STCP 06-2 Issue 005 De-synchronised Island Management

CM089 – Electricity System Restoration Standard
21 April 2023

STC Procedure Document Authorisation

Company	Name of Party Representative	Signature	Date
National Grid Electricity System Operator Ltd			
National Grid Electricity Transmission plc			
SP Transmission Ltd			
Scottish Hydro-Electric Transmission Ltd			
Offshore Transmission Owners			

STC Procedure Change Control History

Issue 1	26/01/2005	BETTA Go-Live version
Issue 2	04/07/2005	Issue 002 incorporating PA019
Issue 3	25/10/2005	Issue 003 incorporating PA034 & PA037
Issue 4	xx/12/2009	Issue 004 for Offshore Transmission
Issue 5	01/04/2019	Issue 005 for National Grid Separation Changes
Issue 6	21/04/23	Issue 006 Incorporating changes to facilitate the Electricity System Restoration Standard

1 Introduction

1.1 Scope

1.1.1 This procedure shall be utilised in the event that parts of the Total System are operated or are intended to be operated as De-synchronised Islands under specific Outage or contingency conditions. A De-synchronised Island is a part of the Total System that is operating Out of Synchronism with the main National Electricity Transmission System, but where there is no Total Shutdown or material Partial Shutdown (as determined by NGESO). This procedure does not

apply to Systems that operate permanently as a De-synchronised Island. e.g. Shetland.

1.1.2 De-synchronised Island management is a joint process between NGESO and the TO. For the purposes of this document, the TO is SHETL.

1.1.3 This procedure does not cover any arrangements that fall inside the scope of STCP 06-1 System RestorationBlack Start.

1.1.4 This procedure covers any De-synchronised Island that includes:

- part of the National Electricity Transmission System; or
- is wholly within a User's System and includes a BM Unit registered with NGESO and active in the Balancing Mechanism.

1.1.5 This procedure covers the arrangements and responsibilities of NGESO and the TO, in relation to:

- the production of a Grid Code OC9 De-synchronised Island Procedure, (DIP);
- the planning, operation and management of De-synchronised Islands, as part of the arrangements for an Outage on the National Electricity Transmission System;
- the operation and management of unplanned De-synchronised Islands; and
- re-synchronisation of a De-synchronised Island, to the National Electricity Transmission System.

1.1.6 It should be noted that the provisions of Grid Code OC9.5 (Re-Synchronisation of PowerDe-synchronised Islands) covers the interface between NGESO and User's, and where appropriate the TO.

1.2 Objectives

1.2.1 This document specifies the roles and responsibilities for De-synchronised Island management in terms of:

- Planning for a De-synchronised Island;
- producing a Grid Code OC9 De-synchronised Island Procedure, (DIP);
- transferring the operation of a De-synchronised Island between NGESO and the TO by means of a De-synchronised Island Operating Certificate (DIOC);
- establishing and operating a De-synchronised Island;
- liaison with Users; and
- re-synchronisation of the De-synchronised Island to the National Electricity Transmission System.

2 Key Definitions

2.1 For the purposes of STCP 06-2:

2.1.1 **Event** is as defined in the Grid Code as at the Code Effective Date and for the purposes of this STCP only, not as defined in the STC

3 Procedure

3.1 De-synchronised Island– Outage Planning Process

3.1.1 When NGESO receives an Outage request in accordance with STCP 11-1 Outage Planning that, if implemented, would require or could lead to De-synchronised Island running, NGESO shall, in conjunction with the TO and Users, consider whether a new De-synchronised Island Procedure (DIP) is required or whether it is appropriate to review and revise an applicable existing DIP (as detailed in section 3.2).

3.1.2 Where the need for a DIP is identified and agreed, the associated Outage request will only be granted if NGESO considers an appropriate DIP can be produced prior to the proposed Outage date. Agreement to the Outage request will also be conditional on NGESO obtaining User's agreement to the DIP, where appropriate.

