-on-the-solar-energy-industry-in-malaysia-2/

Investment Option 1: Outright Purchase

What is a Solar Outright Purchase model?

In the **Outright Purchase** model, the entire investment comes from the power consumer. The Outright Purchase model is also known as the **EPCC Model** (Engineering, Procurement, Construction and Commissioning)

Who should adopt an Outright Purchase model?

Any business with a business premise that has ample space for the installation of a solar PV system and can afford the upfront investment in owning a solar PV system

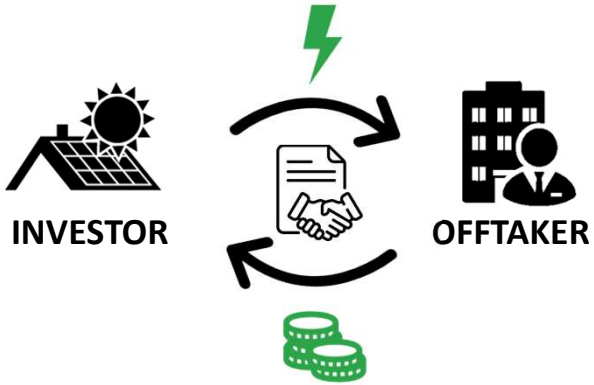
An Outright Purchase investment has a potential in that a well-managed project can yield up to 25% internal rate of return (IRR) and result in a payback of under 4 years with tax benefits and tax incentives

Investment Option 2: Solar Power Purchase Agreement (PPA)

What is Solar PPA?

A PPA is a **long-term agreement** executed between an investor of a solar PV system ("Investor") and a electricity consumer ("Off-taker"), for the sale & purchase of electricity generated from the solar PV system

- The **Investor** will bear the cost of supplying, installing, operating & maintaining the solar PV system on the Off-taker's premises
- The **Off-taker** will purchase the solar-generated electricity for their own consumption at an agreed tariff ("PPA Tariff") for an agreed duration ("Tenure")



The PPA Tariff is usually cheaper than the price of the electricity purchased from an existing distribution licensee, such as TNB, which is referred to as "Electricity Tariff"

PROCESS OF INVESTING IN SOLAR PV SYSTEMS

Site Audit

A qualified & SEDA Registered Solar PV Service Provider (RPVSP) analyses the building structure, solar PV system design, the installation cost and your current utility pricing.

Sign Contract

RPVSP provides a proposal offering an **Outright Purchase** Price or a **Solar PPA** tariff (discounted from utility standard tariff). There is no cost (to the consumer) for the proposal and no obligation for you.

Engineering, Installation and Monitoring & Maintenance

Detailed engineering will then be undertaken to develop the optimized solution for your roof, as well as to obtain all permits, procure equipment, install & construct the Solar PV System.

a) For an **Outright Purchase**; certain service providers (i.e. Hasilwan) will be able to handle all monitoring, maintenance and repairs throughout the lifecycle of the Solar PV System (25 years) under a maintenance contract.

b) For **Solar PPA**; at the end of each month, the Investor (i.e. Hasilwan) sends a bill indicating the amount owing of solar power produced (multiplied by the agreed solar electricity tariff discount) while all maintenance cost will be borne by the Investor and not the electricity consumer.

Cheaper, Cleaner Electricity

Enjoy lower energy costs, while reducing your carbon footprint.

FISCAL INCENTIVES & FINANCING FOR SOLAR INVESTMENTS

Green Investment Tax Allowance (GITA) for Assets

- Investment tax allowance for 100% of qualifying capital expenditure incurred on green technology asset, until the year of assessment 31st Dec 2023

Green Investment Tax Allowance (GITA) for Projects

- Applicable to companies carrying out qualifying green technology projects for their business or for self-consumption
- It provides 100% income tax allowance on qualifying capital expenditure for a project until 31st Dec 2023

Green Income Tax Exemption (GITE) for Services

- This incentive provides income tax exemption for 100% of statutory income for the year of assessment from the date the application received by MIDA, until 31st Dec 2023

Green Income Tax Exemption (GITE) for Solar Leasing

- Income tax exemption of 70% on statutory income for up to 10 years for companies undertaking solar leasing activities, for the year of assessment for applications received by MIDA from 1st January 2020

Green Technology Financing Scheme 3.0

- RM2 Billion was allocated to the scheme under Budget 2021 and is open for application until Dec 2022
- The scheme provides financing for investments in the production or utilization of green technology, as well as investments or assets related to energy efficiency

Source: https://www.legal500.com/developments/thought-leadership/legal-updates-on-the-solar-energy-industry-in-malaysia-2/

