

**MALAYSIA
LOW CARBON
CITIES**



DEEP DIVE SESSION 1

Sectoral Strategies for Transitioning to Low Carbon Cities

SUSTAINABLE ENERGY (ENERGY EFFICIENCY & RENEWABLE ENERGY)

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Chief Executive Officer



NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP) 2016-2025

52,233 GWH (8.0%) savings

CO₂ reduction :37,702 ktCO_{2eq}



NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP) 2016-2025

NEEAP GUIDING PRINCIPLES

Sustainable Development	Efficient Use of Energy	Increase Competitiveness and Welfare	Concerted Participation
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NEEAP STRATEGIC THRUSTS

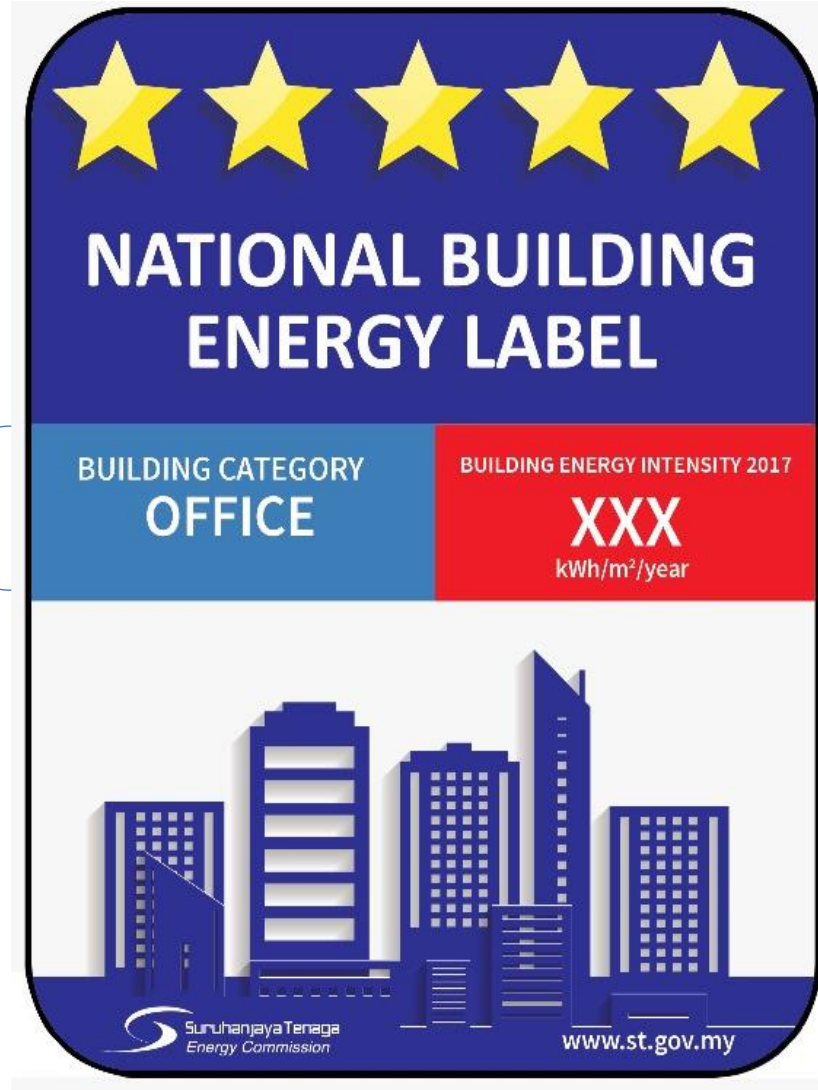
Strategic Thrust 1 : Implementation of Energy Efficiency Plan	Strategic Thrust 2 : Strengthen Institutional Framework, Capacity Development and Training for Implementation of EE Initiatives	Strategic Thrust 3 : Establishment of Sustainable Funding Mechanisms To Implement Energy Efficiency Initiatives	Strategic Thrust 4 : Promotion of Private Sector Investment in Energy Efficiency Initiatives
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NEEAP KEY INITIATIVES

Equipment Program Initiative	Industrial Program Initiative	Buildings Program Initiative
<ol style="list-style-type: none"> Promotion of 5-Star Rated Appliances Minimum Energy Performance Standards (MEPS) 	<ol style="list-style-type: none"> Energy Audits and Energy Management in Industries Promotion of Co-generation 	<ol style="list-style-type: none"> Energy Audits and Energy Management in Buildings Energy Efficient Building Design

BUILDING ENERGY LABEL (BEI LABEL)

