GUIDELINE FOR SUSTAINABLE DEVELOPMENT OF DATA CENTRE

1. INTRODUCTION

1.1 In the dynamic digital landscape, data centres have become one of the crucial components of modern infrastructure, serving as the growth engines that drive everything from online communication to financial transactions. As Malaysia continues to strengthen its position as a leading digital hub in Southeast Asia, the data centre industry plays a crucial role in this digital transformation. It significantly contributes to economic growth and enhances the nation's global competitiveness.

1.2 Recognising the importance of sustainability, Malaysia is committed to advancing its data centre infrastructure with a strong emphasis on environmental responsibility. Sustainable development of data centres that focus on reducing energy consumption and carbon footprints is at the forefront of this initiative. Integrating cutting-edge technologies and sustainable practices is crucial not only for mitigating environmental impact but also aligns with Malaysia's goal of achieving net-zero emissions by 2050.

1.3 To support this vision, the Government has introduced the Digital Ecosystem Acceleration (DESAC) incentive scheme to attract quality digital infrastructure projects, such as data centres and cloud computing, while accelerating the development of Malaysia's digital economy.

1.4 This guideline provides a comprehensive framework for the development and operation of sustainable data centres in Malaysia. It outlines best practices and regulatory standards to ensure that data centres are high-performing and environmentally friendly. By adopting these guidelines, Malaysia aims to set a benchmark for sustainable data centre operations, reinforcing its position as a leader in sustainable development in the region.

1.5 The objectives are;

1.5.1 To position Malaysia as the data centre hub in Southeast Asia by attracting investment from sustainable data centre organisations;

1.5.2 To unlock further capacity of organisations in designing and operating energy-efficient data centre;

1.5.3 To accelerate the use of renewable or clean energy in delivering low-carbon energy sources for the operation of the data centre; and

1.5.4 To encourage innovation in enhancing the efficiency of water consumption in the design and operation of the data centre.

2. ELIGIBILITY CRITERIA

2.1 The following measurements are to be used for achieving sustainable data centre status in Malaysia.

2.1.1 Power Usage Effectiveness (PUE)

a) Power Usage Effectiveness is defined as the ratio of the data centre total energy consumption to information technology equipment energy consumption, calculated, measured or assessed across the same period.

b) The organisation should accelerate energy efficiency measures with best-in class technologies at the hardware and software level, and the design PUE limit shall be based on different category of data centre (Refer to Appendix 1).

Note : The organisation shall refer to the owner or developer or operator of the data centre.

c) The organisation shall declare the calculated design PUE value according to international standard ISO/IEC 30134-2.

$$PUE = E_{DC}/E_{IT}$$

where

E_{DC} is the total data centre energy consumption (annual), in kWh;

E_{IT} is the IT equipment energy consumption (annual), in kWh.

2.1.2 Carbon Usage Effectiveness (CUE)

a) Carbon Usage Effectiveness is defined as the ratio of the data centre annual CO_2 emissions and IT equipment energy demand.

b) The organisation shall declare the calculated design CUE value according to international standard IS0/IEC 30134-8. The total CO_2 emissions are calculated based on the source of energy and the quantity consumed. Different sources of energy (coal, gas, oil, renewable, etc.) have different carbon emission factors, which need to be considered when calculating total emissions.

If using grid electricity;

$$\text{CUE (in kg}CO_2\text{ per kWh)} = \text{DC Total } CO_2 \text{ emission / Total IT energy}$$
$$= \text{GEF x PUE}$$

where

grid emissions factor (GEF) is the CO_2 factor of Malaysia's electrical power and it is regional-specific (refer to Appendix 2 to determine the GEF value).

c) The organisation may purchase renewable energy resources for its operation or produce or co-producing (renewable) electricity on-site or generating CO_2 in other manners (e.g., maintenance operation of diesel generators). The CUE calculation remains the same as above but the source CO_2 data will come from a combination of:

i) the percentage of grid-sourced energy per above sources and

ii) the actual CO_2 emission data from locally produced electricity or generating sources.