CASE STUDY

SOLAR QUARTER

FirstVIEW
Intelligent Business

CERTIFICATE OF ACHIEVEMENT

THIS IS AWARDED TO

Hasilwan (M) Sdn Bhd

SOLAR PROJECT EXCELLENCE AWARDS

BEST SOLAR PROJECT OF THE YEAR

Awarded On 19th November 2021

MALAYSIA SOLAR WEEK 2021 LEADERSHIP AWARDS

Hasilwan (M) Sdn Bhd was selected as a winner for the category:

Best Solar Project of the Year at 'Malaysia Solar Week Leadership Awards 2021'

The winning project is the **Malaysian Highway Solar Project**, which involves the installation of approximately 3122 pieces of solar photovoltaic (PV) panels on metal deck roofing of various buildings, building integrated photovoltaic (BIPV) car park structure and ground mounted structures

CASE STUDY

Development, Design, Construction, Finance, Invest, Operation & Maintenance of a Highway Solar PV System (via NEM Scheme) of 1,368.68 kWp for 21 years under Power Purchase Agreement.
13 PV Systems at 8 sites along the highway. 7 Rooftop systems and 6 Ground Mounted Systems.

HIGHWAY OPERATIONAL HQ

BIPV SOLAR CAR PARK

PLAZA TOLL WORKS

DETAILED ANALYSIS & SYSTEM DESIGN

GROUND MOUNTED SOLAR SYSTEM

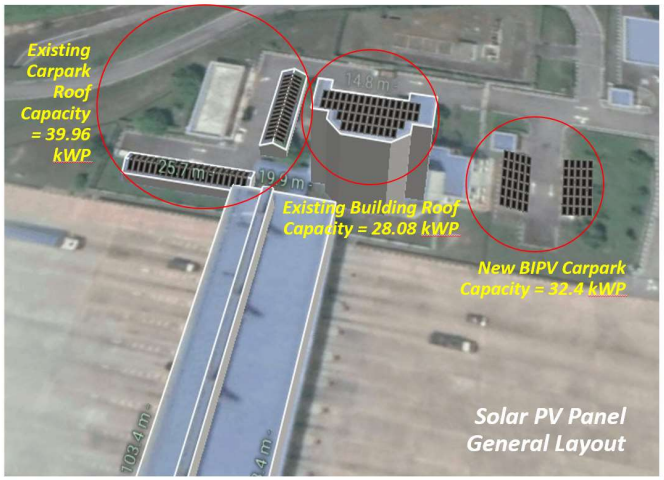
SURAU & REST AREA

SAMPLE SIMULATION FOR AN INFRASTRUCTURE PROJECT

Technical Assessment on Proposed Installation of Solar Photovoltaic System

Proposed Solar PV Layout

- Capacity Limit based on 60% of the Fuse Rating (Subject to verification with the NEM NOVA Guidelines to be issued by SEDA): 530 kWac / 795 kWp (1.5 DC : AC)
- Proposed capacity based on usable area availability: **100.44 kWp**



Solar PPA Model & Savings

TNB Tariff Category	TNB Tariff Rate	Discount/Savings from TNB Total Cost of Electricity	Fixed Solar PPA Rate (21 yrs)
B Commercial	RM0.509/kWh	Minimum 14.71%	RM0.4580/kWh