Building Category:
Office/Hospital/University/School & others

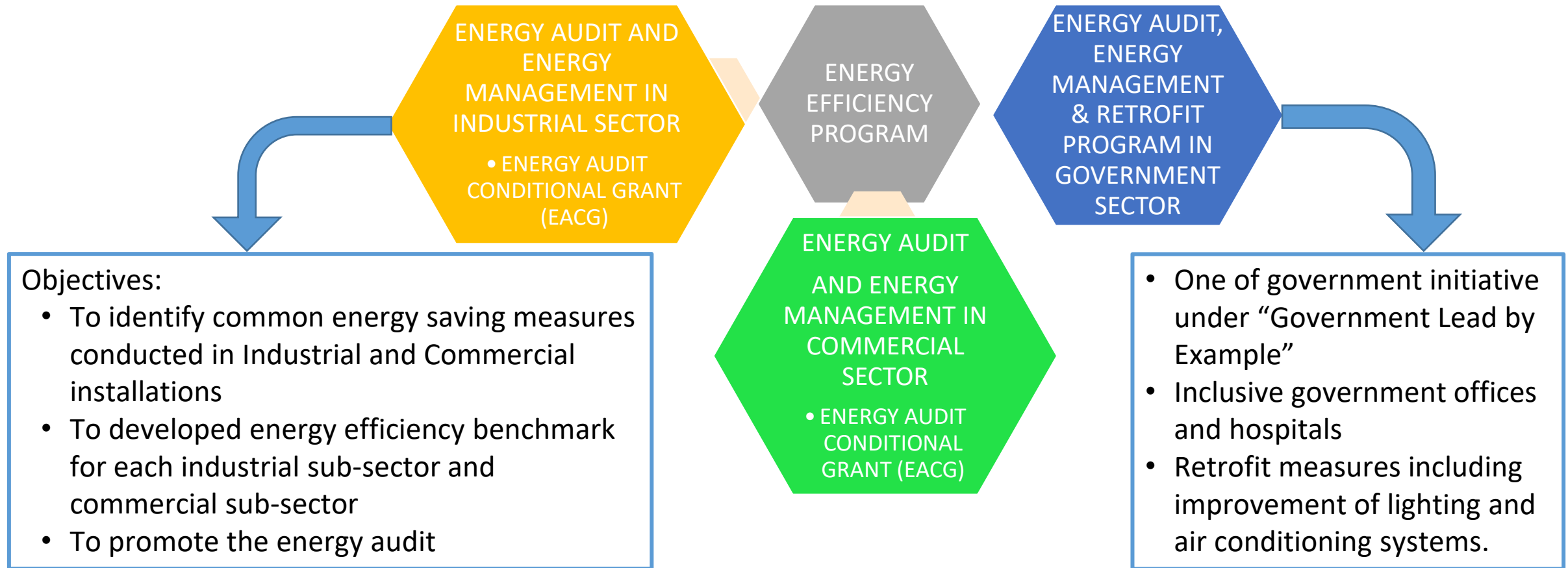


Star rating:
1 star: Not efficient
5 star: Most efficient

Building energy performance
Unit: kWh/m²/year

STAR RATING	BEI RANGE VALUE
5-Star	BEI ≤ 100
4-Star	100 < BEI ≤ 130
3-Star	130 < BEI ≤ 160
2-Star	160 < BEI ≤ 250
1-Star	BEI > 250

ENERGY EFFICIENCY PROGRAM UNDER THE RMK-11 (2016-2020)



EFFICIENT MANAGEMENT OF ELECTRICAL ENERGY REGULATIONS (EMEER) 2008

Subjected to:-

Any installation consume electricity equal or exceeding **3,000,000 kWh** in **6 consecutive months**

1. To manage the electricity consumption
2. Total annual consumption about 40TWh annually
3. About 25,000 installations under Industry and about 1500 installations subjected to EMEER 2008 and consuming about 80% of total industry consumption.
4. About 1.5 millions installations under Commercial and about 500 installations subjected to EMEER 2008.

Duties and Responsibilities of Installations



To appoint a Registered Electrical Energy Manager ;



To submit a written confirmation of the appointment;



To submit information of affected installation

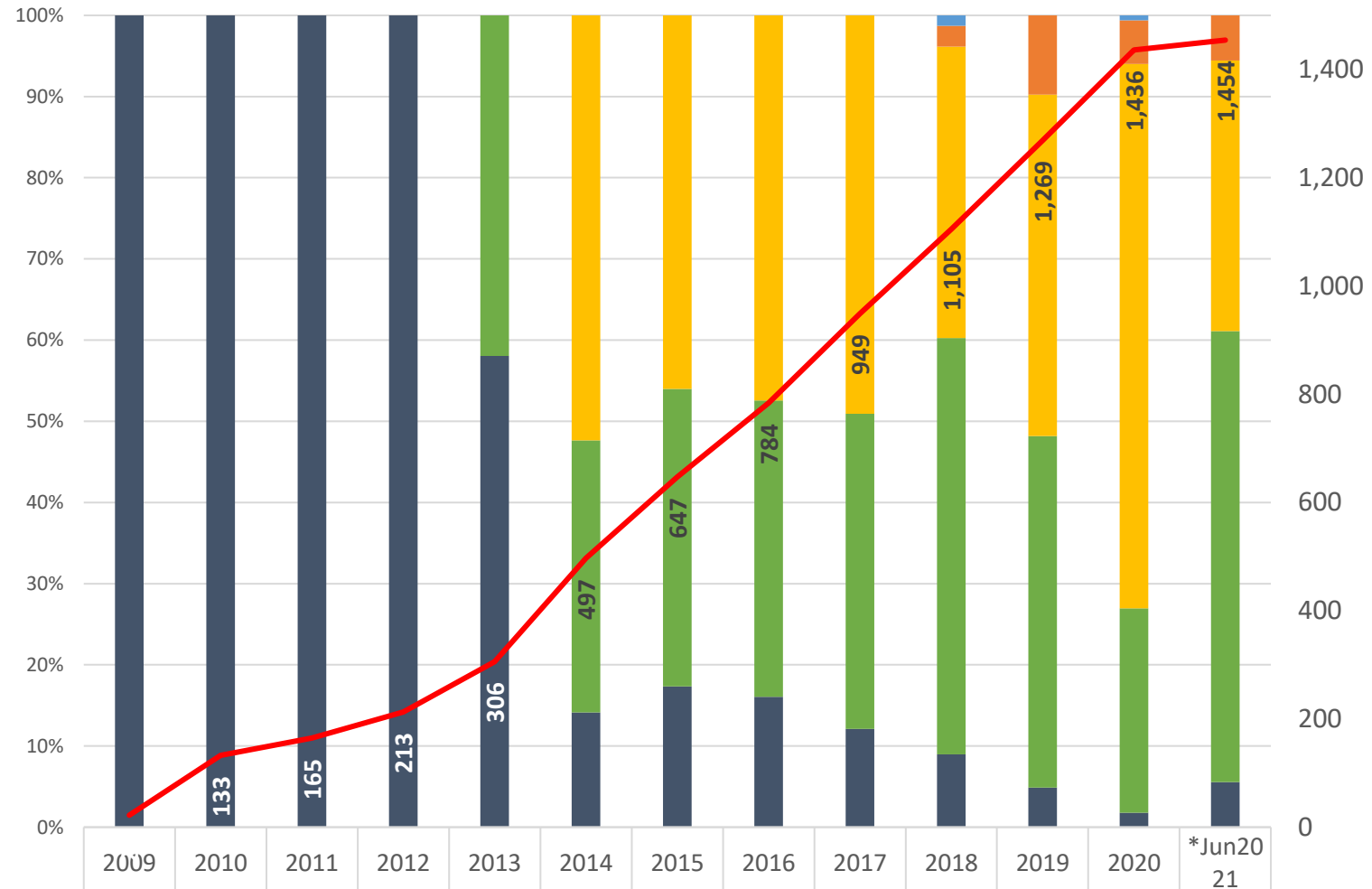
- Policy of EMEE
- Objectives of EMEE
- The Accounts & Document pertaining to EMEE



