Energy Efficiency Opportunities Assessments (EEOAs) for Registered Corporations (RCs)

Detailed Requirements

Presented at: Industry Online Workshop

Presented by: Ryan Ng, Regina Wang, Lawrence Wong
Senior Engineers
Verification Office, Resource Conservation Department

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Objective

To inform industry on the detailed requirements of EEOAs for RCs

Agenda

1. Background
2. General requirements
3. Detailed requirements

1 Background

Enhanced ECA requirements (gazetted on 2 Jun 2017)

Proposed requirement	Details	
Enhanced energy management practices for registered corporations	**The most energy-intensive facilities Consumption ≥ 500TJ/yr** • Structured EnMS by 2021 • **EE opportunities assessments (EEOA)** ✓ **1st EEOAs by 2021 and every 6 yrs thereafter** ✓ **Cover at least 80% of energy consumption**	**Next tier energy-intensive facilities Consumption 54 – 500TJ/yr** • Structured EnMS by 2022 • **EE opportunities assessments (EEOA)** ✓ **1st EEOAs by 2021** ✓ **review every 3 yrs the need for subsequent EEOAs** ✓ **Cover at least 80% of energy consumption**
Energy performance measurement requirements for new facilities & major expansions	**All new energy-intensive facilities & major expansions i.e. ≥ 54TJ/yr (from 2018)** • Design and construction phase ✓ Plan for and install instruments and meters at system level • Operations phase ✓ Report energy use and energy performance indicators based on measured data ➢ Cover energy-consuming systems that account for at least 80% of total consumption	
Energy efficient design of new facilities & major expansions	**All new energy-intensive facilities & major expansions i.e. ≥ 54TJ/yr (from 2018)** • Design phase ✓ Review facility design, develop economically feasible energy/carbon efficiency measures for incorporation into the new facility and report findings	
MEPS for common industrial equipment & systems	• MEPS to be set at premium efficiency level for single speed 3-phase induction motors (from 1 Oct 2018) • MEPS to be extended to other common industrial equipment and systems over time	

Approach for EEOA for RCs

The EEOA is a systematic means of identifying economically viable EE opportunities (EEOs), which forms the basis for sustained EE improvement rates

Adopts key elements of ISO 50002

Endorsed by Certified EEO Assessor

- Plan and define scope of assessment
- Measure performance of ECSs
- Analyse energy use and performance data
- Identify potential EEOs
- Evaluate feasibility with cost-benefit analysis
- Report findings to company management and NEA

Regular, periodic EEOAs

Companies to consider implementing economically viable EE measures

As of 25 Feb 2020, there are 38 registered EEO assessors (20 in-house and 18 independent) listed on IES website. This number is expected to increase as existing Qualified Energy Services Specialists (QuESS) convert to independent EEO assessors by 30 Jun 2020.

2 General Requirements

Application of EEOA (RC) requirements

Each RC is required to:

i. Conduct an EEOA for **each relevant business activity** under its control **within the Assessment Period;** and

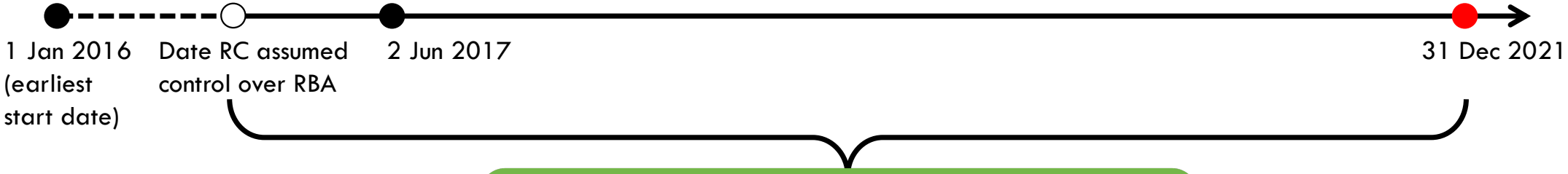
ii. Submit the EEOA report by **end of the Assessment Period.**

- All data used for the EEOA must relate to the Assessment Period for the energy-consuming system (or part of the system).
- All data used shall also be kept for at least 10 years from date of report submission to NEA.
- Relevant business activities may submit reports of energy audits conducted during the Assessment Period. Only reports that fully comply with EEOA requirements and are endorsed by certified EEO Assessors will be considered for acceptance.

