Regional Workshop on Low Carbon Technologies For MSMEs in the ASEAN.

Energy Efficiency, Renewable Energy and Best Practices

By
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MALAYSIA

SIRIM

OUTLINE OF PRESENTATION

- Energy Policy in Malaysia
- Sustainable Energy:
  - Supply Side Management
  - Demand Side Management
- SMEs in Malaysia
- GEF/UNIDO National Projects
- SHIP Plant Demonstration Projects by SIRIM.
- Conclusion.

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 Renewable Energy (RE) Policy + Action Plan (2010)	• To prolong the life span of the nation's oil and gas reserves

Petroleum Development Act 1974

- Vested on PETRONAS the exclusive rights to explore, develop and produce petroleum resources of Malaysia

National Petroleum Policy 1975

- To regulate downstream oil & gas industry via the Petroleum Regulations 1974

National Energy Policy 1979

- To ensure adequacy, security and cost-effectiveness of energy supply
- To promote efficient utilization of energy
- To minimize negative environmental impacts in the energy supply chain

National Depletion Policy 1980

- To prolong lifespan of Malaysia's oil reserves for future security & stability of oil supply

Four-Fuel Diversification Strategy 1981

- To pursue balanced utilization of oil, gas, hydro and coal

Five-Fuel Diversification Strategy 2001

- Renewable Energy included as the "fifth fuel" in energy supply mix

NATIONAL GREEN TECHNOLOGY POLICY

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Launched by the Malaysian Prime Minister on 24 July 2009

Four Pillars of Green Technology Policy

ENERGY

Seek to attain energy independence & promote efficient utilisation

ENVIRONMENT

Conserve and minimise impact on the environment

ECONOMY

Enhance the national economic development through the use of technology

SOCIAL

Improve the quality of life for all

POLICY STATEMENT

GreenTechnology shall be a driver to accelerate the national economy and promote sustainable development

What Is SUSTAINABLE ENERGY ?

"Effectively, the provision of **energy** such that it meets the needs of the present without compromising the ability of future generations to meet their own needs

Two key components of **Sustainable Energy**:
Renewable energy and **Energy** efficiency

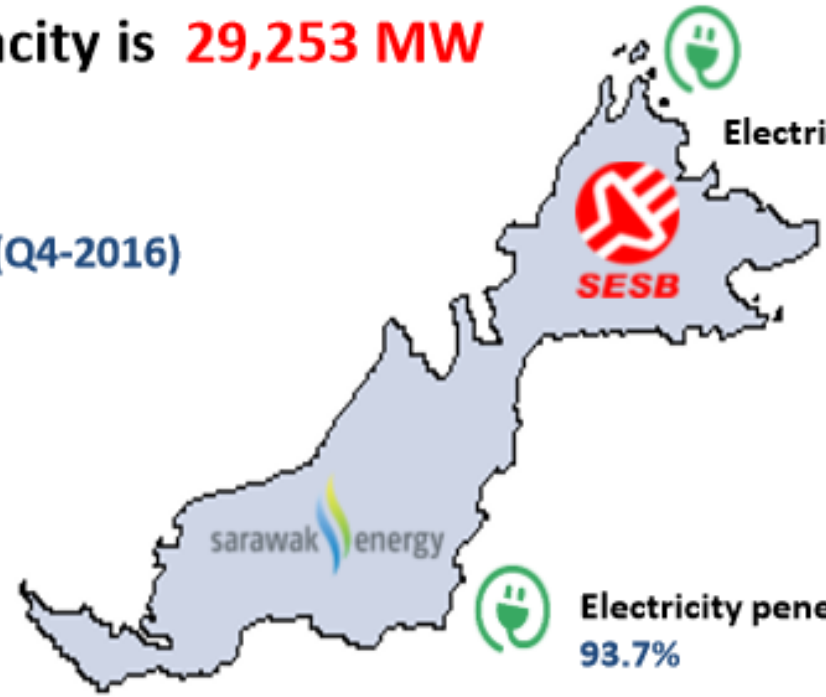
Supply Side Management

As of 2016	INSTALLED CAPACITY (MW)	PEAK DEMAND (MW)	RESERVE MARGIN (%)
Pen. Malaysia	23,249	17,788	28.7%
Sabah	1,567	944.9	37.9%
Sarawak	4,437	3,315	34%

Total installed capacity is 29,253 MW

Electricity penetration: 99.83%

GDP: 4.5% (Q4-2016)

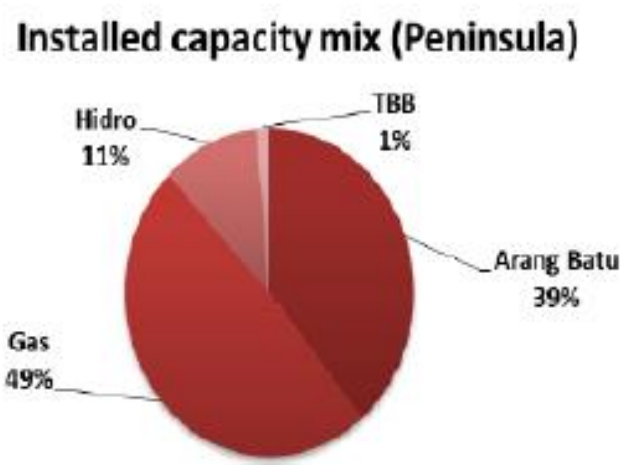


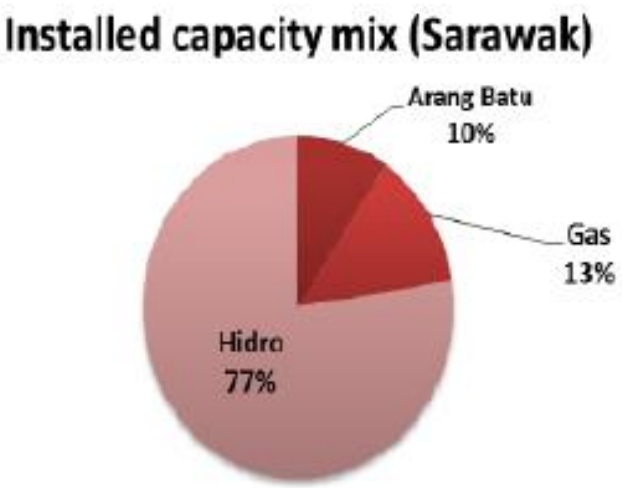
Electricity penetration: 95%

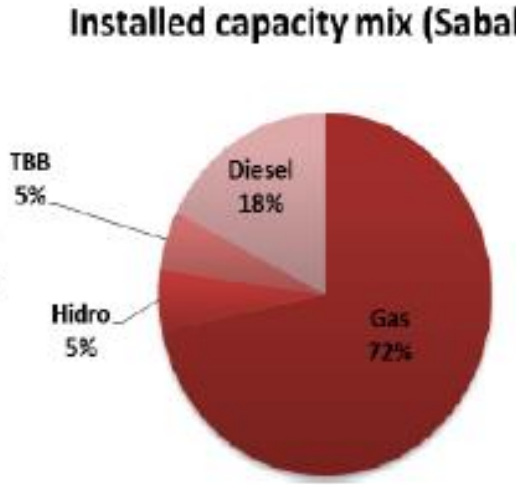
Electricity penetration: 93.7%

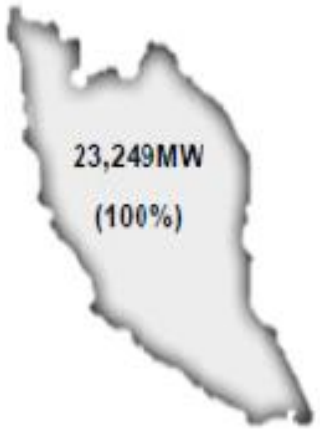
Source: KeTTHA Electricity Info Feb 2017