To submit reports

NUMBER OF REGISTERED ELECTRICAL ENERGY MANAGER (REEM)

Total REEM By Year



UTM	0	0	0	0	0	0	0	0	0	2	0	1	0
EACG	0	0	0	0	0	0	0	0	0	4	16	9	1
MAESCO	0	0	0	0	0	100	69	65	81	56	69	112	6
AEMAS	0	0	0	0	39	64	55	50	64	80	71	42	10
INTERVIEW	22	111	32	48	54	27	26	22	20	14	8	3	1
TOTAL	22	111	32	48	93	191	150	137	165	156	164	167	18
CUMULATIVE	22	133	165	213	306	497	647	784	949	1,105	1,269	1,436	1,454

MINIMUM ENERGY PERFORMANCE STANDARD

Govern by Electricity Regulation 1994 gazetted on 3rd May 2013



Energy rating: 1 to 5-Star

Appliance type

Appliance energy rating
(Equals the number in the energy rating)

Information on the brand and model

Energy consumption
(In kWh/year)

Energy savings compared to the lowest 2-Star rated product
(In percentage)

Testing standards used



Air Conditioner

- Type :Non-ducted Single Split Wall Mounted
- Capacity \leq 25,000 btu/hr

Fan

- Ceiling Fan with diameter less than 60 inch
- Wall fan, desk fan, table fan with diameter less than 16inch

Refrigerator

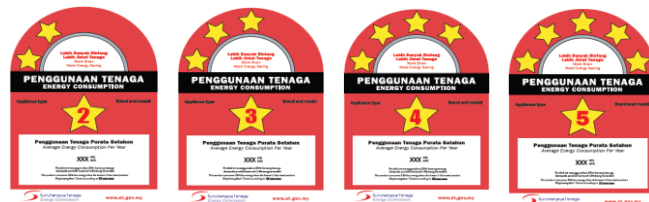
- 1-door & 2-door only

Television

- Type :LCD, PLASMA, LED, CRT
- Screen size up to or equal to 70 inch

Lamp

- T5 & T8 Fluorescent Lamp
- Self ballasted single capped CFL
- Single Capped Fluorescent Lamp & Circular Fluorescent Lamp
- Self ballasted LED Lamp



MEPS minimum requirement is 2-Star

More Stars More Efficient

MINIMUM ENERGY PERFORMANCE STANDARD

MEPS ACHIEVEMENT(2013-2017)

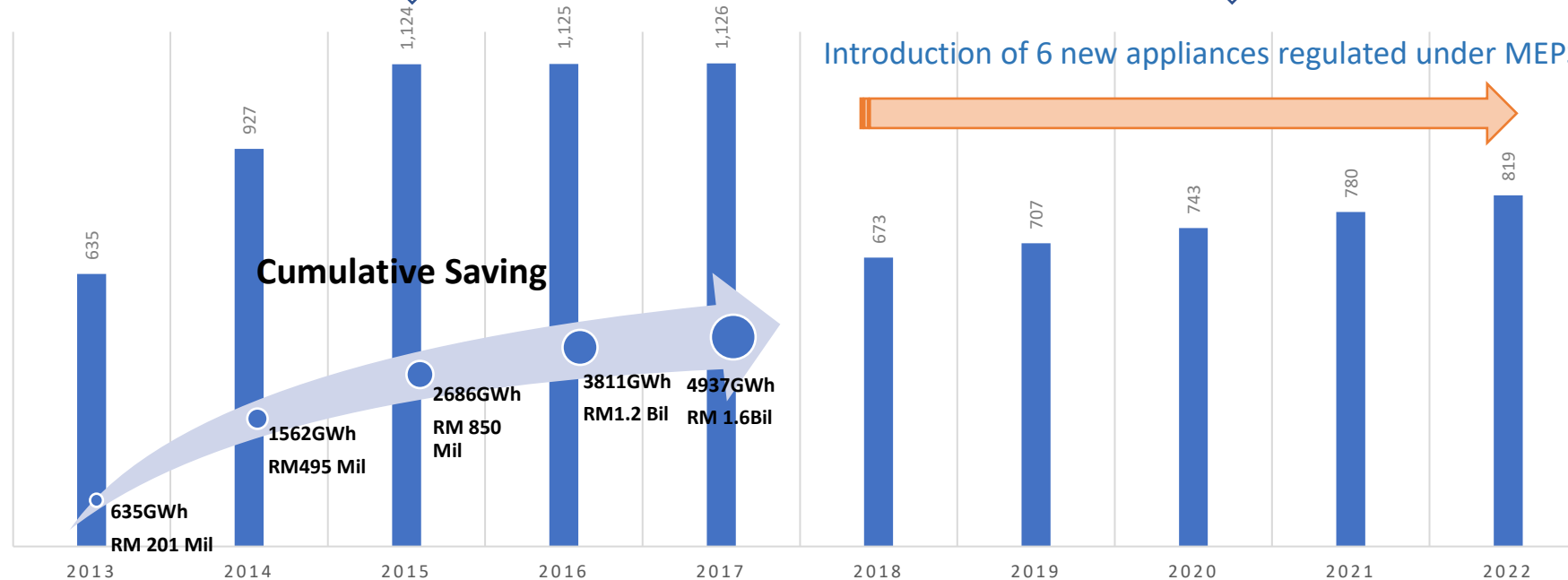
Cumulative Savings 2013-2017 shall be 4937 GWh equivalent to 1.6 Billion