3.1.3 At the planning stage, NGESO may agree the proposed transfer of control of a De-synchronised Island to the TO. When operation of the De-synchronised Island is proposed to be transferred to the TO, under either an Outage or following an Event, the boundary of the De-synchronised Island so transferred shall not include any

Transmission Plant and/or Apparatus not wholly owned by that TO or any User's equipment.

3.2 De-synchronised Island Procedure (DIP)

3.2.1 Identification of need for a new DIP or changes to an existing DIP

3.2.1.1 NGESO shall, in conjunction with other relevant parties within the proposed De-synchronised Island, be responsible for identifying the need for and agreeing the format and content of a DIP.

3.2.1.2 The principles that apply to establishing a new DIP under this STCP, shall also apply to any required changes to an existing DIP.

3.2.1.3 If NGESO, or any TO which is a party to a DIP, becomes aware that a change is needed to a DIP it shall:

- in the case of NGESO, initiate a discussion between NGESO and the relevant TO to seek to agree the relevant change; or
- if a TO becomes so aware, it shall contact NGESO who shall then initiate such discussions.

3.2.1.4 Following the need for a change as identified in 3.2.1.3, NGESO shall, in conjunction with the TO and other affected Users, review, update and re-issue DIPs as necessary.

3.2.2 Minimum DIP requirements

3.2.2.1 The DIP shall, as a minimum:

- include a record of which Users and User Sites are covered by the DIP;
- include a record which of the three methods set out in the Grid Code OC9.5.2 (or combination of the three) shall apply, with any conditions as to applicability;
- set out what is required from NGESO, the TO and each User in terms of each De-synchronised Island, whether planned or unplanned; and
- set out what action should be taken if a DIP does not cover a particular set of circumstances.

3.2.2.2 The DIP shall establish responsibilities for re-synchronisation, including liaison with Users and establishing the required conditions.

3.2.3 DIP development

3.2.3.1 When developing the DIP, NGESO shall be responsible for procuring from relevant Users the information necessary for the operation of the De-synchronised Island. For example, this may include (but not limited to):

- a schedule of Transmission System connected Generating Units, with appropriate MW and Mvar range within the De-synchronised Island and indicate whether these can be run as either block loads or on free governor action;
- load profile and load duration curves;
- confirmation of the Reactive Power and Frequency response capability of Generating Units within the proposed De-synchronised Island; and
- the co-ordination of the necessary contracts to provide island services within the proposed De-synchronised Island.

3.2.3.2 Where it is the intention to transfer operation of the De-synchronised Island to the TO and issue a DIOC, the DIP should contain additional information, pertinent to safe

and secure operation of the De-synchronised Island, as agreed with the TO. For example, this may include (but not limited to):

- available Embedded generation;
- confirmation of sufficient generation to meet the De-synchronised Island Demand plus response and reserve requirements;
- confirmation of sufficient Mvar capability to meet the De-synchronised Island Demand plus reserve requirements;
- restoration and contingency arrangements;
- confirmation that relevant contracts will be in place;
- power System configuration including available levels of LF relay and DAR status; and
- the update frequency of the above information.

3.2.3.3 The DIP may also include any other relevant factors that NGESO, the TO or Users believe are relevant and could have an impact on De-synchronised Island establishment or operation.

3.2.3.4 When requested by NGESO, the TO shall provide all reasonable assistance in the development and production of a DIP.

3.2.3.5 When NGESO has prepared a DIP, NGESO shall send it to the TO for agreement. Once agreed, the DIP shall be signed by NGESO and passed on to the TO for signature to provide confirmation of the agreement. NGESO will also seek written confirmation of agreement from all relevant Users.

3.2.3.6 Once signed, the DIP shall become a Grid Code OC9 De-synchronised Island Procedure under this STCP and shall apply between NGESO and the TO as if it were part of this STCP.

3.2.3.7 A copy of the DIP shall be issued by NGESO to the TO accompanied by the issue number and the date of implementation.