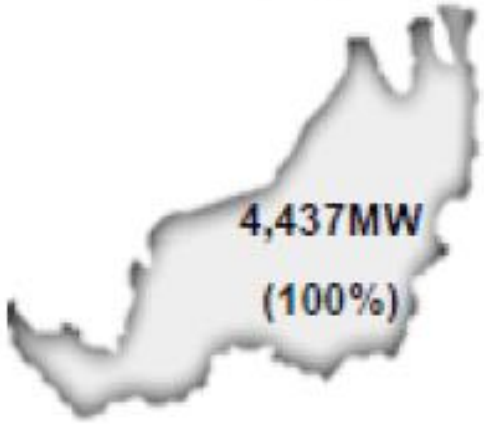
MALAYSIA: POWER MIX

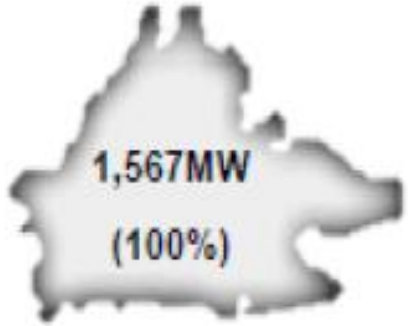












DEVELOPING THE POTENTIAL OF RENEWABLES

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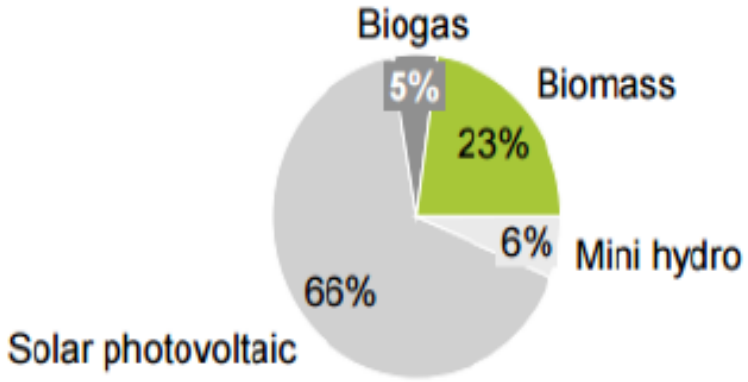
2014

Total Installed Capacity

%

243 MW



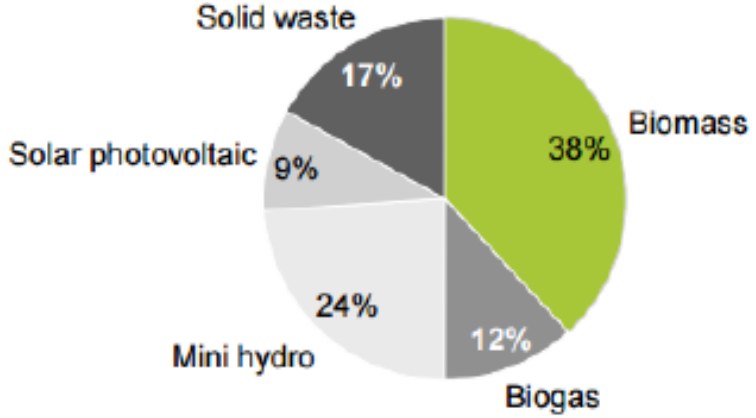
VS

2020

Total Installed Capacity

%

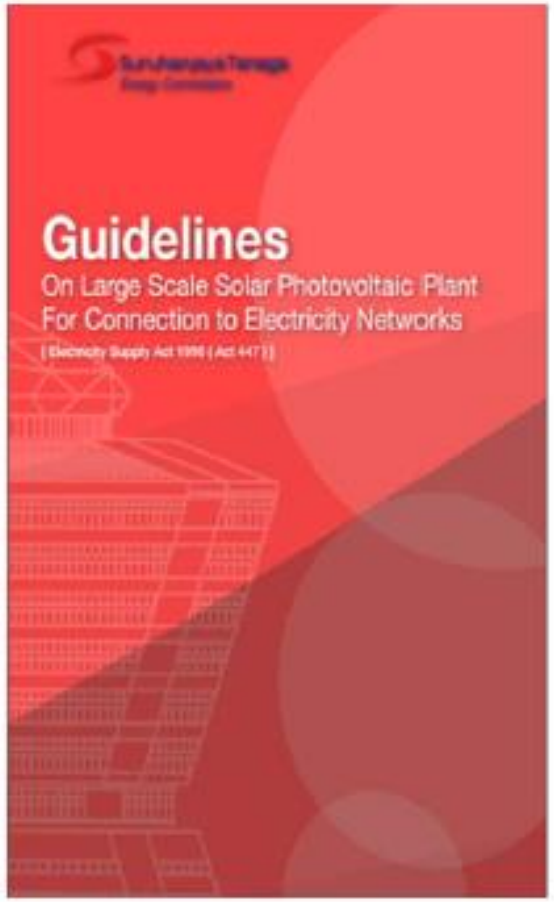
2,080 MW



Enabling Businesses. Enhancing Lives

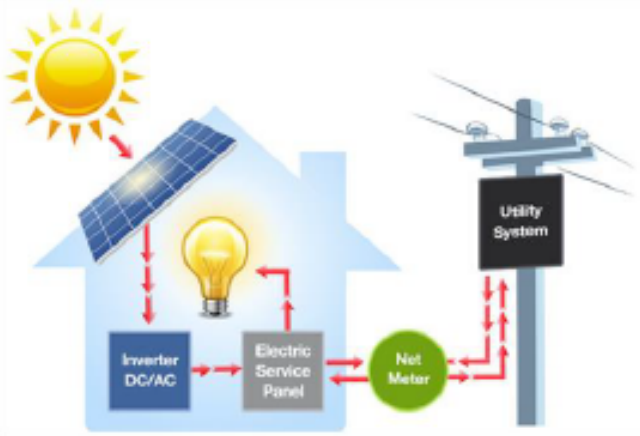
LARGE SCALE SOLAR

- LSS is implemented by the Energy Commission (EC)
- Quota allocation
  - 1000 MW for 2017-2020 (250 MW/year)
    - 800 MW for Peninsular Malaysia
    - 200 MW for Sabah



NET ENERGY METERING

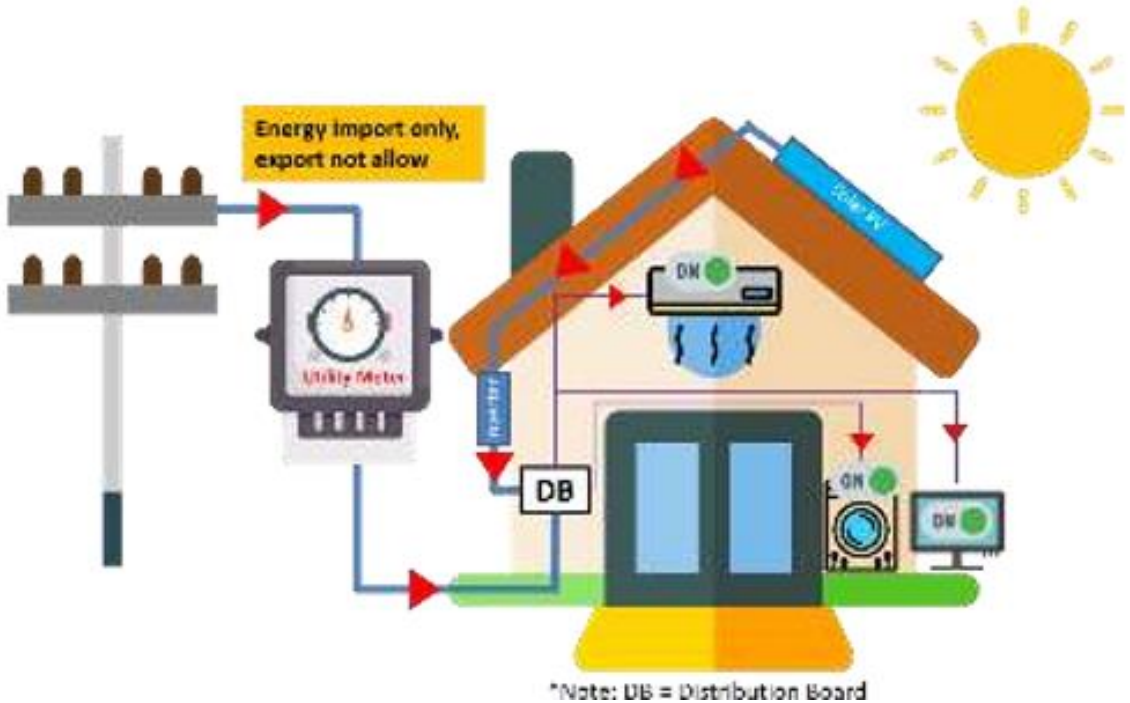
- FiT for Solar PV to cease post 2017 due to limited RE Fund.
- NEM & LSS introduced to continue development of the solar PV market.
  - Announced by YAB PM during Budget 2016
- SEDA as implementing agency for NEM
- Quota allocation for NEM;
  - 500 MW for 2016-2020 (100 MW per year)
    - 450 MW for Peninsular Malaysia
    - 50 MW for Sabah