WAY FORWARD (2018-2022)

Cumulative Savings 2013-2022 expected to be 8,659 GWh equivalent to 2.7 Billion



ESTIMATED SAVING (GWH)



- Washing Machine
- Rice Cooker
- Electric Freezer
- Microwave
- Cloth Dryer
- Oven

The calculation of saving is calculated with baseline of Lowest of 2-Star appliances. This baseline is determined with an assumption that if Malaysia did not adopt MEPS, then all the appliances that will be in the market are 2-Star rated product.

In June 2018, there will be a revision on testing method for refrigerator and calculation method for air conditioner. Thus, the saving calculation method will be revised and the baseline will change. Thus, the saving value is expected to decrease. From 2018, saving expected to increase 5% every year due to introduction of new appliances.

SUSTAINABILITY ACHIEVED VIA ENERGY 2.0 (SAVE) EFFICIENCY PROGRAM



The SAVE 2.0 program is an e-Rebate program of RM200 for the purchase of energy efficient air conditioners or refrigerators with 4- & 5-stars ST energy efficient labeled



Type of Domestic Appliances		Aircond (split unit, wall mounted)	Refrigerator
2021	Target	~ 140,000 isi rumah	
	E- Rebate per unit	RM200	
	Allocation	RM30 juta	
	Estimated Saving per year	52.67 GWj	RM20.78 juta
		35,553 tonne CO ₂	

SUMMARY

NEEAP 2016 - 2025

BEI LABEL

EACG

EMEER 2008

MEPS 2013

The Policy, Regulation and Initiatives mentioned are implemented with aim to **REDUCE ENERGY CONSUMPTION** as well as **CARBON FOOTPRINT**

WAY FORWARD FOR ENERGY EFFICIENCY (EE) IN MALAYSIA

FUNDING MECHANISM

Establish effective and sustainable funding mechanism for EE projects

CAPACITY

To improve the resources in EE such as expert energy auditor and M&V

ENFORCEMENT

Intensify enforcement of EE legislation



POLICY & LEGAL FRAMEWORK

Strengthen and streamline policy as well as legal and institutional framework – Enactment of new Energy Efficiency and Conservation Act (Electrical and Thermal)

AWARENESS

Foster EE culture among industry stakeholders and the public

MONITORING (SMART BUILDING)

Improve monitoring system, data collection and management, periodic energy audit and analysis on saving potential (smart meter and smart grid)

NATIONAL ENERGY AWARDS (NEA) & ASEAN ENERGY AWARDS (AEA)



LARGE SCALE SOLAR PHOTOVOLTAIC PLANT, NET ENERGY METERING & SELF-CONSUMPTION



ENERGY POLICIES ON RE



COP21 • CMP11
PARIS 2015
UN CLIMATE CHANGE CONFERENCE

COP 21:
To reduce Malaysia's Greenhouse Gas intensity of GDP by 45% by 2030 relative to the emissions intensity of GDP in 2005

National Petroleum Policy (1975)

Efficient utilization of petroleum resources

Ensuring the nation exercises majority control in the management and operation of the industry

National Energy Policy (1979)

Supply Objective:
Ensure adequate, secure & cost-effective energy supply

Utilization Objective:
Promote efficient utilization of energy and eliminate wasteful and non-productive usage

Environmental Objective :
Minimize negative impacts to the environment

National Depletion Policy (1980)

To prolong the life span of the nation's oil and gas reserves

Four-fuel Policy (1981)

Aimed at ensuring reliability and security of supply through diversification of fuel (oil, gas, hydro and coal)

Five-fuel Policy (2001)

Encourage the utilization of renewable resources such as biomass, solar, mini hydro etc

Efficient utilization of energy

National RE Policy and Action Plan (2010)

To prolong the life span of the nation's oil and gas reserves

11 perkara yang patut anda tahu mengenai

RANCANGAN MALAYSIA KESEBELAS

2016-2020

PERTUMBUHAN BERPAKSIKAN RAKYAT

Kita akan membangun secara mampan 10

Model pembangunan konvensional "grow first, clean up later" merupakan model pembangunan yang tidak mampan. Pertumbuhan hijau akan memastikan impak yang minimum terhadap alam sekitar dan pemuliharaan sumber asli. Kita akan membuat perubahan ketara kepada penentuan dasar, pengawalseliaan institusi, perkongsian tanggungjawab dan penilaian masyarakat ke atas alam sekitar.

Gaya hidup hijau: Kita akan mengubah gaya hidup supaya lebih cekap tenaga. Isi rumah dan industri akan digalakkan untuk mengurangkan penggunaan tenaga pada waktu puncak melalui amalan permintaan pengurusan tenaga, seperti pelabelan tenaga. Rakyat akan mempunyai banyak pilihan pengangkutan awam yang lebih baik, selaras dengan peralihan kepada kenderaan cekap tenaga. Peralihan tenaga boleh baharu dalam campuran tenaga akan ditingkatkan.