3.2.3.8 NGESO shall ensure, in so far as reasonably practicable, that each User shall comply with Grid Code OC9.5 (as amended from time to time), and any DIP signed as agreed by that User pursuant to Grid Code OC9.5.

3.2.3.9 If a DIP can not be agreed between NGESO and the TO, this section 3.2 shall not apply. NGESO may plan on the basis that if a DIP can be agreed with appropriate Users, it will be implemented in accordance with normal Grid Code provisions, with NGESO undertaking the operation of the De-synchronised Island.

3.3 Transfer of a De-synchronised Island

3.3.1 This section applies to De-synchronised Islands where it is the intention to transfer operation of the De-synchronised Island to the TO.

3.3.2 If the TO and NGESO are in agreement, NGESO may pass operation of a De-synchronised Island to the TO, providing that a DIP is in place that covers the particular System conditions that are encountered or expected to be encountered.

3.3.3 NGESO shall sanction De-synchronised Island establishment and operation, on the basis that all conditions relevant to the DIP and the effective operation of the De-

synchronised Island are satisfied. Any Outage that requires a DIP can only be taken when the conditions relevant to that DIP are in place.

3.3.4 The TO shall implement a DIP in accordance with its provisions or as otherwise agreed with NGESO. The TO may issue instructions to Generating Units as provided for in the DIP.

3.3.5 Prior to formal transfer, NGESO shall remain responsible for all aspects of operation within the proposed De-synchronised Island.

3.3.6 Formal transfer shall take place by the issue of a DIOC by NGESO and its acceptance by the TO. Formal transfer shall follow the guidelines in Appendix A.

3.3.7 The necessary actions to create the De-synchronised Island shall be agreed and implemented in accordance with STCP1-1 Operational Switching and the agreed DIP.

3.4 TO Operation of a Planned De-synchronised Island

3.4.1 Once the DIOC has been accepted by the TO, the TO shall be responsible for the operation of that part of the System covered by the DIOC until the DIOC is cancelled. The De-synchronised Island should be operated in accordance with the requirements of the DIP, Good Industry Practice and the following voltage and Frequency criteria:

- the Frequency on the De-synchronised Island shall be nominally 50Hz and shall be controlled within the limits 49.5 – 50.5Hz; and
- voltage levels on the National Electricity Transmission System shall normally remain within -/+ 5% of nominal. The minimum voltage is –10% and the maximum is + 10% of nominal. Voltages of +10% and –5% should not prevail for more than 15 minutes.

3.4.2 NGESO shall provide to the TO all necessary information as detailed in sections 3.2.3.1 - 3.2.3.3 (or as otherwise agreed), to the TO to enable it to fulfil its duties under the DIP. NGESO shall provide regular updates of the information as detailed in sections 3.2.3.1 - 3.2.3.3 to the TO at the following intervals:

- as agreed in the DIP;
- at the request of the TO; or
- if the Plant, Apparatus, Demand or System configuration changes significantly from that detailed in the DIP.

3.4.3 At any time during which a DIOC is in force for a particular De-synchronised Island, NGESO may, where it has good reason, cancel the DIOC and take back operation of the De-synchronised Island. NGESO shall notify Users accordingly.

3.4.4 At any time during which a DIOC is in force for a particular De-synchronised Island the TO may, where it has good reason, choose to cancel the DIOC and pass back operation of the De-synchronised Island to NGESO. NGESO shall notify Users accordingly.

3.4.5 NGESO shall retain an overview of the operation of the De-synchronised Island that has been transferred to the TO by way of the DIOC. Whilst the DIOC is in place NGESO shall not liaise with Users without agreement of the TO.

3.5 Operation of an Un-Planned De-synchronised Island

3.5.1 An Event can result in an unplanned De-synchronised Island. In such circumstance section 3.5.2 - 3.5.5 shall apply whether or not there is a DIP in place.

3.5.2 It is accepted that in the initial phase, following an unplanned De-synchronised Island Event, normal operational standards may not be achievable and the National Electricity Transmission System may be operated outside normal voltage and

Frequency criteria, provided that damage to Plant and/or Apparatus, or a safety hazard would not result.

