



**LOW CARBON**  
CONTRACTS COMPANY

# Thermal Commissioning Guidance

80% of Installed Capacity

Operational Condition Precedent 2.1 (B)

**Version 2.0**

Issued on 21 November 2017

Applicable to Investment Contracts, CFD Agreement and CFD Standard Terms and Conditions issued on August 2014 and March 2017

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## Disclaimer

*This guidance does not and is not intended to supersede or replace the provisions of the CFD. This guidance does not constitute legal or investment advice and should not be relied upon as such. Generators should consult their professional advisors where they require advice, whether legal or otherwise. LCCC further reserves the right to amend this guidance and any associated guidance from time to time.*

*This guidance should not be viewed as in any way restricting LCCC in the nature, type and/or amount of evidence, information and documentation it will require to satisfy itself of the Generator's fulfilment of the Operational Conditions Precedent, nor as to the nature, level and timing of our consideration or reconsideration of the evidence that is provided. LCCC reserves the right at any time to request further or additional evidence, and to review or reconsider the evidence already provided.*

## Section 1: Introduction

This document provides generators with guidance on the forms of evidence that the Low Carbon Contracts Company considers acceptable in order to demonstrate that no less than 80% of the Installed Capacity Estimate has been commissioned.

- 1.1 The Operational Conditions Precedent (OCP) must be fulfilled by the Generator in order for it to be able to issue a Start Date Notice and commence generation that is eligible for CFD payments. It is therefore important that Generators give proper consideration ahead of time to how they intend to evidence that they have fulfilled the OCPs.
- 1.2 This guidance is intended to assist CFD Generators with the technologies listed below in considering what evidence they will need to provide to the Low Carbon Contracts Company (LCCC) to demonstrate that they have fulfilled the Operational Condition Precedent 2.1(B) at Schedule 1 (Conditions Precedent) to the Contract for Difference (“CFD”). The Generation Technologies covered by this guidance are:
  - Biomass Conversion
  - Dedicated biomass with Combined Heat and Power (“CHP”)
  - Energy from Waste (“EfW”) with CHP
  - Advanced onversion Technologies (“ACT”) with and without CHP
- 1.3 LCCC would encourage generators to engage early in the OCP process. This will enable the parties to discuss the approach; and for LCCC to gain an understanding of the Generators’ commissioning plan.
- 1.4 As a general principle, it is LCCC’s intention that, insofar as it is possible, a Generator should be able to utilise processes, procedures, documentation, and tests that already form part of its commissioning plan as submissable evidence, providing that these meet the requirements and are in accordance with the Reasonable and Prudent Standard. This guidance is indicative of what would be acceptable to LCCC and Generators are encouraged to contact their Commercial Manager as soon as possible to discuss any concerns you may have in more detail.
- 1.5 Before the Generator proceeds with the formal submission, we recommend that submissions are made in draft form so that LCCC can comment on the following:
  - any evidence that the Generator is intending to submit with the OCP Notice; and
  - the details of any commissioning programmes / proposed pass-fail criteria / planned tests intended to meet the requirements of OCP 2.1(B).

## Section 2: Definitions

- 2.1 The “CFD Counterparty” is the Low Carbon Contracts Company Ltd.
- 2.2 Defined terms used in this guidance and not defined herein should be given the meaning provided in the “CFD” (which is comprised of the CFD Agreement and the CFD Standard Terms and Conditions as published by the Department of Energy and Climate Change on 29 August 2014<sup>1</sup> and in March 2017<sup>2</sup>). This guidance is also applicable to Investment Contracts. However, Generators with Investment Contracts are advised to review the equivalent clauses.
- 2.3 Please note that Installed Capacity is determined at the export metering point. This document refers to the **Installed Capacity and Final Installed Capacity guidance**<sup>3</sup> issued by LCCC which defines Installed Capacity as “*the capacity of the Facility (expressed in MW) were it to be operated on a continual basis at the maximum capacity possible without causing damage to it (assuming any source of power used by it to generate electricity was available to it without interruption)*”.

