

# Measuring sustainability

The need for alignment through standard metrics

# Holistic environmental sustainability — and why it matters



**Customer  
Requirements**

**Government  
Regulations**

**Attractive for  
investors**

**Business  
value**

# Why data center operators need to track environmental sustainability

## Data center operators will:


- Enhance their ability to grow operations
- Appeal to a broader customer base
- Improve benchmarking their own sites against each other
- Improve benchmarking themselves against competitors
- Align data collection across organizational silos
- Have information to shape holistic strategy and action plans
- Be able to report and show progress year over year
- Drive progress toward sustainability within industry

# The five key areas of impact




## Energy

Data Centers consume 1 - 2% of global energy



## GHG emissions

Scope 1, 2 and 3 emissions have direct impact on climate change




## Water

Data center cooling systems and power plants use significant amounts of water



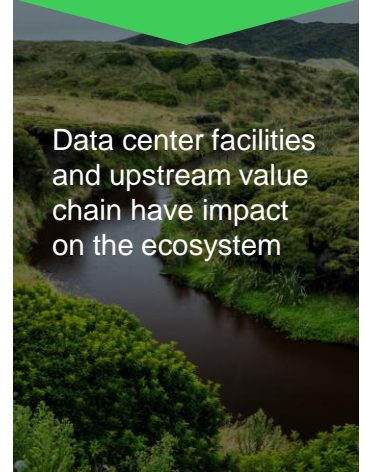
## Waste

Waste is generated during construction and operations



## Land and biodiversity

Data center facilities and upstream value chain have impact on the ecosystem



# The journey to holistic environmental sustainability

## Beginning

- Energy
- GHG emissions
- Water

## Advanced

- Energy
- GHG emissions
- Water
- Waste

## Leading

- Energy
- GHG emissions
- Water
- Waste
- Land and biodiversity

# Introducing the metrics for measuring sustainability

# Key criteria for metric selection

**Relevant and important**  
to data centers

**Reflect impact** on environment  
directly or indirectly

**Ease of implementation**

**Ease of communication**  
within organizations


**Ease of benchmarking**  
across different organizations

**Actionable**

**Apply to all** geographies

**Standardized**/Can be quantified

# Metrics to measure energy

Metric Categories	Key metrics	Units	Recommendations		
			Beginning	Advanced	Leading
 Energy	Total energy consumption	kWh	✓	✓	✓
	Power usage effectiveness (PUE)	Ratio	✓	✓	✓
	Total renewable energy consumption	kWh	✓	✓	✓
	Renewable energy factor (REF)	Ratio		✓	✓
	Energy reuse factor (ERF)	Ratio			✓



## Energy reuse factor (ERF)

### Definition (ISO/IEC 30134-6)


$$\frac{\text{Ratio of reused energy}}{\text{Total energy consumption}}$$

ERF = 0 indicates no energy is reused  
ERF = 1.0 indicated all energy is reused

### Application

Encourages data center operators and municipalities to find ways to repurpose energy (e.g. waste heat)

# Metrics to measure greenhouse gas emissions

Metric Categories	Key metrics	Units	Recommendations		
			Beginning	Advanced	Leading
 GHG emissions	GHG emissions (SCOPE 1)	mtCO <sub>2</sub> e	✓	✓	✓
	Location-based GHG emissions (SCOPE 2)	mtCO <sub>2</sub> e	✓	✓	✓
	Market-based GHG emissions (SCOPE 2)	mtCO <sub>2</sub> e	✓	✓	✓
	GHG emissions (SCOPE 3)	mtCO <sub>2</sub> e			✓
	Location-based carbon intensity (SCOPE 1 + SCOPE 2)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Market-based carbon intensity (SCOPE 1 + SCOPE 2)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Carbon usage effectiveness (CUE)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Total carbon offsets	mtCO <sub>2</sub> e		✓	✓
	Hour-by-hour supply and consumption matching	TBD			✓

mtCO<sub>2</sub>e = metric tonne of carbon dioxide equivalent

# Metrics to measure greenhouse gas emissions

SCOPE 1

SCOPE 2

SCOPE 3

## GHG emissions (SCOPE 3)


### Definition

Other indirect emissions (value chain, business travel, waste management)


### Application

Evaluate vendors and products via environmental product disclosures


# Metrics to measure water usage

Metric Categories	Key metrics	Units	Recommendations		
			Beginning	Advanced	Leading
 Water	Total site water usage	m <sup>3</sup>	✓	✓	✓
	Total source energy water usage	m <sup>3</sup>		✓	✓
	Water usage effectiveness (WUE)	m <sup>3</sup> /kWh	✓	✓	✓
	Total water use in supply chain	m <sup>3</sup>			✓

# Metrics to measure waste

Metric Categories	Key metrics	Units	Recommendations		
			Beginning	Advanced	Leading
 Waste	Total waste generated	tons		✓	✓
	Waste landfilled	tons		✓	✓
	Waste recycled	tons		✓	✓
	Waste diversion rate	tons		✓	✓

# Metrics to measure land and biodiversity






Metric Categories	Key metrics	Units	Recommendations		
			Beginning	Advanced	Leading
 Land & biodiversity	Mean species abundance (MSA)	MSA/km <sup>2</sup>			✓

## Metric Categories

## Key metrics

## Units

## Recommendations

			Beginning	Advanced	Leading
 <b>Energy</b>	Total energy consumption	kWh	✓	✓	✓
	Power usage effectiveness (PUE)	Ratio	✓	✓	✓
	Total renewable energy consumption	kWh	✓	✓	✓
	Renewable energy factor (REF)	Ratio		✓	✓
	Energy reuse factor (ERF)	Ratio			✓
 <b>GHG emissions</b>	GHG emissions (SCOPE 1)	mtCO <sub>2</sub> e	✓	✓	✓
	Location-based GHG emissions (SCOPE 2)	mtCO <sub>2</sub> e	✓	✓	✓
	Market-based GHG emissions (SCOPE 2)	mtCO <sub>2</sub> e	✓	✓	✓
	GHG emissions (SCOPE 3)	mtCO <sub>2</sub> e			✓
	Location-based carbon intensity (SCOPE 1 + SCOPE 2)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Market-based carbon intensity (SCOPE 1 + SCOPE 2)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Carbon usage effectiveness (CUE)	mtCO <sub>2</sub> e/kWh	✓	✓	✓
	Total carbon offsets	mtCO <sub>2</sub> e		✓	✓
	Hour-by-hour supply and consumption matching	TBD			✓
 <b>Water</b>	Total site water usage	m <sup>3</sup>	✓	✓	✓
	Total source energy water usage	m <sup>3</sup>		✓	✓
	Water usage effectiveness (WUE)	m <sup>3</sup> /kWh	✓	✓	✓
	Total water use in supply chain	m <sup>3</sup>			✓
 <b>Waste</b>	Total waste generated	tons		✓	✓
	Waste landfilled	tons		✓	✓
	Waste recycled	tons		✓	✓
	Waste diversion rate	tons		✓	✓
 <b>Land &amp; biodiversity</b>	Mean species abundance (MSA)	MSA/km <sup>2</sup>			✓

Life Is On



**Schneider**  
Electric