***Exceptions**: Relevant business activities involving the generation, transmission or distribution of electricity through the use of gas and/or steam turbines, with a designated power output of more than **10 megawatts (MW)**.*

Compliance timeline for 1st EEOA (i.e. 1st Assessment Periods)

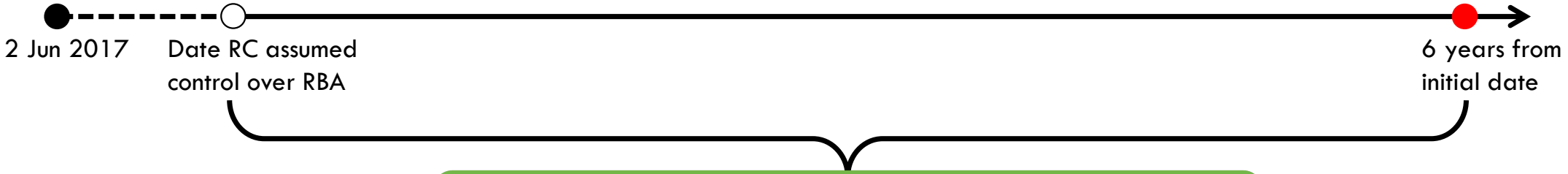
If the RC established operational control over the relevant business activity **on or before 2 Jun 2017:**



1st Assessment Period

- **Max 6 years**
- **Conduct 1st EEOA, submit EEOA report by 31 Dec 2021**

If the RC established operational control over the relevant business activity **after 2 Jun 2017:**



1st Assessment Period

- **Conduct 1st EEOA, submit EEOA report by 6 years from initial date**

Examples of 1st Assessment Periods

Operational control over a business activity is established if the activity attains the energy use threshold of 54TJ in at least 2 out of the 3 preceding calendar years.

RC established operational control **on or before 2 Jun 2017**

Total energy consumption of activity above 54TJ?						Date RC establishes operational control	Assessment Period
2014	2015	2016	2017	2018	2019		
✓	✓					1 Jan 2016	1 Jan 2016 – 31 Dec 2021
✓		✓				1 Jan 2017	1 Jan 2017 – 31 Dec 2021
	✓	✓				1 Jan 2017	1 Jan 2017 – 31 Dec 2021
	✓		✓			1 Jan 2018	1 Jan 2018 – 31 Dec 2023
		✓	✓			1 Jan 2018	1 Jan 2018 – 31 Dec 2023
			✓	✓		1 Jan 2019	1 Jan 2019 – 31 Dec 2024
			✓		✓	1 Jan 2020	1 Jan 2020 – 31 Dec 2025

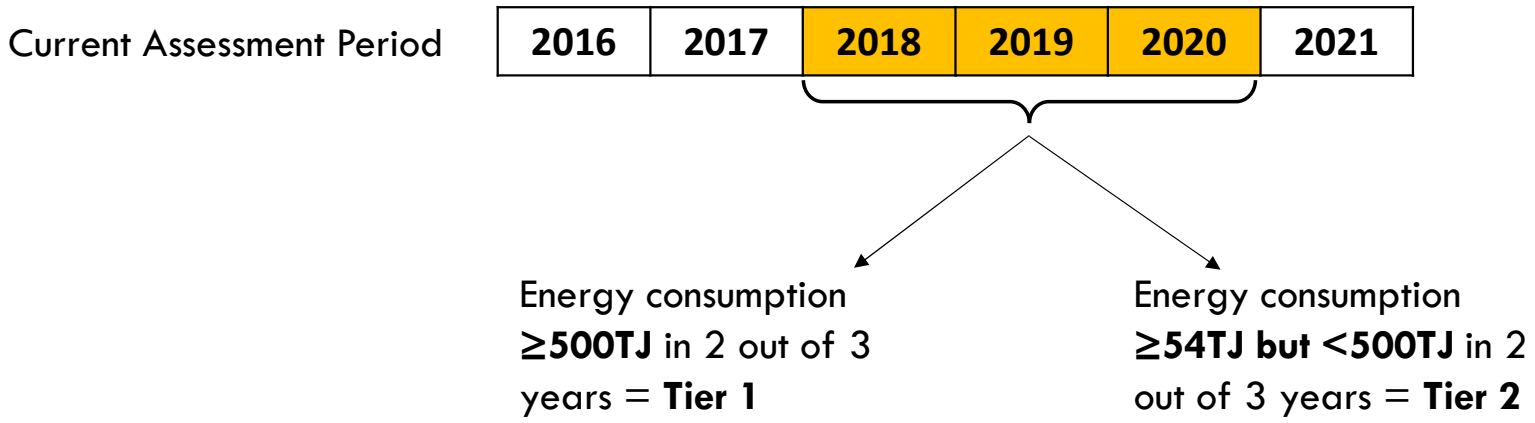
RC established operational control **after 2 Jun 2017**