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<sup>1</sup>Department of Energy and Climate Change, [Contract for Difference: Standard Terms and Conditions](#), published in 29 August 2014.

<sup>2</sup>Department for Business, Energy & Industrial Strategy, [Contracts for Difference: standard terms and conditions, version 2](#) published in 13 March 2017.

<sup>3</sup>Low Carbon Contracts Company, [Guidance: Installed Capacity and Final Installed Capacity](#), published in January 2017.

## Section 3: Context

3.1 The CFD<sup>4</sup> requires the delivery to the CFD Counterparty of “evidence, in form and content satisfactory to the CFD Counterparty, acting reasonably, that an Installed Capacity of not less than eighty per cent. (80%) of the Installed Capacity Estimate has been Commissioned”.

3.2 The CFD defines “**Commissioned**” as meaning “all of the Commissioning Tests have been successfully completed, followed or passed (as appropriate) in relation to the Facility (or a part of the Facility)...”

3.3 The definition of “**Commissioning Tests**” as set out in the CFD means:

*“all of the procedures and tests which, in accordance with the Reasonable and Prudent Standard, and in compliance with industry guidelines, practices and standards, are:*

*1) relevant to generating facilities which are the same as, or similar type to, the Facility (including those which are relevant to the Facility Generation Technology); and*

*2) required to be completed, followed or passed (as appropriate): (i) in order for a generating facility to generate electricity; or (ii) to demonstrate that a generating facility is fit for commercial operation;”*

3.4 LCCC has adopted the following framework for assessing Thermal Generators compliance with OCP 2.1(B). The detailed evidential requirements are set out in Sections 4 and 5 of this document.



3.5 As a result of the definitions that are relevant to OCP 2.1 (B), **two** overarching requirements need to be evidenced:

1. that the Facility has been “Commissioned” meaning that the Commissioning Tests have been completed and it can generate electricity or, is fit for commercial operation; and
2. a capacity of at least 80% of its installed Capacity Estimate can generate electricity on a continuous basis without causing damage to the Facility.

<sup>4</sup>At Schedule 1, Part B (Further Conditions Precedent), paragraph 2.1 (B).

## Section 4: Commissioning Evidence

4.1 The submission to demonstrate that the Facility has been Commissioned should include:

- a) The Summary Report (see 4.2);
- b) Facility layout;
- c) Single line diagram showing the location of the Facility Metering Equipment;
- d) Illustration of the boiler capability at different fuel throughputs (“Firing diagram”);
- e) A commissioning plan including the period when the Installed Capacity Test will be undertaken;
- f) The Process flow diagram, or alternatively the heat and mass balance at the design reference conditions, of the plant.

4.2 The Generator should collate a report listing the tests which demonstrate that the Facility has been Commissioned together with the evidence of the successful completion of these tests (“Summary Report”), such evidence being in the form of:

- a) The tests undertaken and a reference to the supporting documentation (such supporting documentation being the relevant pass / fail requirements of each test signed off by the Generator’s engineer); or
- b) certificates from competent bodies; or
- c) appropriate contractual certificates issued under the construction contract; and
- d) where available supported by construction completion certificate signed by the Generator’s engineer.

**Appendix 1** of this guidance identifies the aspects that the LCCC would expect to see included within the Summary Report. In the event the tests outlined in Appendix 1 require some minor modification to account for the particular design of the Facility, this should be discussed in advance with LCCC.

4.3 The assessment of this OCP by LCCC will include:

- a) a desktop exercise reviewing the Generators’ submission;
- b) any request for additional Supporting Information as may be required (possibly including Supporting Information confirming that the tests included in the Summary Report have been undertaken to a Reasonable and Prudent Standard); and
- c) a site inspection to validate the OCP submission.