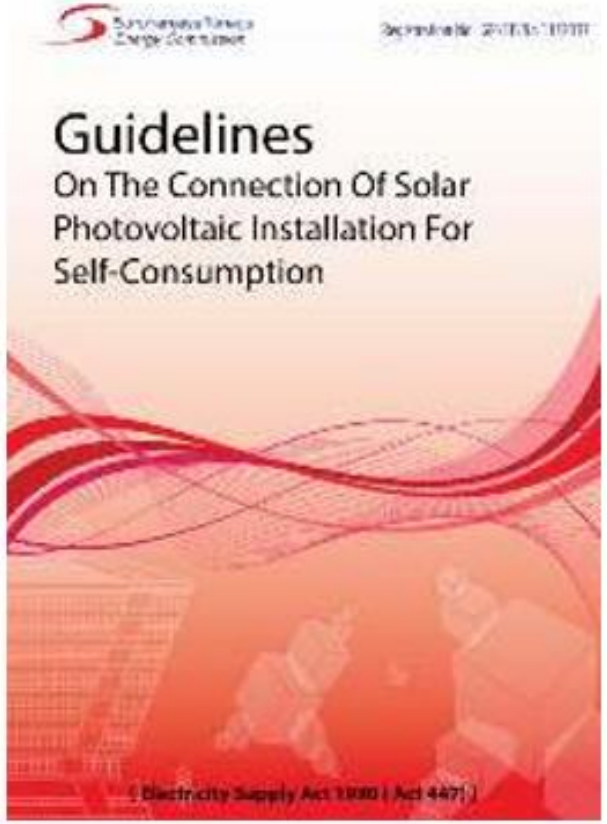


- ✓ NEM is "in-direct connection behind the meter"
- ✓ Consumer to self-consume first
- ✓ Only excess energy flow to grid

SELCO..

- ✓ A mechanism where an eligible consumer installs a solar PV system entirely for own use and in the event of excess of generation, the energy is not allowed to be exported to the grid
- ✓ Issuer of SelCo Guidelines: Suruhanjaya Tenaga





Demand Side Management

ENERGY EFFICIENCY IN BUILDING..

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Low Energy Office - LEO

1

- 1st showcase model completed in 2004 (GBI-Silver)
- Demonstrate the feasibility of EE design standards as implied in MS1525 :2001 Code of Practice on EE & Use of RE for Non-Residential Buildings
- BEI – **100 kWh/m² annually**
- **CO_2 reduction 56%**

Green Energy Office - GEO

2

- 1st certified green building in Malaysia (GBI-Certified)
- Demonstrate advance EE and RE design for commercial building- 2007
- BEI - **65kWh/m² annually**
- Solar Energy - 35kWh generated
- **CO_2 reduction 86%.**

Diamond Building

3

- Improved from both LEO & GEO building experience.
- Completed in 2010
- Platinum certificate, from Malaysia's Green Building Index (GBI) and Singapore's Green Mark.
- Building Energy Index- **85 kWh/m² annually**

EFFICIENT MANAGEMENT OF ELECTRICAL ENERGY REGULATIONS (EMEER 2008)

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- Efficient Management of Electrical Energy Regulations (EMEER) 2008 has been gazetted on 15th December 2008

- Key Provisions:
  - Applied to big energy users 3mil kWh/6months
  - Requires appointment of Electrical Energy Manager
  - Electrical Energy Management Policy
  - Energy audit recommendations for electrical energy management
  - Monitoring &nd keeping of records
  - Periodical reporting

SAVE PROGRAM

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Sustainability Achieved via Energy Efficiency (SAVE) Programme, 2011-2013 resulted in :

- reduction of domestic electricity consumption of 306.9 GWh
- savings of RM78.4 million
- Greenhouse Gases (GHGs) emission reduction of 208,705tCO_2eq

Energy savings from SAVE Programme over 2011 – 2013

Sustainability Achieved via Energy Efficiency (SAVE) Programme

The SAVE programme was an initiative spearheaded by the Ministry of Energy, Green Technology and Water (KeTTHA) from 2011 to 2013

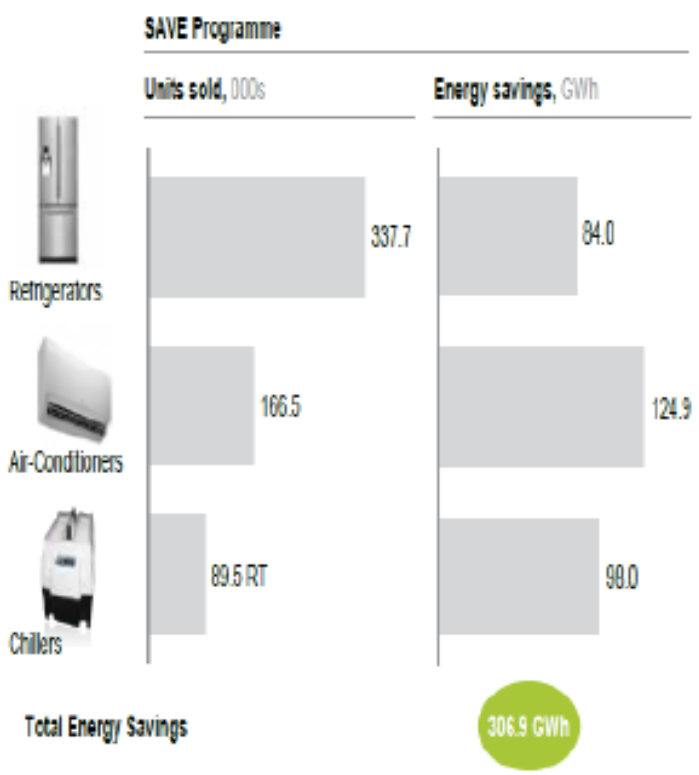
Introduced by the Government in collaboration with utility companies and participating appliance manufacturers

Rebates offered to qualified customers for
- Purchase of five star rated appliances, RM200 for refrigerators and RM100 for air-conditioners
- Replacement of old chillers (>10 years) to energy efficient chillers, RM200 per RT[1]

Encouraged addition of new energy efficient products – 27 new brands of air-conditioners and refrigerators

[1] Refrigeration Tonnes

Source: Sustainable Energy Development Authority (SEDA) | Economic Planning Unit (EPU)



ENERGY PERFORMANCE CONTRACTING

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- Initiative started in January 2013 to promote EE in government buildings.
- Effective mechanism **to implement energy saving measures** to promote energy conservation in government buildings by market mechanism-private investments
- Urgent requirements to cultivate **new strategic industries** with active **involvement and investments from private sectors as outlined in Economic Transformation Program**
- Under the EPC concept government buildings are allowed to engage ESCOs to improve EE
- The cost of investment to implement EE improvement will be provided by the ESCO, while the owner of government buildings are allowed to pay the cost of investments by the ESCOs from the savings made

ETOU (ENHANCED TIME OF USE) SCHEME INTRODUCED..