Compliance timeline for subsequent EEOAs

In the **last year of its current Assessment Period,** NEA will classify each relevant business activity into either of the following categories based on its energy consumption:

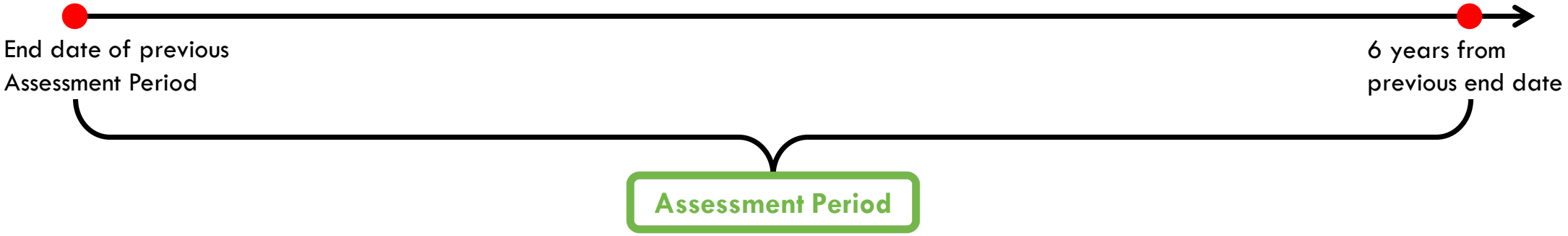
- **Tier 1**: Relevant business activity consumes energy **equal to or more than 500TJ** in at least two out of three preceding calendar years.

- **Tier 2**: Relevant business activity consumes energy **equal to or more than 54TJ,** but **less than 500TJ** in at least two out of three preceding calendar years.

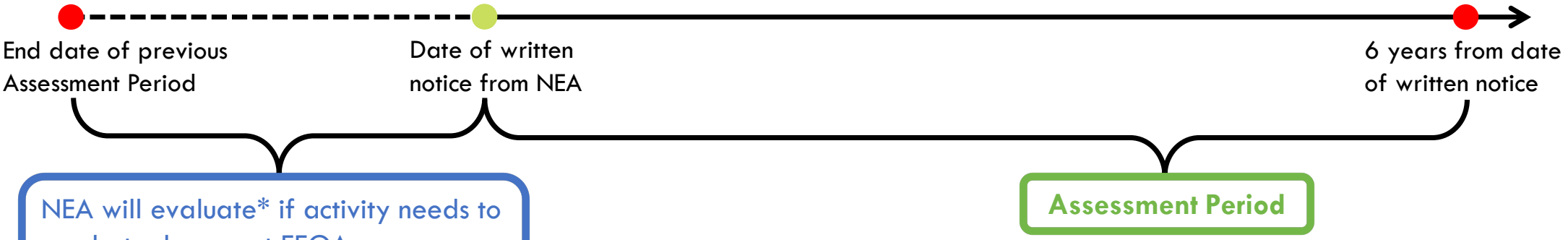


Compliance timeline for subsequent EEOAs

If the relevant business activity is determined to be **Tier 1**:



If the relevant business activity is determined to be **Tier 2**:



NEA will evaluate* if activity needs to conduct subsequent EEOA

- If yes, NEA will issue written notice

*Evaluation criteria would include (i) no. of EE measures identified that were subsequently implemented, (ii) potential for further EE improvement, and (iii) duration since last EEOA was conducted.