Note: The default carbon emission factor for purchased RE specifically solar PV-based electricity is 0.046 kgCO_2 eq/kWh (Source of secondary data: Life Cycle Greenhouse Gas Emissions from Solar Photovoltaics, National Renewable Energy Laboratory)

2.1.3 Water Usage Effectiveness (WUE)

a) Water Usage Effectiveness is defined as the ratio of the data centre water consumption divided by the energy consumed by IT equipment.

b) The organisation should avoid water stress areas in locating the new data centre by considering area with water stress index (WSI) of less than 0.8, and this only applicable for areas within Peninsular Malaysia (website link to the water stress index map; https://geoportal.sirim.my/sgportal#home).

c) The organisation should deploy water efficiency management practices and innovation to accelerate the efficient use of water by the data centre.

d) The organisation may utilise the reclaimed or reuse water for their operation.

e) The recommended design WUE is 2.2 m^3/MWh or lower, and the organisation shall continuously monitor and disclose the actual WUE in their annual sustainability report and work to improve the WUE of 2.0m^3/MWh or lower from the baseline design WUE value over the next 10 years.

f) The organisation shall declare the calculated design WUE value according to international standard ISO/IEC 30134-9.

3. EFFECTIVE DATE OF APPLICATION

3.1 Applications received by MIDA for tax incentives under the DESAC scheme until **31 December 2027** will be subject to conditions outlined in this guideline.

Appendix 1

Category of DC	Power Supply	Power Capacity	Baseline PUE at Current IT Load	Proposed DESIGN PUE Target for High EE	Measurement Methodology for PUE	Proposed DESIGN WUE	Measurement Methodology For WUE	Measurement Frequency
Hyperscale (commercial single tenant & Service Provider Private)	High Voltage (132KV and above)	Above 21.25 MW	Baseline needs to be established	1.4 and below (to be validated once baseline is established)	The proposed PUE measurement will be based on ISO/IEC 30134-2:2016/Amd.1 :2018	2.2 m^3/MWh or lower	The proposed WUE measurement will be based on calculated WUE value according to international standard ISO/IEC 30134-9: 2022.	Annualized average
Colocation (multi-tenant) Purpose Built (post 2020 build)	High Voltage (132KV and above)	Above 21.25 MW	Baseline needs to be established	1.6 and below (to be validated once baseline is established)		2.2 m^3/MWh or lower		Annualized average
Colocation (multi-tenant) Purpose Built (pre 2020 build)	Medium Voltage (33KV)	4.25 to <21.25 MW	Baseline needs to be established	1.7 and below (to be validated once baseline is established)		2.2 m^3/MWh or lower		Annualized average
Colocation (multi-tenant) Purpose Built (pre 2020 build)	Low Voltage (11KV)	0.85 MW - < 4.25 MW	Baseline needs to be established	1.7 and below (to be validated once baseline is established)		2.2 m^3/MWh or lower		Annualized average
Colocation (multi-tenant) Converted Building	Low Voltage (11KV)	0.85 MW - < 4.25 MW	Baseline needs to be established	1.7 and below (to be validated once baseline is established)		2.2 m^3/MWh or lower		Annualized average
Enterprise Private (Captive) Purpose Built & Converted Building	Low Voltage (11KV)	0.85 MW - < 4.25 MW	Baseline needs to be established	1.7 and below (to be validated once baseline is established)		2.2 m^3/MWh or lower		Annualized average

Appendix 2

The electricity emission factor obtained from 2021 Grid Emission Factor (GEF) in Malaysia, prepared by Energy Commission. The emission factors are expressed in Gigagram carbon dioxide per gigawatt hour (Gg CO_2/GWh).

Region	**Grid emission factor (in $GgCO_2$ /GWh)**
Peninsular Malaysia	0.758
Sabah	0.425
Sarawak	0.198