## Section 5: Installed Capacity Test

- 5.1 It is recognised that under standard EPC or construction contracts, overall plant performance tests cover more than just an Installed Capacity test, and may include efficiency, heat rate, and reliability tests as part of the acceptance testing and handover provisions.
- 5.2 To meet the requirements of the CFD there is no requirement to achieve all the aspects of acceptance testing and handover provisions of construction contracts, but the Generator must evidence that the Installed Capacity be no less than 80% of the Installed Capacity Estimate.
- 5.3 The Installed Capacity is defined as *“the capacity of the Facility (expressed in MW) were it to be operated on a continual basis at the maximum capacity possible without causing damage to it (assuming any source of power used by it to generate electricity was available to it without interruption)”*.
- 5.4 LCCC considers that the ASME PTC-46 “Overall Plant Performance” standard, which currently recommends a minimum test duration of 2-4 hours (dependent on technology) for consistent fuels, with variable fuels such as waste requiring longer test durations, to be a reasonable approach for evidencing the Installed Capacity.
- 5.5 LCCC will consider the requirements of the ASME PTC-46 “Overall Plant Performance” standard only where it relates to the power output determination, and would not require Generators to record parameters that are only used, for example, to calculate heat rate/efficiency. In addition, LCCC will recognise the Generators’ use of station instrumentation that is already installed, so long as the overall uncertainty on the final net power value is within the limits allowed by the standard. To clarify, since the intention of the tests is to verify ‘normal operational’ capacity, system isolation should not be applied.
- 5.6 We would suggest Generators’ engage with LCCC to discuss the proposed test and its duration prior to it being undertaken. LCCC (or a representative on behalf of LCCC) may wish to agree a time with the Generator to attend the testing. The Generator should give reasonable updates of the intended testing period in which the Installed Capacity test is intended to be undertaken, so that observation of the tests can be arranged if required. At least fifteen (15) business days’ prior notification should be provided to LCCC of the testing period, and subsequent updates provided should the test period be delayed.
- 5.7 The Installed Capacity test may start at any time of day within this testing period and requires no prior notification to LCCC that the test has started/restarted.
- 5.8 The Installed Capacity test should be:
- a) completed only when all the Commissioning Tests have been successfully completed, followed, or passed.
  - b) based on recognised test procedures for assessing capacity and may include equivalent international standards and ensures an accurate and complete determination of gross (nameplate) capacity; parasitic loads; electrical losses; and net generating capacity.<sup>5</sup>
  - c) undertaken using all plant and equipment as would be intended to be used during commercial operation and under normal operating conditions.
  - d) undertaken without the use of equipment, or any configuration, to artificially alter the Installed Capacity test such that it does not give a true reflection of the net capacity.

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<sup>5</sup>Please refer to Low Carbon Contracts Company Ltd, [Guidance: Installed Capacity and Final Installed Capacity](#) (published on June 2015) for determination of net generating capacity. Contact LCCC for further clarification on parasitic loads and electrical losses.

- e) undertaken while using the type, specification and quantity of fuel that is consistent with anticipated operation post-commissioning and consistent with OCP 2.3.
- f) carried out as near to design conditions, as evidenced by manufacturer's specification or warranty, as possible, and corrected for ambient conditions.
- g) carried out under usual operating conditions consistent with the Firing Diagram (including temperature pressure and fuel net calorific value ("NCV")), and which would not cause long term damage to the plant, if the plant was continued to be operated in that way on a continual basis.
- h) completed in accordance with the Reasonable and Prudent Standard, and follow industry guidelines, practices and standards as well as compliant with all necessary consents and permits (for example, if the Facility was not in compliance with the prevailing environmental permit at the time of test, it would not meet this requirement).