System Eff Degradation	Year	TNB Tariff Average Increase Rate	Current TNB Tariff B Rate (RM/kWh) [A]	Current ICPT Charges (RM/kWh) [B]	Current KWTBB (RM/kWh) [C]	Effective TNB Tariff Rate (RM) [A]+[B]+[C]=[D]	Proposed PPA Tariff Rate [E]	Saving Rate/kWh [A] + [B] + [C] - [E] = [F]	Discount rate per Unit of Electricity (% per kWh) [F / D]	kWh Generation from Solar PV System (Based on simulation) [G]	Yearly Savings [F] * [G] = [H]	Accumulative Savings over 25 years
	0		0.509	0.0200	0.008	0.537	0.4580	0.079	14.71%			
1.000	1	0%	0.509	0.0200	0.008	0.537	0.4580	0.079	14.71%	149,034	RM 11,773.69	RM 11,773.69
0.980	2	0%	0.509	0.0200	0.008	0.537	0.4580	0.079	14.71%	146,053	RM 11,538.21	RM 23,311.90
0.975	3	0%	0.509	0.0200	0.008	0.537	0.4580	0.079	14.71%	145,234	RM 11,473.46	RM 34,785.36
0.969	4	0%	0.509	0.0200	0.008	0.537	0.4580	0.079	14.71%	144,414	RM 11,408.70	RM 46,194.06
0.964	5	10%	0.560	0.0200	0.009	0.589	0.4580	0.131	22.23%	143,594	RM 18,796.49	RM 64,990.55
0.958	6	0%	0.560	0.0200	0.009	0.589	0.4580	0.131	22.23%	142,775	RM 18,689.19	RM 83,679.74
0.953	7	0%	0.560	0.0200	0.009	0.589	0.4580	0.131	22.23%	141,955	RM 18,581.89	RM 102,261.63
0.947	8	0%	0.560	0.0200	0.009	0.589	0.4580	0.131	22.23%	141,135	RM 18,474.60	RM 120,736.23
0.942	9	0%	0.560	0.0200	0.009	0.589	0.4580	0.131	22.23%	140,316	RM 18,367.30	RM 139,103.53
0.936	10	10%	0.616	0.0200	0.010	0.646	0.4580	0.188	29.09%	139,496	RM 26,209.87	RM 165,313.40
0.931	11	0%	0.616	0.0200	0.010	0.646	0.4580	0.188	29.09%	138,676	RM 26,055.86	RM 191,369.26
0.925	12	0%	0.616	0.0200	0.010	0.646	0.4580	0.188	29.09%	137,856	RM 25,901.85	RM 217,271.11
0.920	13	0%	0.616	0.0200	0.010	0.646	0.4580	0.188	29.09%	137,037	RM 25,747.84	RM 243,018.94
0.914	14	0%	0.616	0.0200	0.010	0.646	0.4580	0.188	29.09%	136,217	RM 25,593.83	RM 268,612.77
0.909	15	10%	0.677	0.0200	0.011	0.708	0.4580	0.250	35.35%	135,397	RM 33,914.20	RM 302,526.97
0.903	16	0%	0.677	0.0200	0.011	0.708	0.4580	0.250	35.35%	134,578	RM 33,708.89	RM 336,235.86
0.898	17	0%	0.677	0.0200	0.011	0.708	0.4580	0.250	35.35%	133,758	RM 33,503.57	RM 369,739.44
0.892	18	0%	0.677	0.0200	0.011	0.708	0.4580	0.250	35.35%	132,938	RM 33,298.26	RM 403,037.70
0.887	19	0%	0.677	0.0200	0.011	0.708	0.4580	0.250	35.35%	132,119	RM 33,092.95	RM 436,130.64
0.881	20	10%	0.745	0.0200	0.012	0.777	0.4580	0.319	41.07%	131,299	RM 41,914.16	RM 478,044.80
0.876	21	0%	0.745	0.0200	0.012	0.777	0.4580	0.319	41.07%	130,479	RM 41,652.49	RM 519,697.29
0.870	22	0%	0.745	0.0200	0.012	0.777	0.0000	0.777	100.00%	129,660	RM 100,774.91	RM 620,472.20
0.865	23	0%	0.745	0.0200	0.012	0.777	0.0000	0.777	100.00%	128,840	RM 100,137.83	RM 720,610.03
0.859	24	0%	0.745	0.0200	0.012	0.777	0.0000	0.777	100.00%	128,020	RM 99,500.75	RM 820,110.78
0.854												