Reduce, reuse, and recycle (3R): Kita akan melihat sisa sebagai sumber yang bermilai. Isi rumah akan digalakkan untuk mengasingkan sisa bagi mencapai sasaran 22% kadar kitar semula menjelang tahun 2020, manakala sektor swasta akan digalakkan untuk menggunakan sisa sebagai input untuk penakeran tenaga atau produk lain.

Pembelajaran hijau: Kita akan memupuk perkongsian tanggungjawab melalui pendidikan untuk memelihara alam sekitar. Amalan penggunaan dan pengeluaran mampan akan ditingkatkan dalam kurikulum sekolah untuk menyemai tingkah baik dan minda mesra alam.

RENEWABLE ENERGY PROGRAMME

Feed In Tariff

A program that allows electricity produced from indigenous RE resources to be sold to power utilities at a **fixed premium price and for specific duration**

- ❑ Provides a conducive and secured investment environment
- ❑ Provides incentives to RE producers as it only pays for electricity produced

Large Scale Solar

A program that allows electricity produced from Solar PV to be sold to power utilities at a **fixed price**

- ❑ The procurement of solar power plant is through a competitive bidding process
- ❑ 1000MW target for the duration of 4 years from 2017 – 2020 : LSS1 & LSS 2
- ❑ 500MW target to achieve COD in 2021: LSS 3
- ❑ 1000MW target to achieve COD in 2022 and 2023 : LSS MEnTARI

NEM RAKYAT, NEM GoMEn, NOVA

A program that allows the energy produced from the installed solar PV system to be consumed first and any excess will be exported to the grid

- ❑ Allocation capacity of 500MW by 2020 (one to one)
- ❑ Allocation of 500MW 2021 – 2023

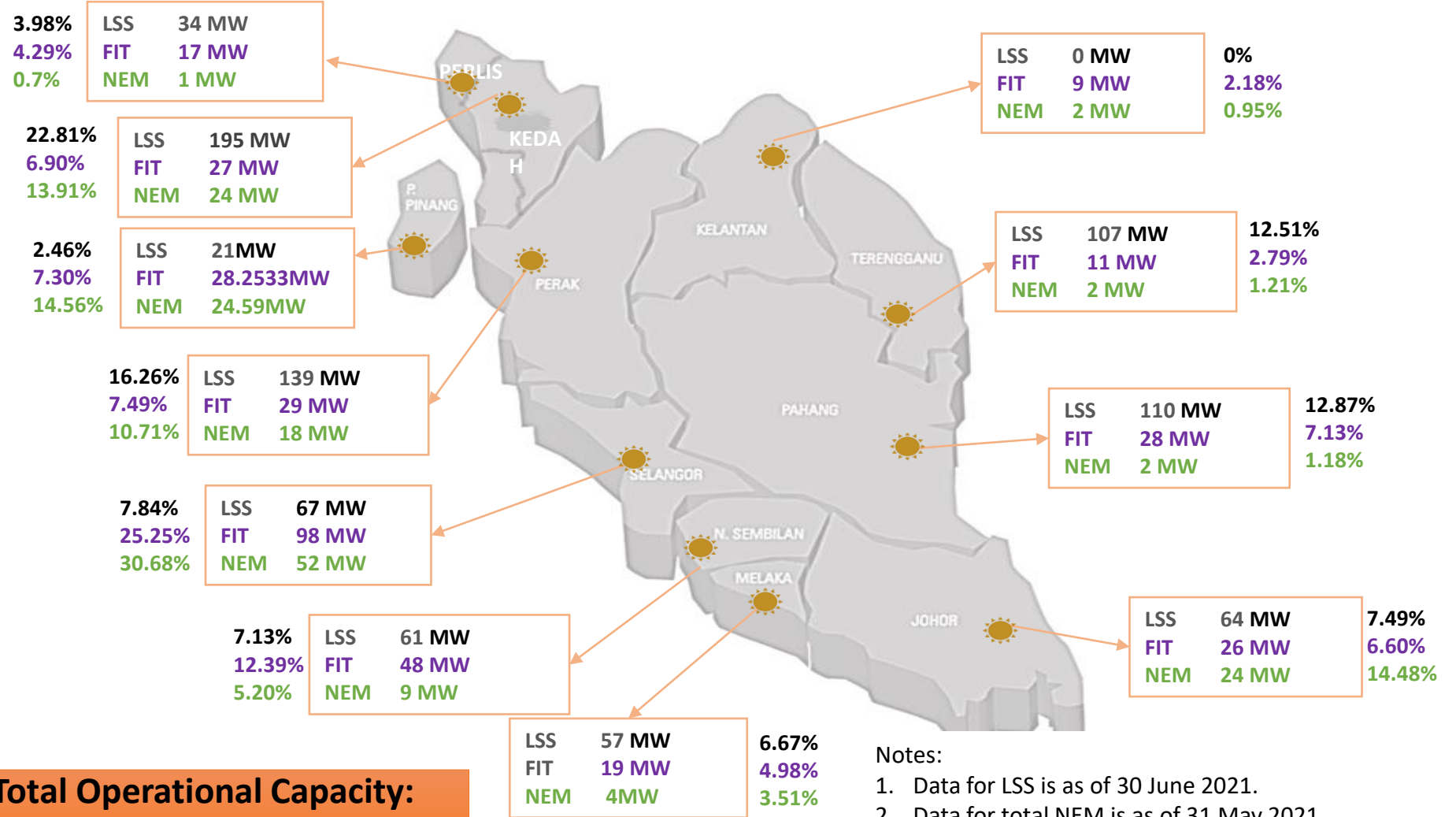
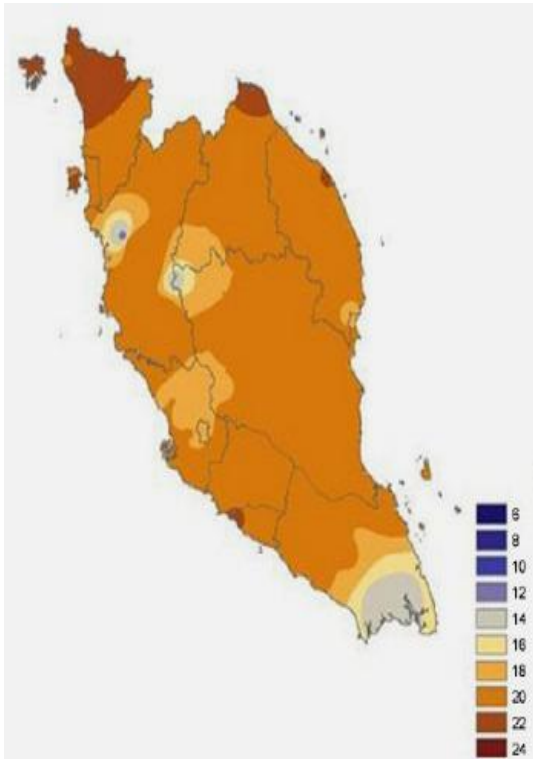
Self Consumpti on