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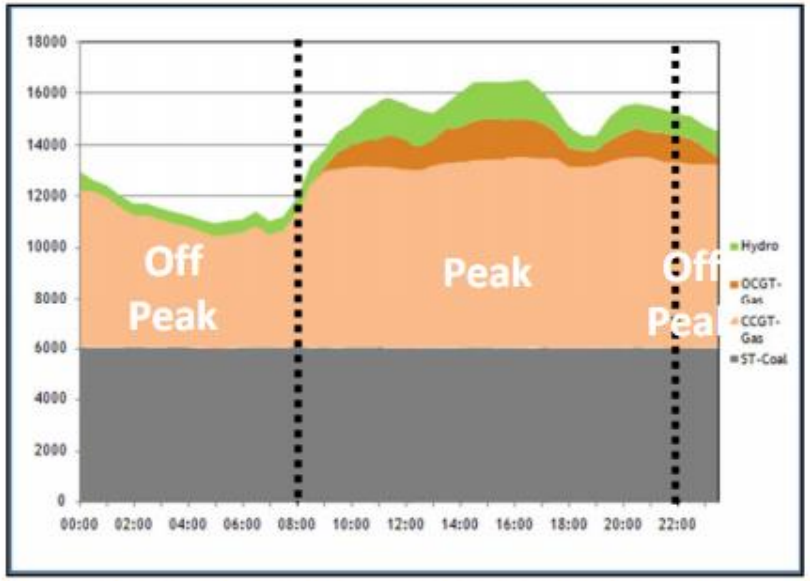
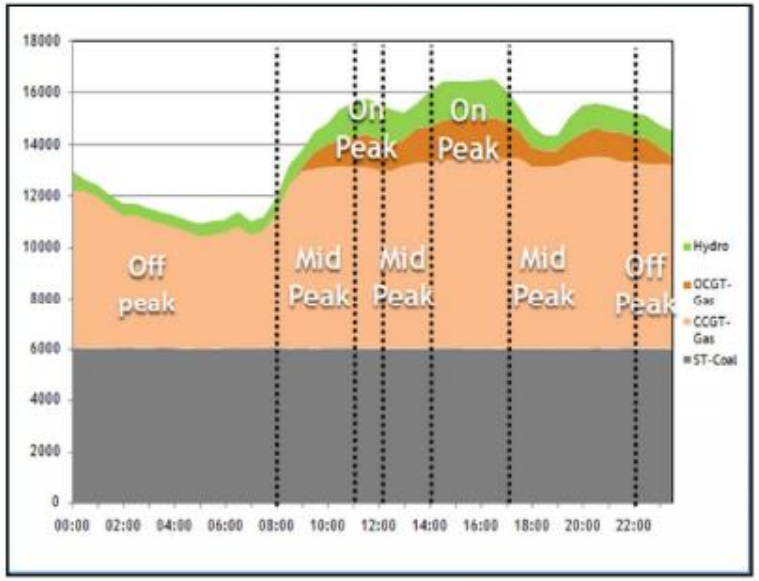
Existing TOU Tariff (C2, E2, E3, F2, and H2)



- 2 Time zones: Peak and Off-Peak Energy Rates
- Demand charges during Peak hours
- Offered to MV and HV customers

ETOU Scheme for Commercial (MV) and Industrial on LV, MV & HV



- 3 Time zones: Peak, Mid-Peak and Off-Peak Energy Rates
- Peak and Mid-Peak Demand Charges
- ETOU to be offered to;
  - Commercial MV
  - Industrial LV, MV and HV

OVERALL NATIONAL ENERGY EFFICIENCY ACTION PLAN

52,233 GWH (8.0%) savings

NATIONAL ENERGY EFFICIENCY ACTION PLAN (NEEAP) 2016-2025

			
Strategic Thrust 1 : **Implementation of Energy Efficiency Plan**	***Strategic Thrust 2 :*** **Strengthen Institutional Framework, Capacity Development & 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**

NEEAP KEY INITIATIVES

Equiment Programme Initiative	Industrial Programme Initiative	Buildings Programme Initiative
1. Promotion of 5-Star Rated Appliances	1. Energy Audits& Energy Management in Industries	1. Energy Audits & Energy Management in Buildings
2. Minimum Energy Performance Standards (MEPS	2. Promotion of Co-generation	2. Energy Efficient Building Design

ENERGY AUDIT CONDITIONAL GRANT..

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Energy Audit And Energy Management in :

Industrial Buildings
Energy Audit
(2016-2018)

Commercial Buildings
Energy Audit
(2016-2018)

Shared cost of Energy Audit between Government & Private Sectors as an incentive for Private Sectors to pursue retrofit program

EPC FINANCING THROUGH EPC FUND BY MDV

SMEs in Malaysia

DEFINITION OF SME IN MALAYSIA

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THRESHOLD

- **Manufacturing**: Sales turnover ≤ RM50 million (USD12 mil) OR full-time employees ≤ 200 workers
- **Services & other sectors:** Sales turnover ≤ RM20 million (USD5 mil) OR full-time employees ≤ 75 workers

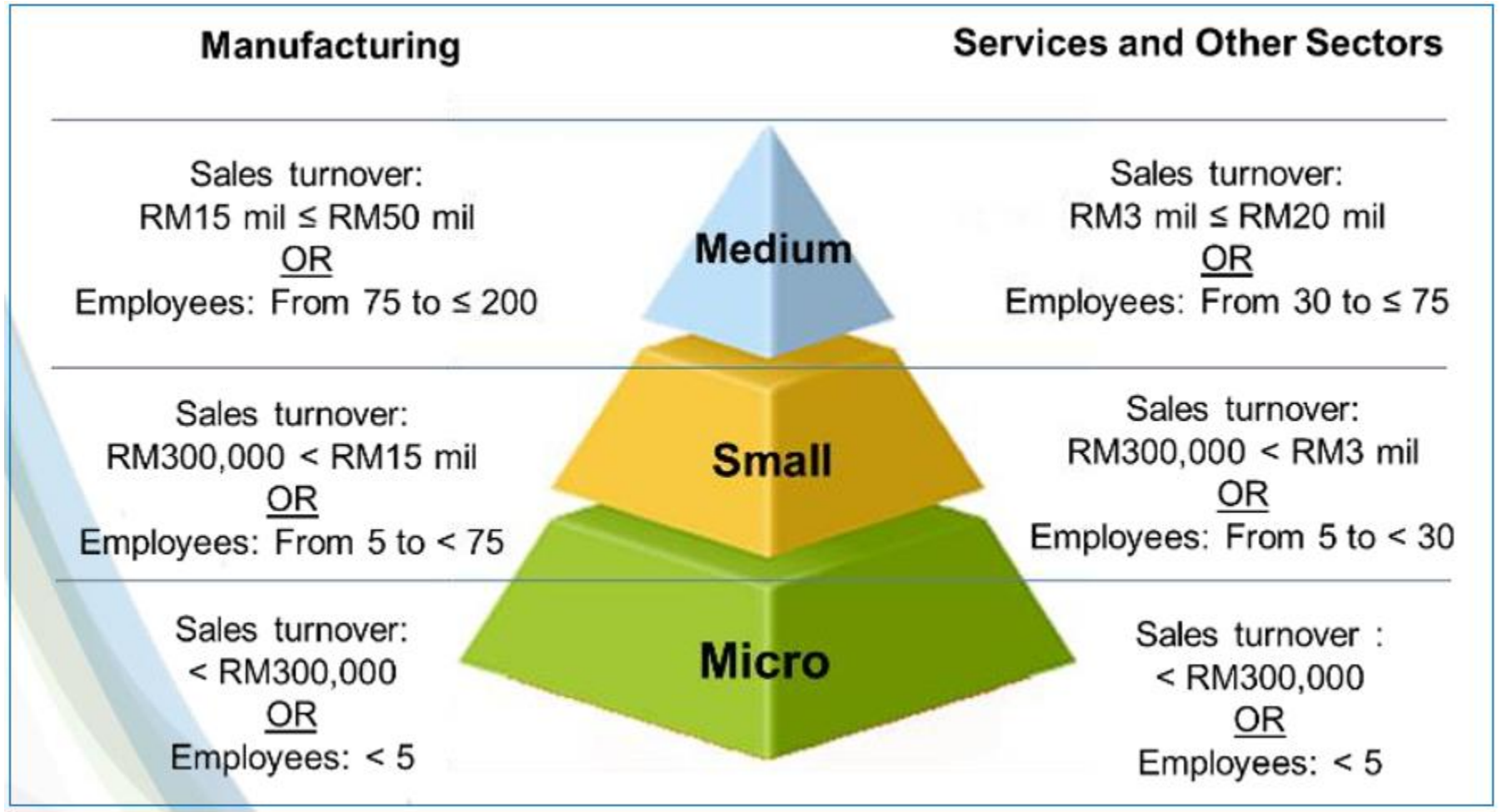
REGISTRATION

- **Locally incorporated** under Companies Act 1965; or
- Registered under Registration of Business Act (1956) or LLP Act 2012; or
- **Registered** under authorities or district offices in Sabah and Sarawak; or
- Registered under statutory bodies for professional service providers.