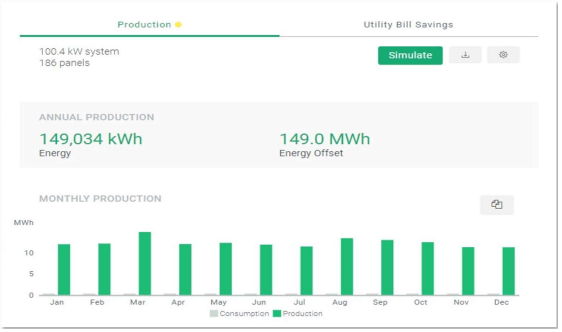
12 Months' Electricity Usage

LEBUHRAYA KAJANG-SEREMBAN, SDN BHD

Tariff B – Low Voltage Commercial Tariff

No	Month	For All kWh / Month	RM/Month	2% Diskaun Rangsangan Ekonomi	ICPT RM/kWh	KWTBB %	Total TNB Bill RM/Month
1	Jan-20	42,774.00	21,757.17	0.00	0.0200	1.6%	22,960.76
2	Feb-20	38,718.00	19,692.66	0.00	0.0200	1.6%	20,782.10
3	Mar-20	41,988.00	21,357.09	0.00	0.0200	1.6%	22,538.57
4	Apr-20	35,295.00	17,950.36	0.02	0.0200	1.6%	18,564.37
5	May-20	37,095.00	18,866.56	0.02	0.0200	1.6%	19,511.88
6	Jun-20	40,555.00	20,627.70	0.02	0.0200	1.6%	21,333.20
7	Jul-20	41,980.00	21,353.02	0.02	0.0000	1.6%	21,260.77
8	Aug-20	40,376.00	20,536.58	0.02	0.0000	1.6%	20,447.87
9	Sep-20	41,672.00	21,196.25	0.02	0.0000	1.6%	21,104.68
10	Oct-20	39,734.00	20,209.81	0.00	0.0000	1.6%	20,533.16
11	Nov-20	35,691.00	18,151.92	0.00	0.0000	1.6%	18,442.35
12	Dec-20	35,872.00	18,244.05	0.00	0.0000	1.6%	18,535.95
Total		471,750 kWh	RM 239,943.15				RM 246,015.66
Average		39,313 kWh/Month	RM 19,995.26				RM 20,501.31
Capacity Limit based on breaker sizing 1500A							530 kWac / 795 kWp
Proposed Capacity kWp (due to Energy Consumption) - Prelim assessment							340.00 kWp
Proposed Capacity kWp Based on usable area at Site.							100.44 kWp

Solar Energy Production



Summary of Proposed Solar PV System & Savings Analysis

SOLAR PV SYSTEM PERFORMANCE (TECHNICAL)	Proposed Solar PV System Capacity	**100.44 kWp**
	Annual (1st Year) Energy Generation from Solar PV System (Based on Simulation)	149,034.00 kWh
LEKAS CURRENT TNB BILL INFO	**12 Months Electricity Consumption (kWh)**	471,750.00 kWh
	12 Months TNB Electricity Bill (RM)	RM246,015.66
COMMERCIAL OFFER TO LEKAS	Project Investment	**Zero CAPEX / Zero O&M** for Solar PV System
		21 Years Power Purchase Agreement (PPA)
	Tariff Rate (RM)	RM 0.458 /kWh
SOLAR PV SYSTEM PERFORMANCE (SAVINGS)	Estimated Average Annual Savings from Solar Power Generation over 25 years (RM/Year)	RM37,143.24
	Estimated Accumulative Saving	RM928,580.97 (over 25 years)
SOLAR SAVINGS TO LEKAS	Ratio of Solar Generation vs. TNB Consumption (Total Electricity Consumption)	31.59%

CASE STUDY



Hasilwan's Roles:

- As a developer / investor partnership together with the Highway Concessionaire, advising on technical, commercial, regulatory compliance & legal structuring
- Take the lead on all technical scope (Due Diligence, Design, EPCC, O&M etc.) for the development of the 1,373.68kWp Solar PV systems
- Appointed as the EPCC and O&M contractor for the project
- To obtain the necessary regulatory licenses and/or approvals required (i.e. SEDA, ST (Licensing), ST (Safety), TNB (SARE), TNB DN(RE), TNB Metering, TNB Retail, etc.) for the development of the Solar PV Plant

CASE STUDY

Achievements:

- First successful solar project to secure NEM Quota for a Highway Infrastructure project within 5 months
- Successfully designed, built & commissioned the Solar PV Systems without major highway operations disruptions with traffic management planning
- Successfully secured approval from SEDA for NEM Ground Mounted system
- Successfully secured approval from Energy Commission on competent personnel requirement providing operational cost savings to asset owner

The Future Grid

The Future Grid will be More Green to Take on Challenges in Creating a Net-Zero Carbon & Sustainable World