5.9 The Generators' OCP Supporting Information in relation to the Installed Capacity test should demonstrate that the Installed Capacity test has been undertaken in line with this guidance including the following:

- a) a summary of the Installed Capacity test result and the uncertainty measurement associated with the result;
- b) a summary listing the relevant pass/fail requirements of the Installed Capacity test (breaking down the requirements such as operating under normal conditions, operating within the Firing Diagram, meeting emissions values, compliance with all necessary consents, etc)
- c) explain why the Installed Capacity test that has been undertaken satisfies a robust demonstration of the Installed Capacity of the Facility;
- d) explain the justification for any aspects of the standard which have not been applied;
- e) explain how the Installed Capacity test ensures an accurate and complete determination of gross capacity; parasitic loads; electrical losses; and net capacity;
- f) contain a complete evaluation of all test results and all relevant information necessary to be able to make a judgement that the Facility meets the requirements of the Installed Capacity test;
- g) a description of the measuring points, methods, and the certificates for measuring equipment;
- h) contain the raw data plus associated chart records (metered output and parasitic loads being recorded in at least 30 minute intervals);
- i) where the test conditions differ from the design conditions, as evidenced by manufacturer's specification or warranty, make corrections to metered output using the Facility correction curves allowed by the standard or, if applicable, are part of the EPC Contract (including ambient air temperature, humidity, and NCV corrections to parasitic loads) but excluding NCV corrections to gross power output; and
- j) a Directors' Certificate confirming at the time and for the duration of the Installed Capacity test Compliance with Laws and Directives and Required Authorisations under Clause 30.1 (A) and (B) of the CfD. 6

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<sup>6</sup>At Schedule 1, Part B (Further Conditions Precedent), paragraph 2.3.

# Appendix 1: Requirements to evidence in the Summary Report

Item	Criteria	Justification
A.	Documentation to verify that the Facility has been commissioned: <ul style="list-style-type: none"> <li>• Pressure Testing in accordance with statutory requirements complete</li> <li>• Balance of plant electrical protection testing complete.</li> <li>• All fire systems tested and in operation.</li> <li>• Facility fuel system commissioned</li> <li>• SCADA Site Acceptance Test Report</li> </ul>	Demonstrates that the Facility has been commissioned
B.	G59 or Interim Operational Notification - unless Operational Condition Precedent 2.6 of Schedule 1, Part B, paragraph 2 (as inserted under 5.4 of the CFD Agreement) has been fulfilled	
C.	For steam turbine/boiler projects only: <ul style="list-style-type: none"> <li>• Boiler safety valve test complete</li> <li>• Turbine-Generator, boiler interlocks/protections tested</li> <li>• Turbine overspeed tested</li> <li>• Turbine auxiliary system commissioned</li> <li>• Facility ash handling system commissioned</li> <li>• Functional tests</li> <li>• Turbine runback tested (loss of main auxiliary equipment)</li> <li>• Turbine load rejection test completed successfully</li> <li>• Plant stability tests</li> <li>• Demonstration of emergency shutdown system operation (e.g. diesel Generator auto-start)</li> </ul>	
D.	Activities related to engine projects only: <ul style="list-style-type: none"> <li>• Generator set interlocks/protection tested</li> <li>• Generator set auxiliary system commissione</li> <li>• Functional tests: <ul style="list-style-type: none"> <li>• Engine trip tests completed (low oil pressure, high water temperature, etc. simulated)</li> <li>• Full load rejection test completed</li> <li>• Engine overspeed tested</li> <li>• Demonstrate emergency shutdown system operation (e.g. emergency Generator auto-start)</li> </ul> </li> </ul>	
E.	Documentary evidence to confirm that all preoperational planning conditions have been completed. The Directors' Certificate confirming at the time of the Installed Capacity test <i>Compliance with Laws and Directives and Required Authorisations</i> under Clause 30.1(A) and (B) of the CfD will be accepted to evidence this requirement.	Confirms the plant is legally permitted to be constructed
F.	Environmental permit in place, and documentary evidence from the relevant environmental authority to confirm that all preoperational conditions have been satisfied.	Confirms the plant is legally permitted to operate