Scope of EEOA

Each EEOA shall cover:

A. All energy-consuming systems, that account for **at least 80% of the total energy consumption** of the relevant business activity during the **Reference Period**; and

B. Any energy-consuming system that **uses, directly or indirectly**, energy produced by any energy-consuming system mentioned in (A).

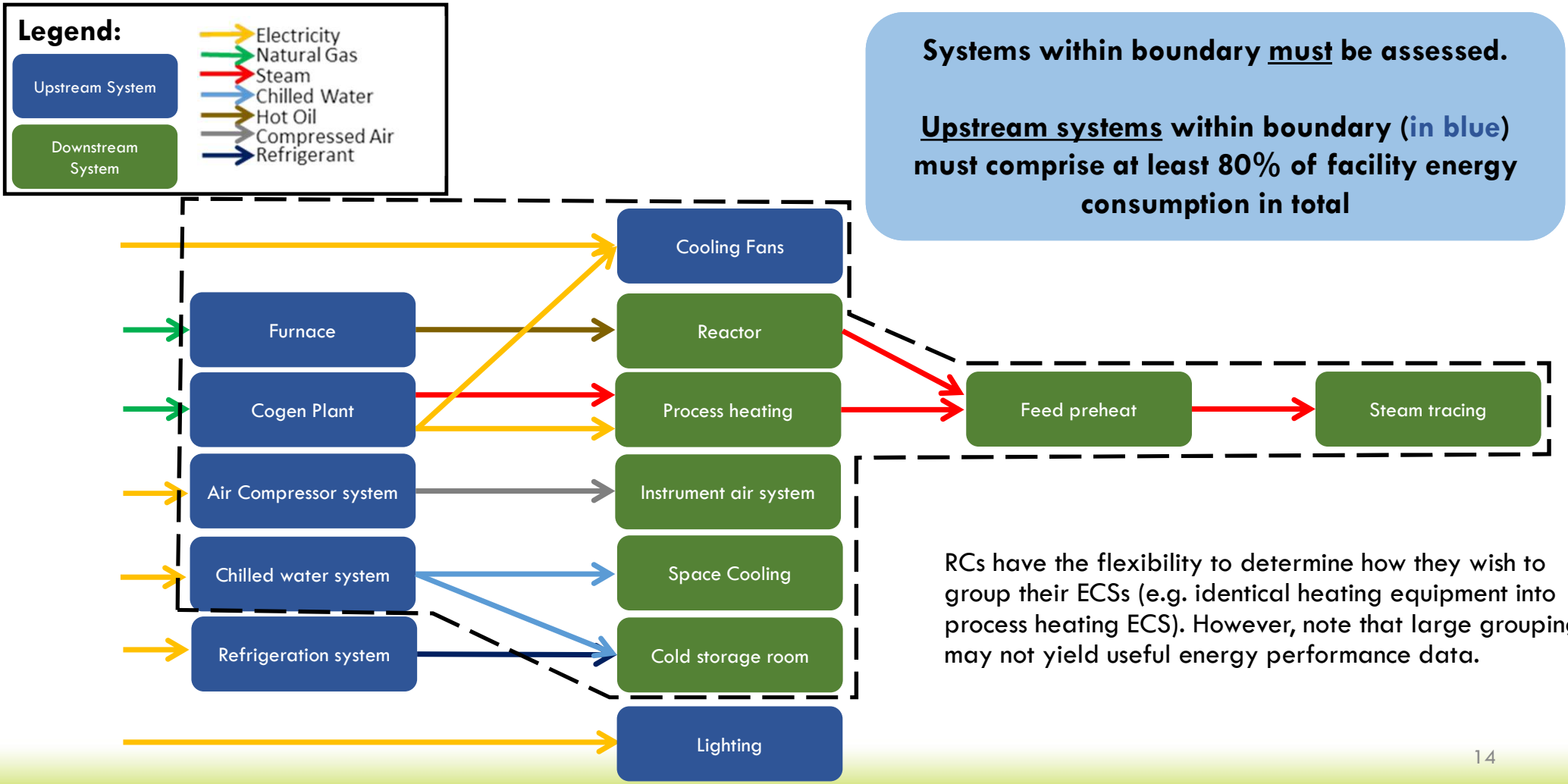
***Exemptions**: Energy-consuming systems that are aircraft engine test cells are not required to be assessed**.*

Reference Period refers to a period of 12 continuous months within an Assessment Period.