A program that allows the energy produced from the installed solar PV system for self-consumption.

OPERATIONAL SOLAR CAPACITIES IN PENINSULAR MALAYSIA

RULE OF THUMB
 1MW ~ 1.8 to 3.0 acres
 (assumption using 560W panel module)

Solar irradiation

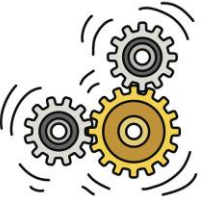


Total Operational Capacity:
LSS 855 MW
FIT 387 MW
NEM 181 MW

Notes:

1. Data for LSS is as of 30 June 2021.
2. Data for total NEM is as of 31 May 2021
3. Data for NEM percentage by states is of 7 April 2021.
4. Data for solar FiT is as of Sept 2020.
5. Percentage is in comparison to the specific programmes' operational capacities.

FEED-IN-TARIFF (FiT) PROGRAMME



MECHANISM

Malaysia's FiT system obliges Distribution Licensees (DLs) to buy from Feed-in Approval Holders (FIAHs) the electricity produced from renewable resources (renewable energy) and sets the **FiT rate**.

The DLs will pay for renewable energy supplied to the electricity grid for a specific duration.

By guaranteeing access to the grid and setting a favourable price per unit of renewable energy, the FiT mechanism would ensure that renewable energy becomes a viable and sound long-term investment for companies industries and also for individuals.

The quota is managed by Sustainable Energy Development Authority (SEDA)



PROCUREMENT MECHANISM

The procurement of FiT Solar Power Plant is through ballot.

Solar FiT was only offered from 2011 – 2018.



RELATED ACT

RENEWABLE ENERGY ACT 2011

An Act to provide for the establishment and implementation of a special tariff system to catalyse the generation of renewable energy and to provide for related matters.

Renewable Energy covered under the RE Act are biomass, biogas, small hydropower & solar photovoltaic

Mini Hydro

Operational
70.30 MW



Biomass

Operational
70.65 MW



Landfill / Biogas

Operational
111.04 MW



Solar

Operational
387.03 MW



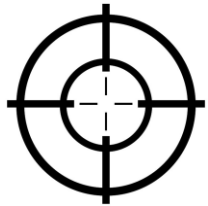
LSS PROGRAMME



IMPLEMENTATION OF LSS AS PART OF ENERGY MIX

Project implementation will be in accordance to Malaysia's Electricity Supply Act 1990 and its related Regulations and Codes. Focus will be on security of supply and reasonable, competitive cost to consumers.

Implementation will be in steps, to manage the addition to the system and the impact to tariff.



COMMISSIONING & CAPACITY TARGET

Cycle	Capacity Awarded	*COD Target Year
LSS 1	371 MW	2017 - 2018
LSS 2	522 MW	2019 - 2020
LSS 3	491 MW	2021
LSSMentari	823 MW	2022 - 2023
Jumlah	**2207 MW	



GUIDELINES

"Guidelines for Large Scale Solar Photovoltaic Plant for Connection to Electricity Network" has been developed as a reference and guidance for the developers.



PROCUREMENT MECHANISME

The procurement of solar power plant is through a competitive bidding process.

Notes:

1. *COD target year is as per specified during bidding
2. **Not included fast track projects. Fast track project 250MW

NEM AND NOVA PROGRAMME

NET ENERGY METERING (NEM)

2016 - 2020

The Government has introduced the Net Energy Metering Scheme in November 2016 with quota allocation of 500 MW up to year 2020 to encourage Malaysia's Renewable Energy (RE) uptake.

The concept of NEM is that the energy produced from the solar PV installation will be consumed first, and any excess will be exported to TNB at "one-on-one" offset basis.

Quota Taken Up	*495MW
Operational	181MW

NEM RAKYAT, NEM GoMEn & NOVA

2021 - 2023

The Government has provided more opportunities to electricity consumers to install solar PV systems on the roofs of their premises to save on their electricity bill.

The new NEM will be in effect from 2021 to 2023 and the total quota allocation is up to 500 MW which will be divided into the three (3) new initiatives/ categories.