EQUITY STRUCTURE

- **Not public-listed** in main board in Malaysia or other countries.
- **Not a subsidiary** of large firms, MNCs, GLCs, Ministry of Finance Incorporated and State-owned enterprises.
- Not a subsidiary of public-listed company in main board in Malaysia or other countries.

CLASSIFICATION OF SMES..



Distribution of SMEs in Manufacturing Sector by Sub-Sector and Size.

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Distribution of SMEs in Manufacturing Sector by Sub-Sector and Size

Sub Sector	Micro	Small	Medium	Total SMEs
Textiles & Wearing Apparel	9,123	872	52	10,047
F&B Products	3,278	2,233	505	6,016
Fabricated Metal Products	2,070	1,698	190	3,958
Printing & Reproduction of Recorded Media	1,717	1,145	56	2,918
Machinery & Equipment (including Repair & Installation of Machinery & Equipment)	841	1,178	97	2,116
Furniture	886	847	110	1,843
Rubber & Plastics Products	322	1,126	308	1,756
Wood & Wood Products	499	791	158	1,448
Non-Metallic Mineral Products	484	758	131	1,373
Basic Metal	431	543	109	1,083
E&E Products	231	639	198	1,068
Chemicals & Chemical Products	271	534	156	961
Paper & Paper Products	283	442	103	828
Motor Vehicles, Trailers & Semi-trailers and other transport equipment	242	440	77	759
Leather & Related Products	219	151	6	376
Basic Pharmaceutical Products & Pharmaceutical Preparations	60	115	17	192
Coke & Refined Petroleum Products	19	39	5	63
Tobacco Products	30	27	3	60
Others	613	356	27	996
Totals	**21,619**	**13,934**	**2,308**	**37,861**

Source: Department of Statistics and SMECorp.

Final Energy Consumption by Sub-Sector in Manufacturing Sector, 2014

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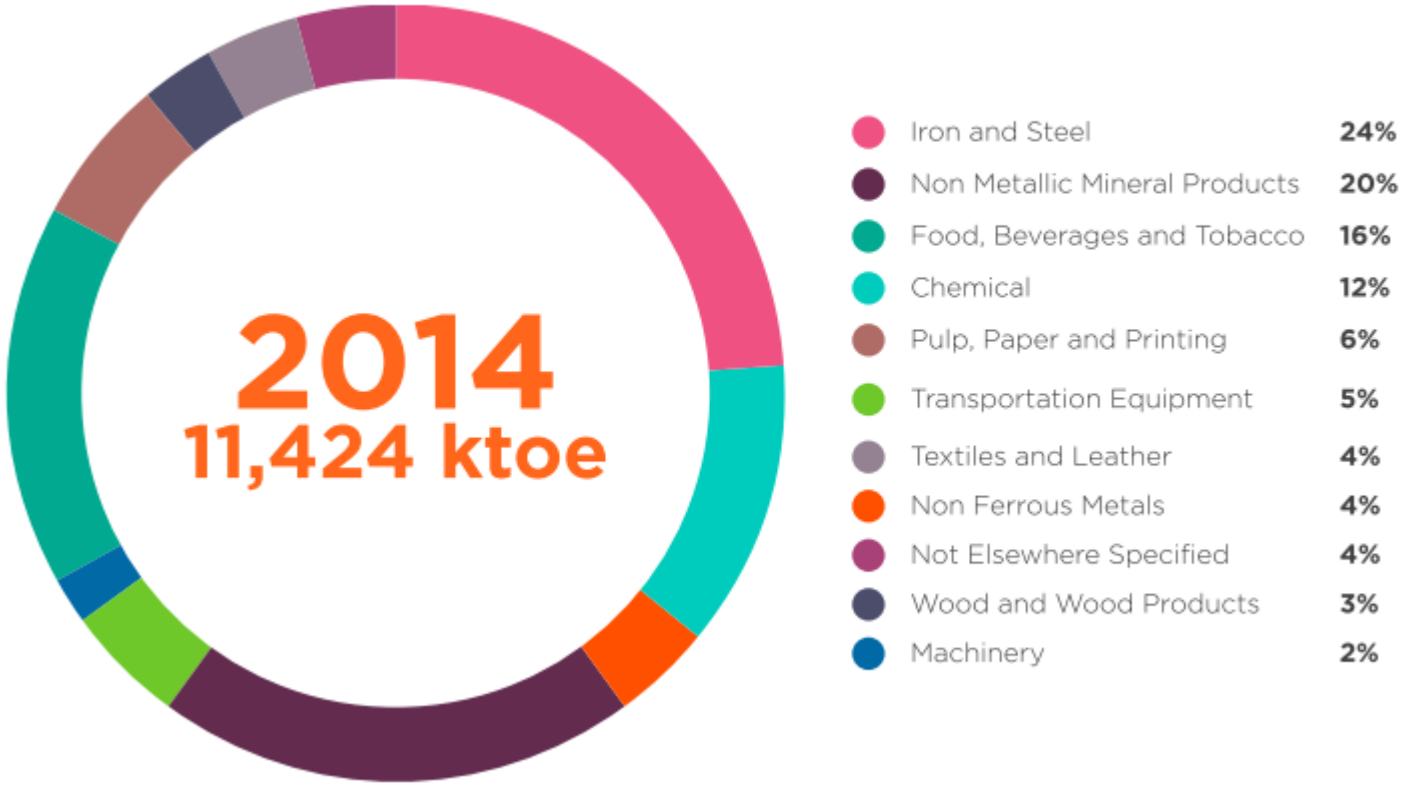
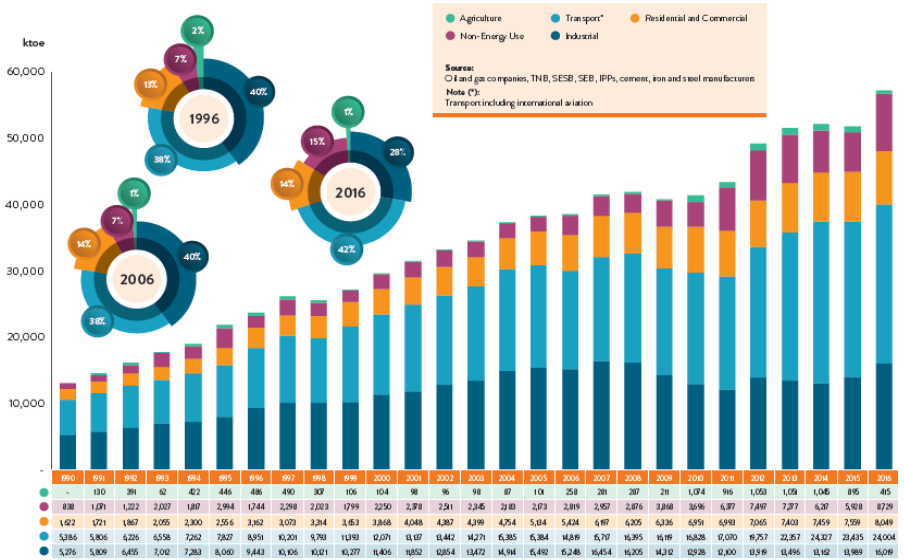
YEAR: 2014 / UNIT: KTOE	NATURAL GAS	PETROL	DIESEL	FUEL OIL	LPG	KEROSENE	COAL & COKE	ELECTRICITY	TOTAL
Iron and Steel	1,849	-	174	25	78	-	-	619	**2,744**
Chemical	617	65	68	73	4	-	-	542	**1,368**
Non Ferrous Metals	80	-	-	-	-	-	-	306	**386**
Non Metallic Mineral Products	126	-	25	57	-	-	1,541	566	**2,315**
Transportation Equipment	60	-	229	-	-	10	-	274	**574**
Machinery	3	69	16	-	-	-	-	152	**239**
Food, Beverages and Tobacco	1,552	60	16	12	1	-	-	222	**1,863**
Pulp, Paper and Printing	139	21	39	-	-	-	-	448	**647**
Wood and Wood Products	18	7	21	31	-	-	-	283	**361**
Textile and Leather	156	12	18	7	1	-	-	273	**465**
Not Elsewhere Specified	66	8	6	20	22	-	-	339	**461**
TOTAL	**4,665**	**241**	**614**	**225**	**106**	**10**	**1,541**	**4,023**	**11,424**