- Chosen by the RC
- Must reflect the business-as-usual energy performance of the relevant business activity operating at its intended capacity

* The energy consumption of these systems are still considered under the total energy consumption of the relevant business activity.

Illustration of Scope of Assessment – based on simplified energy flow diagram of a typical chemical plant



Systems within boundary must be assessed.

Upstream systems within boundary (in blue) must comprise at least 80% of facility energy consumption in total

RCs have the flexibility to determine how they wish to group their ECSs (e.g. identical heating equipment into process heating ECS). However, note that large groupings may not yield useful energy performance data.

3 Detailed Requirements

Data collection

The EEO Assessor and team shall collect, collate and record relevant energy data that supports the EEOA

	Requirements of the Assessment	Information to be included in the report
Facility site level		
1	Block or energy flow diagram showing interaction between all Energy Consuming Systems (ECS) with: ➢ **Measured (or derived from measured variables)** material and energy input and output; and ➢ **System-level Specific Energy Consumption** (SEC) for each fuel or energy commodity used in each ECS	• Block, process or energy flow diagrams • Suitable SEC (product-based/ input-based/ etc.) over appropriate timeframe • Energy and mass (energy commodities) balance between ECS
Individual energy consuming system level		
2	List of equipment and sub-systems as well as their interactions within each ECS	• Energy/ process flow diagrams • Energy and mass balance for self-verification (ensure input and output are aligned) • Common energy-consuming systems that must comply with a minimum energy efficiency standard (eg. Upcoming MEES for water cooled chilled water system) should be identified as one complete system to be assessed in EEOA
3	Breakdown of energy consumption within ECS	• Identification of relevant variables (e.g. temperature, flow, pressure, power etc.) (where there are too many relevant variables, to consider splitting the ECS into sub-systems for analysis – i.e. when the group is too broad) • Methodology to breakdown energy consumption within ECS ▪ Measurement and data collection of relevant variables and energy consumption variables for sufficient period to account for expected range of values ▪ Proper sampling methods where appropriate ▪ Monitoring equipment, configuration and analysis information for measured data if applicable ▪ **Engineering estimates** where there are data gaps with no measuring instrument, methodology to be provided.

Data collection

The EEO Assessor and team shall collect, collate and record relevant energy data that supports the EEOA

	Requirements of the Assessment	Information to be included in the report
General Provisions		
4	Measurement plan for SEC derivation: - ECS level - Selected sub systems and equipment level for identification of EEOs	• List of measured (or derived from measured variables) energy input and output between ECS • List of measured production output/input between ECS • Methodology on the how energy consumption was derived from measured variable. • Type and indicative accuracy of instruments used for measurements • Duration and frequency of measurements • Continuous production and energy commodities **data , over a minimum period of 2 weeks** where production volume is representative of the normal business operations is required. • Declaration by EEO Assessor that all measurements and data reported are reasonably accurate as of at the time when EEOA is conducted.

5	Future changes in production/generation capacity	• Future changes in production/ generation capacity are to be considered when identifying EEOs
		  • Projected expansions, contractions, or changes in production volume
		  • Projected/anticipated changes in, or replacement of, equipment or systems that have significant energy implications
		  • Projected removal or the outsourcing of facilities, equipment or systems

Data analysis

The EEO Assessor and team shall analyze relevant energy data to identify and evaluate EEOs.

	Requirements of the Assessment	Information to be included in the report
General Provisions		
6	Identification and evaluation of EEOs	Identification and Assessment Methodology • Current energy performance (i.e. baseline) derived from measurement plan • Comparison with established benchmarks • Best available alternative technology • Synergy between energy consuming systems • Investment and operation costs • Energy savings and carbon abatement • Financial savings, including estimated returns on investment (i.e. payback period) • Non-energy benefits (e.g. greater productivity, improved reliability) • Basis and criteria for EE opportunities ranking To state reasons if • EEOs are assessed to be not feasible for implementation • No EEOs are identified

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