GUIDELINES

"Guidelines for Solar Photovoltaic Installation on Net Energy Metering Scheme"

"Guidelines for Solar Photovoltaic Installation under the Programme of NEM Rakyat and NEM GoMEn in Peninsular Malaysia"

"Guidelines for Solar Photovoltaic Installation Under Net Offset Virtual Aggregations (NOVA) Programme for Peninsular Malaysia"

Initiative/Categories	Quota Allocation	Quota Opening Date	Quota Taken Up
NEM Rakyat	100MW	1 Feb 2021 – 31 Dec 2023	8.61MW
NEM GoMEn (Government Ministries and Entities)	100MW	1 Feb 2021 – 31 Dec 2023	3.4MW
NOVA (Net Offset Virtual Aggregation)	300MW	1 April 2021 – 31 Dec 2023	26.46MW

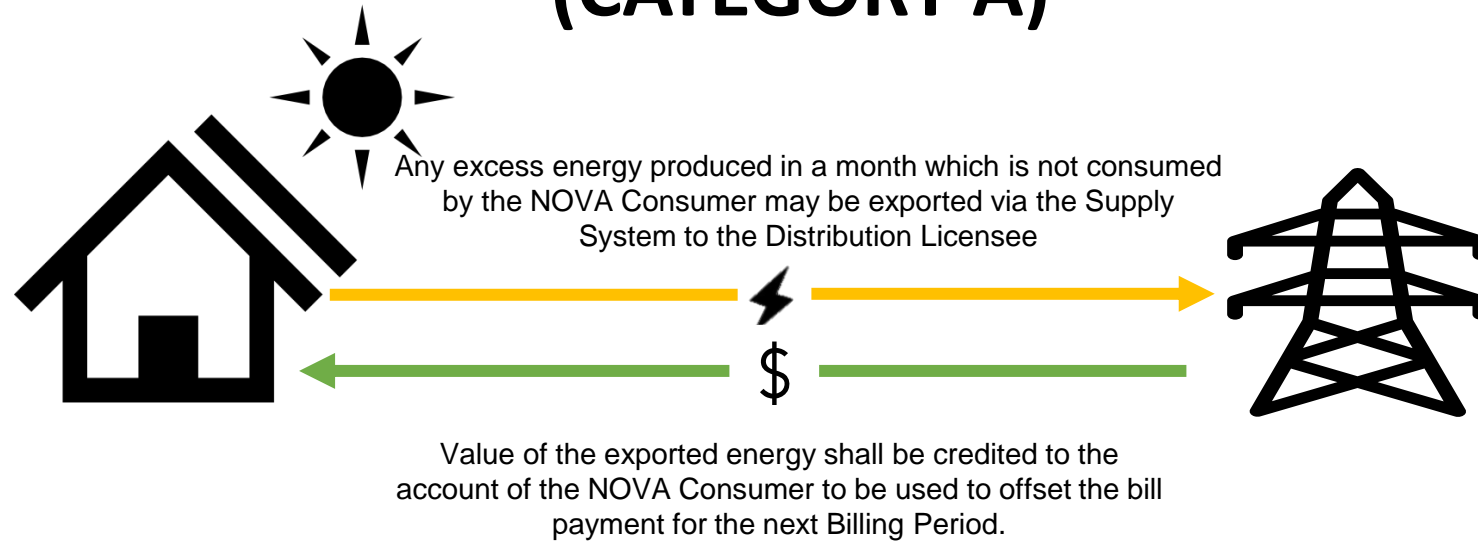
Notes:

- *Cancelled quota has been excluded from grand total figures.
- NEM 2.0 and NEM 3.0 data is as of May 2021

Application of Quota in progress : 230MW

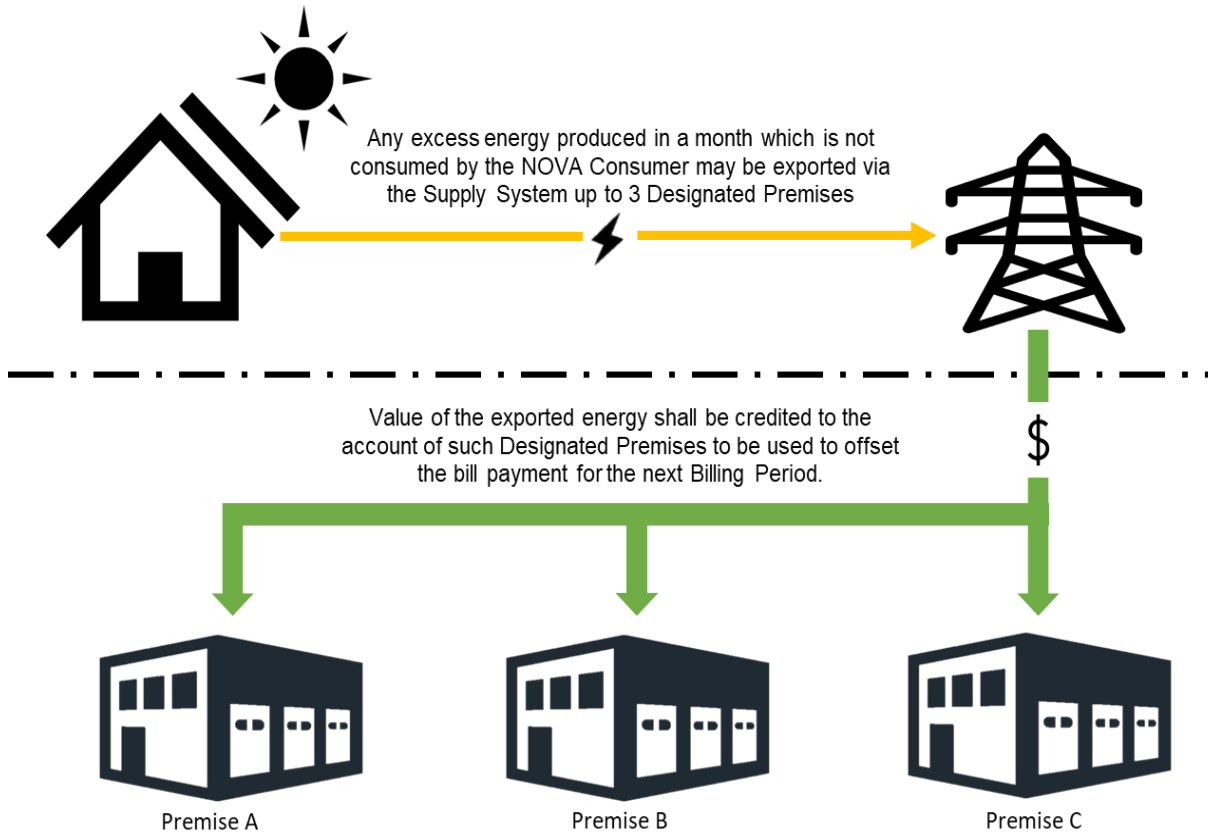


NOVA PROGRAMME (CATEGORY A)