Final Energy Consumption by Sub-Sector in Manufacturing Sector, 2014



FINAL ENERGY CONSUMPTION IN MALAYSIA.

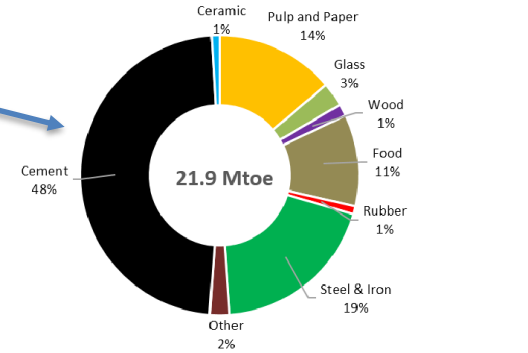


Transport 42%

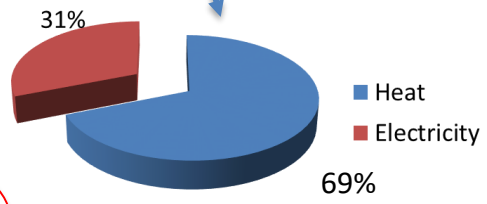
Industry 28%

Residential & Commercial 14%

Non Energy use 14%



Energy use by Industry Sector



Final Energy Use By Industry

Source: National Energy Balance 2016

69% of Final Energy Use in Industry is for Heating

POTENTIAL OF SOLAR ENERGY IN INDUSTRIAL SECTOR

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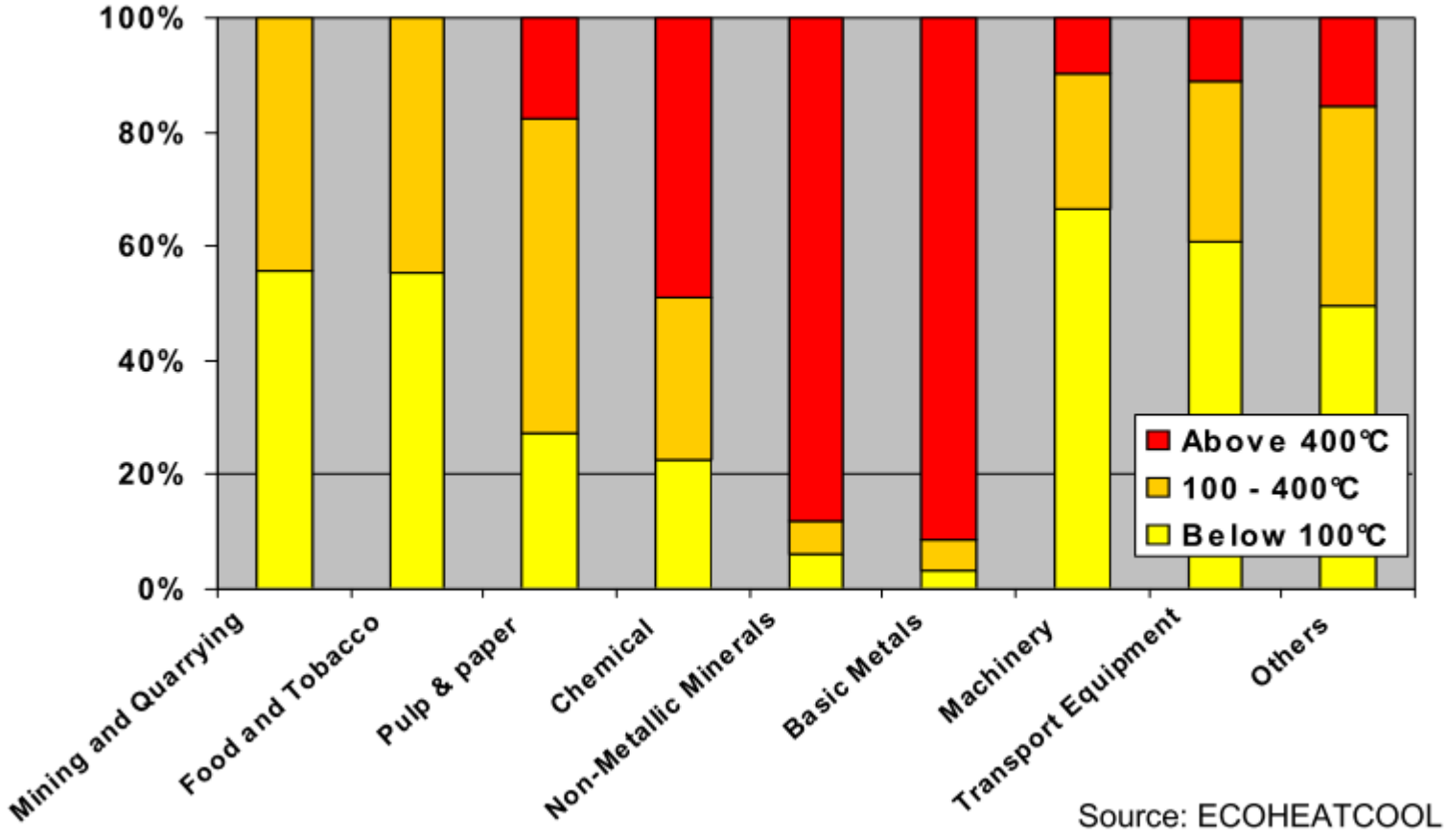
30% of the total Industrial heat demand is required at temp below 100°C and 57% at temp below 400°C



Source: ECOHEATCOOL

Potential Industrial Sectors

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Industrial Sector	Process	Temperature Level [℃]
Food and Beverages	Drying Washing Pasteurizing Boiling Sterilizing Heat Treatment	30 - 90 40 – 80 80 – 110 95 – 105 140 – 150 40 – 60
Textile Industry	Washing Bleaching Dyeing	40 –80 60 – 100 100 – 160
Chemical Industry	Boiling Distilling Various chem. Processes	95 – 105 110 – 300 120 - 180
All Sectors	Pre-heating of Boiler Feed-water Heating of Factory Buildings	30 – 100 30 – 80

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GEF/UNIDO NATIONAL PROJECT

PROJECT DETAILS.... FACTS & FIGURES.

GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Funding Agency

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Implementing Agency

SIRIM

Lead Executing Agency

Title: GHG Emissions Reduction in targeted industrial sub-sector through Energy efficiency and Solar Thermal System

No	Project Details	Remarks
1	Initial Project Concepts & framework started	2012
2	Project Approved	2014
3	Project Duration	2014-2020
4	Project Launching	2015
5	Value of project	USD3.0m
6	Co-Funding from Stakeholders	USD12.0m
7	GHG Emission Reduction targets (life time)	2,759,307 tCo2
8	Technology to be applied	Solar Thermal Technology
9	Targeted Industrial processes.	Medium Temperature process Heat

GEF/UNIDO WITH MESTECC/SIRIM : AN INTERNATIONAL COLLABORATIVE PROJECT

Partners and Stakeholders

- GEF – Funding Agency
- MESTECC – Chairman of the National Project Steering Committee
- UNIDO – Implementing Agency
- SIRIM Berhad – Lead Executing Agency
- Stakeholders: SEDA, ST, MIDA, MITI, MIGHT, EPU, UKM, FMM, MGTC, SERI

BERSEKUTU BERTAMBAH MUTU

KEMENTERIAN TENAGA, SAINS, TEKNOLOGI, ALAM SEKITAR DAN PERUBAHAN IKLIM

MINISTRY OF ENERGY, SCIENCE, TECHNOLOGY, ENVIRONMENT, & CLIMATE CHANGE

SIRIM

UNIDO

gef

PROJECT DETAILS: 3 MAJOR PROJECT COMPONENTS AND DELIVERABLES..