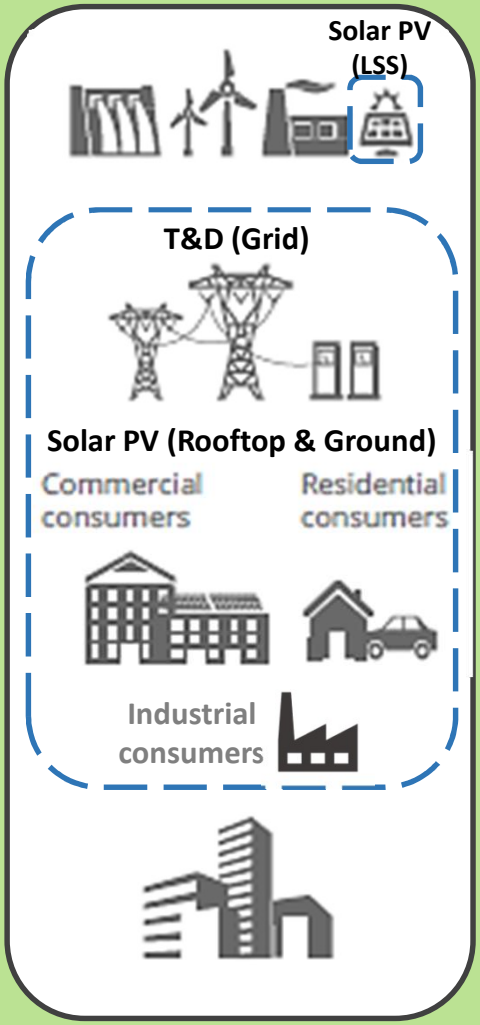
Generation

Transmission & Distribution

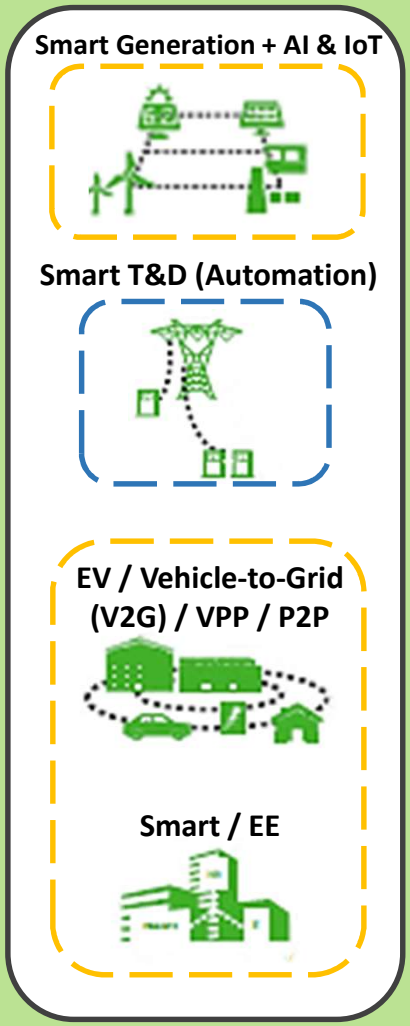
Customer Management

Corporate Services

Today



Tomorrow



3D's for the Grid

Decentralized

- On-site Generation
- Making electricity consumers active elements of the system

Decarbonized

- Critical to long-term carbon goals
- More renewable penetration & electrification of transportation

Digitized

- Smart Transmission & Distribution
- Real-time automated communication & operation of the system

Exciting Future Ahead

Technical Trends

01 Proliferation of Solar Energy + Energy Storage

↕

Drop in Solar PV & Energy Storage Prices

02 Combined Solution of Energy Efficient (EE) Technology & Renewable Energy (RE) Adoption

Government Policies, Incentives & Opportunities

- Electric Vehicle Policies: EVs' 100% road tax exemption, individual tax relief for for EV charging facilities for 2022- 2023
- Decentralization & Market Liberalization of Malaysian Electricity Supply Industry (MESI) – Open trade of electricity between Prosumers & Consumers
- TNB Plans RM22B Investment for 'Grid of the Future'
- Bursa Malaysia – Sustainability Reporting mandatory for all listed companies
- Malaysia's RE Roadmap – 31% RE Capacity by 2025 and 40% by 2035
- Kuala Lumpur Climate Action Plan 2050 – KL's 30% RE rule for new buildings creates solutions to meet requirements

Source: https://www.greentechmedia.com/articles/read/solar-pv-has-become-cheaper-and-better-in-the-2010s-now-what
Source: https://www.iasplus.com/en/publications/us/industry-spotlight/pu/risk-management
Source: https://voiceofasean.com/business/economy/driving-esg-in-corporate-malaysia/
Source: https://www.legal500.com/developments/thought-leadership/legal-updates-on-the-solar-energy-industry-in-malaysia-2/
Source: https://www.theedgemarkets.com/article/putrajaya-kicks-renewable-energy-roadmap-achieve-40-re-capacity-2035

Q & A

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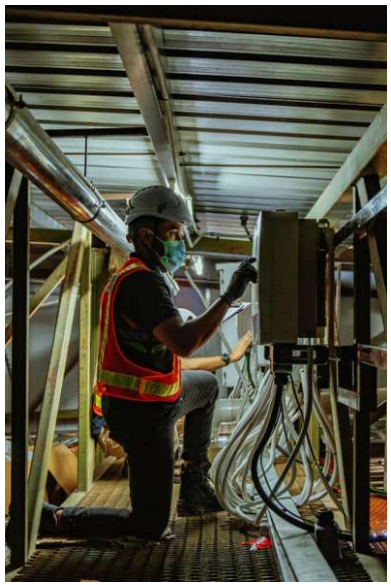

HASILWAN
Powering Technological Solutions

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