- i. Excess energy may be exported via the Distribution Network to the Distribution Licensee;
- ii. The value of the exported energy shall be credited to the account of the NOVA Consumer to be used to offset the bill payment for the next Billing Period.
- iii. The unit price (RM/kWh) of the energy exported in the Billing Period to the Distribution Network shall be based on the Average SMP.
- iv. Only excess energy exported in the month can be used to offset bill payment for the next Billing Period and any remaining excess energy shall be forfeited.
- v. The value of the credit cannot be used to offset the minimum monthly charge as stated in the tariff schedule.

NOVA PROGRAMME (CATEGORY B)



- i. Any excess energy produced in a month which is not consumed by the NOVA Consumer may be exported via the Distribution Network up to three (3) Designated Premises.
- ii. The value of the exported energy shall be credited to the account of such Designated Premises to be used to offset the bill payment for the next Billing Period.
- iii. The unit price (RM/kWh) of the energy exported in the Billing Period to the Distribution Network shall be based on the Average SMP.
- iv. Only excess energy exported in the month can be used to offset bill payment for the next Billing Period and any remaining quantum shall be forfeited. The value of the credit cannot be used to offset the minimum monthly charge as stated in the tariff schedule.
- v. For the purpose of category B, a Designated Premises of the NOVA Consumer is a premises used or operated by its wholly owned subsidiary company

SELF-CONSUMPTION SOLAR



SELF – CONSUMPTION

Allowed for PV rooftop PV installation encourage Malaysia’s Renewable Energy (RE) uptake.

**Operational :
122MW Tx
Connected**

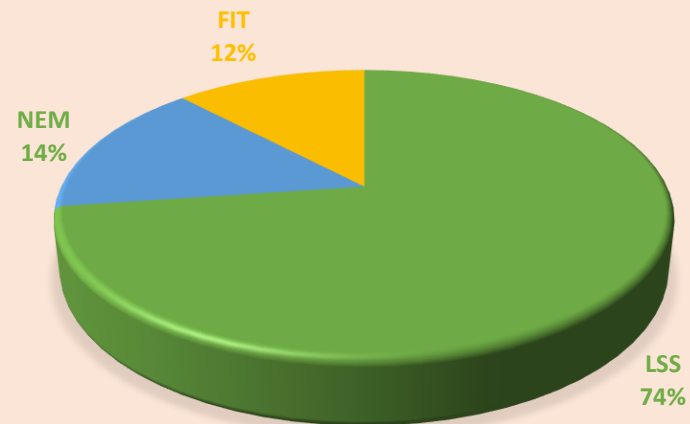


GUIDELINES

“Guideline on the Connection for Solar Photovoltaic Installation for Self-Consumption”

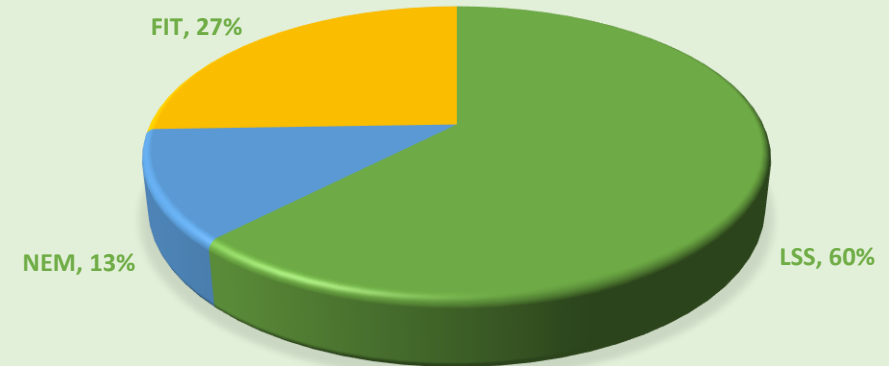
SOLAR IN PENINSULAR & SABAH

COMMITTED SOLAR CAPACITIES BY PROGRAMME



Programmes	Capacity (MW)
LSS	2457
NEM	495
FIT	387

OPERATIONAL SOLAR CAPACITIES BY PROGRAMME



Programmes	Capacity (MW)
LSS	855
NEM	181
FIT	387

CAPACITIES OF SOLAR PROGRAMME

Programme	Category	Capacity Awarded	In Operation
LSS	Solar PV	2,457MW	855MW
NEM	NEM 2016 – 2020	495MW	181MW
	NEM RAKYAT	8.61MW	0.01MW
	NEM GoMEn	3.4MW	0MW
	NOVA	24.46MW	0MW
FiT	Solar PV	387MW	387MW
Other FiT	Biogas, biomass, small hydro	963MW	252MW
Total		3,241MW	1,675.01

Application of Quota in progress for NOVA : 230MW

Notes:

1. Data for FiT included Peninsular Malaysia, Sabah and Labuan.
2. Data for NEM and FiT are based on report from SEDA as of 31 May 2021.
3. Data for LSS is as of 30 June 2021.

THANK YOU