PROJECT TITLE: GHG EMISSIONS REDUCTION IN TARGETTED INDUSTRIAL SUB_SECTORS THROUGH ENERGY EFFICIENCY AND SOLAR THERMAL SYSTEM.

PROJECT COMPONENTS

Development of regulatory framework, support programme and financial incentives mechanism to facilitate solar thermal utilization

Awareness raising and capacity building program relating to process heating and cooling optimization and solar thermal energy utilization

Demonstration and scaling up of sector specific energy efficiency (EE) and solar thermal energy utilization in targeted industrial subsectors

3 MAJOR DELIVERABLES:

- Solar Thermal Roadmap
- 40 National Experts Trained
- 10 Demonstration Plants

TARGETED INDUSTRIAL PROCESS HEAT & TECHNOLOGY: MEDIUM PROCESS HEAT (80-120 C) & EVACUATED TUBES COLLECTORS

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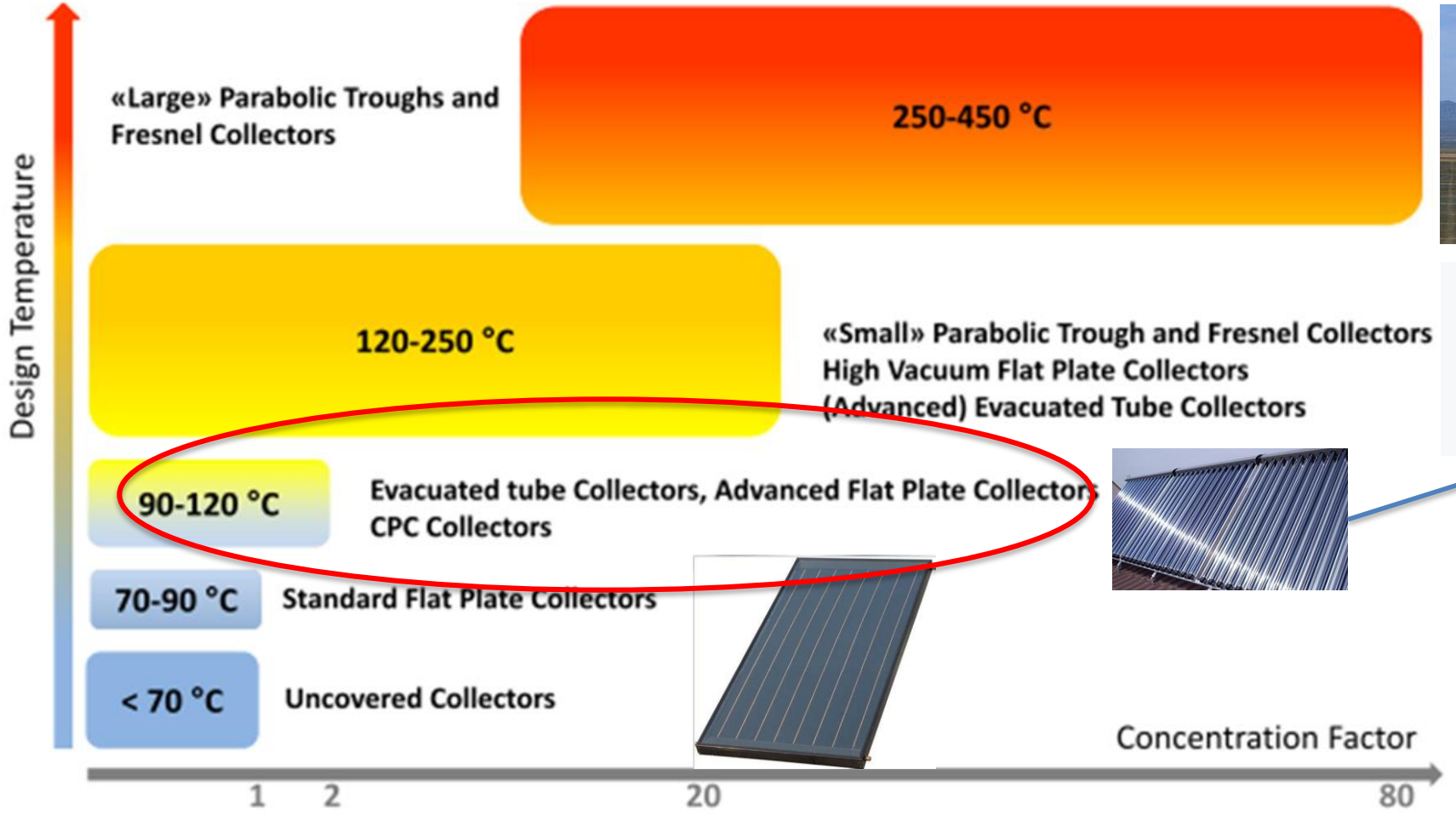
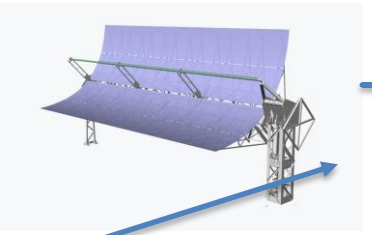
Collectors and Operating Temperatures





Food & Beverages

Pulp & Papers

Rubber Gloves

Hospitals

Hotels

Source: Fraunhofer ISE

Chemical

REGULATORY FRAMEWORK, SUPPORT PROGRAMME & FINANCIAL INCENTIVES

National Solar Thermal Roadmap–Charting The Future of Solar Thermal Industries & Ecosystem


RM2.8 B Investment


565GWth


613 Kton CO2


6093 Job Creation

AWARENESS SEMINARS & CAPACITY BUILDING: INDUSTRY COLLABORATIVE PROJECT

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

SIRIM

* As of September 2018

Total participants attended the seminar & training programmes

- 569 Awareness Seminar
- 339 User Training
- 167 Expert Training Course 1
- 65 Expert Training Course 2

Awareness Seminar, Johor Bahru - 3 Oct 2017

2 Day User Training – 27-28 Nov 2017

Expert Batch 2 (May 2017 –Nov 2017)

COLLABORATION: HOST COMPANIES PARTICIPATED IN EXPERT TRAINING PROGRAMME

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

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SHIP PLANT DEMONSTRATION PROJECTS BY SIRIM

SHIP PLANT AT PPNJ

Handover Ceremony

Solar Thermal Collectors

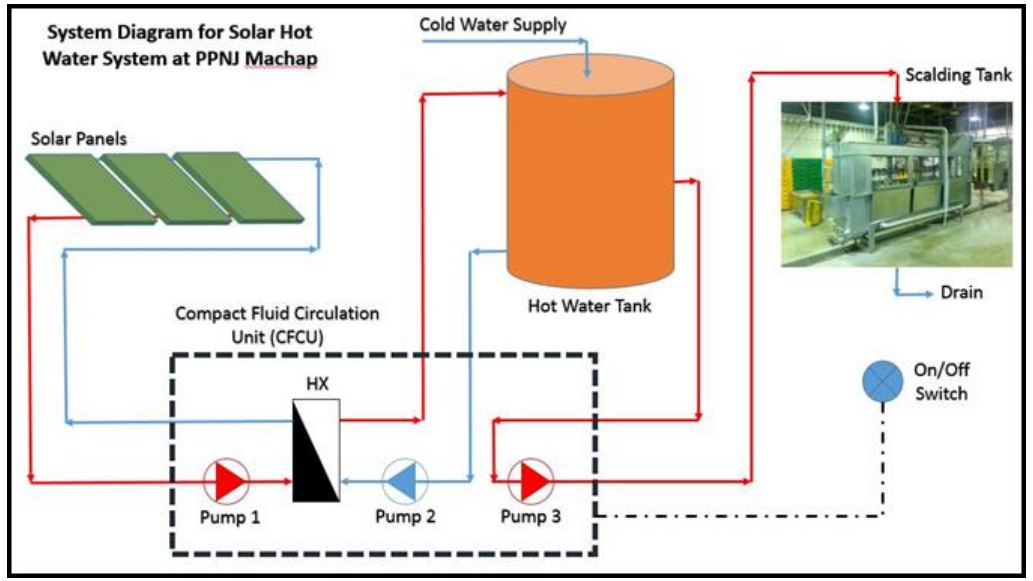
Control panel

Hot Water Storage

Scalding Process

SYSTEM DESIGN

No	Parameters	Unit	Value
1	Year of the project's commencement		2016
2	Period of construction	Year	0.5
3	Capacity	MW	80kWt
4	Generation	GWh/year	5,391.36
5	Useful Life	Year	20 years
6	Energy demand daily	kWh	329
7	Energy demand annually	kWh	102,648
8	Solar heat delivery annually	kWh	99,598
9	Collector Area(Evacuated Tube)	m^2	118.95
10	Hot Water Storage	m^3	8
11	No of tube collector	unit	1170
12	Solar fraction	Percentage (%)	42
13	Process temperature	^0C	60
14	Efficiency solar collector	Percentage (%)	66
15	Design Capacity	Birds	8,000



WINNER OF THE NATIONAL ENERGY AWARD 2018 AND 1ST RUNNER UP FOR ASEAN ENERGY AWARD

MUSLIM KITCHEN SDN BHD

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY

SIRIM

MUSLIM Kitchen

Muslim Kitchen Sdn. Bhd

Established: **2005**
Main product: **variety of frozen food**
Turnover 2014: **RM3 million**
No of employees: **18**
Date of Audit: **Sept 2016**

Technical Issues/Problems:
High LPG consumption for cooking

Before using LPG

Now Support with Solar Thermal

Solutions/work in progress

- Energy audit
- To embark on energy saving measures
- Installation of solar thermal hot water by support the LPG usage

Outcome

•**LPG reduction**: 50%
•**Economic savings**: at least 50 % reduction in expenditure for LPG (RM42,000/year)
•Creates model for industry-wide solution for food industry

CONTROL SYSTEM & THERMAL STORAGE

Sykt Ameen Sdn Bhd

Sejak 1982

Syarikat Ameen Sdn. Bhd

Established: **1982**
Main product: **concentrates and flavored cordials**
Turnover 2014: **RM3 million**
No of employees: **10**
Date of Audit: **Sept 2016**

Technical Issues/Problems:

- Need to install new electric steam boiler
- Need to upgrade power line from utility and need to spent their own cost
- Cost new boiler(34kw) and heat exchanger RM 93,000.00

propose using New boiler

Now Solar Thermal

Solutions/work in progress

- Energy audit
- To embark on energy saving measures
- Installation of solar thermal hot water by alternative using electric boiler

Outcome

- **Electricity reduction**: 100%
- **Economic savings**: at least 50 % reduction in expenditure for electricity (RM54,000/year)
- **Environmental effect:** 122727.27 kWh/yr ,90.94 ton CO2/yr)
- Creates model for industry-wide solution for beverage industry

ROOD TOP INSTALLATION + SPECIAL HEX (STERILIZER






MIWA MANUFACTURING SDN BHD.

Miwa Manufacturing Sdn. Bhd

Established: **2015**
Main product: **jelly drinks**
Turnover 2016: **RM1.2 million**
No of employees: **15**
Date of Audit: **27 Nov 2017**

Jelly manufacturing products

Technical Issues/Problems:

- High energy consumption for electric boiler
- Need to upgrade capacity of electric boiler to increase the production


Existing Electric Boiler


solar thermal system

Solutions/work in progress

- Energy audit
- To embark on energy saving measures
- Installation of solar thermal hot water by alternative using electric boiler


Mixing process


Filling process

Outcome

- **Electricity reduction**: 100%
- **Economic savings**: at least 70 % reduction in expenditure for electricity (RM23,400/year)
- **Environmental effect:** 45,000 kWh/yr ,31.23 ton CO2/yr)
- Creates model for industry-wide solution for beverage industry

Hot water used for jelly drink product


Solar Thermal Panels
Sun
Solar Hot Water System
86.8 °C
94.5 °C
Factory Building
Production Area
Solar Hot Water Tank
Water Supply
87.2 °C
Electric Heater
Solar Pump
OFF
H1
ON
SP1
OFF
H2
**** °C
Filtered
Water
Pump
ON
SP2
84.3 °C
OFF
System
Energy
Trend
Electri Heater

Flat Plate Technology For Electrochemical Cleaning Processes (Switzerland)

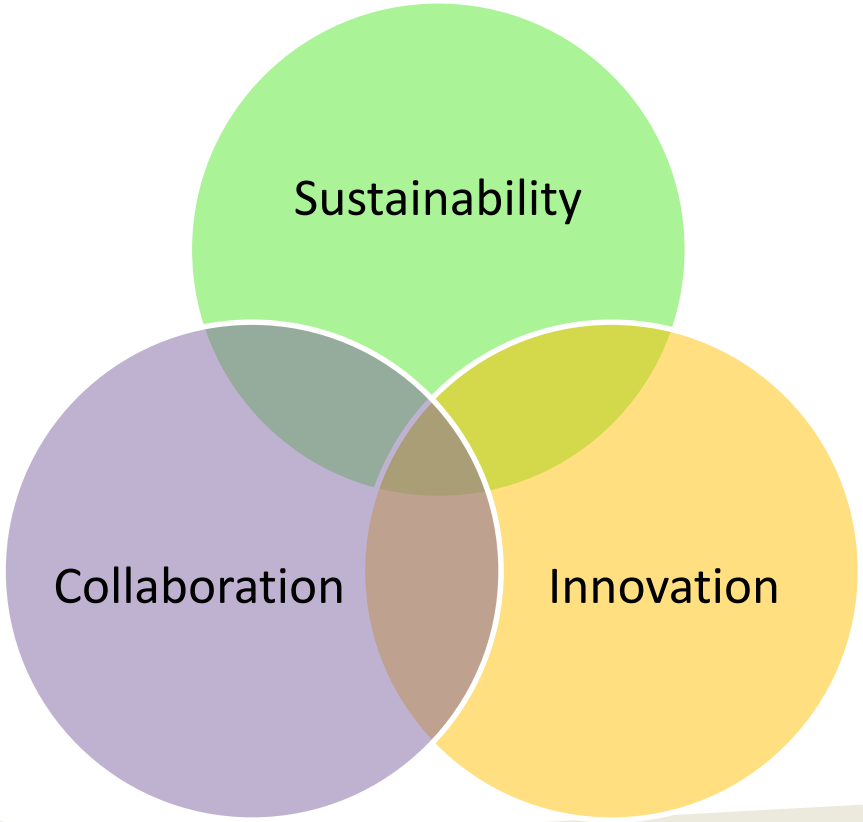
SHIP PLANT- AUSTRIA

- Brewery Göss, Austria: 1064 kWth (1375 m²)

CONCLUSION..

The GEF/UNIDO Solar Thermal Project exhibits the NEXUS of:

- **International *Collaborative* Efforts**
- **towards solving Industrial Energy Efficiency and Environmental *Sustainability***
- **Through The Application of *Innovative* Technology Solution.**



SIRIM invites international and local delegates to learn and benefit more from this project by:

1. Participating in the Capacity Building programme and Demonstration Project.
2. Engaging SIRIM to design similar project that is tailored to industry and country needs
3. Participating in future events organized by SIRIM

THANK YOU

FOR DETAILS KINDLY CONTACT

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