3.5.3 If the resultant De-synchronised Island is not sustainable and is operating outside of normal parameters, then NGESO shall liaise with the TO and Users to agree how the De-synchronised Island may be safely shutdown.

3.5.4 If the resultant De-synchronised Island is not sustainable and its continued operation would risk safety or cause damage to Plant and/or Apparatus the TO may take the decision to shutdown the De-synchronised Island using the emergency Switching provisions of STCP1-1 Operational Switching and Grid Code OC7.6.6. This would only apply where the normal liaison timescales would not permit the option in section 3.5.3 to be followed.

3.5.5 If the ongoing running of the De-synchronised Island in its current form is not sustainable, but recoverable, then NGESO may liase with the TO and Users to agree a course of action to change the characteristics of the De-synchronised Island, for example, by load reduction.

3.5.6 If the De-synchronised Island is sustainable, then NGESO shall immediately liaise with the TO and all affected Users, informing Users of the situation and advising them of a De-synchronised Island under OC9.5 of the Grid Code.

3.5.7 In some circumstances immediate re-synchronisation may be possible, in which case, this will be carried out within the provisions of STCP01-1. If a period of De-synchronised Island running is required in excess of that required for immediate re-synchronisation, NGESO may make use of, where available, an existing DIP. Where there is no approved DIP, the TO shall assist NGESO by provision (where appropriate) of relevant operational information.

3.5.8 If a De-synchronised Island is established and maintained where there is no DIP in place, the De-synchronised Island shall only be maintained where all affected Users who can be contacted have agreed to the continued operation.

3.5.9 NGESO may with the agreement of the TO, pass operational responsibility of the De-synchronised Island to the TO, in line with any DIP. Transfer of operation to the TO shall be in accordance with section 3.3 and its continuing operation shall be in accordance with section 3.4.

3.5.10 In the case of Events causing an emergency situation it is accepted that it may be necessary to complete the Plant and/or Apparatus release before a DIOC is issued.

3.6 Change in conditions

3.6.1 A DIOC is only valid for the agreed configuration of the TO's Transmission System within the De-synchronised Island at the time of release. Further faults or Outages within the De-synchronised Island that have a lasting influence on the viability and or effectiveness of the De-synchronised Island must be brought to the attention of NGESO who shall agree with the respective TO the most appropriate course of action. This may include the cancellation of the DIOC and the transfer of the De-synchronised Island back to NGESO.

3.7 Re-synchronisation of De-synchronised Islands

3.7.1 Once the TO has completed the Outage (whether this be planned or unplanned), the Plant and/or Apparatus shall be made available to NGESO in accordance with STCP 01-1 Operational Switching.

3.7.2 Re-synchronisation of the De-synchronised Island shall also be in accordance with STCP 01-1 Operational Switching.

3.7.3 Following re-synchronisation of the De-synchronised Island, the TO shall inform NGESO of all relevant conditions within the transferred System and the DIOC shall

be cancelled. Operation of the De-synchronised Island returns to NGESO. NGESO shall inform appropriate Users that normal operation has resumed.

3.8 De-synchronised Island Test Bookings

3.8.1 If a planned De-synchronised Island has not taken place for a period of greater than 12 months, then NGESO may choose to carry out a De-synchronised Island Test. All De-synchronised Island Tests shall be carried out in accordance with the provision of STCP 08-3 Operational/System Testing.

3.8.2 De-synchronised Island Tests should be agreed in accordance with STCP–11-1 Outage Planning and included in the Outage database for information.

3.9 Training

3.9.1 The TO shall ensure that its control room staff continue to remain trained and suitably skilled to operate a De-synchronised Island where control is transferred to it under a DIP. NGESO shall make available, where reasonably requested, suitable training resources and facilities to assist in this process.

Appendix A: De-synchronised Island Operating Certificate (DIOC) Completion

A De-synchronised Island Operating Certificate (DIOC) will be used to formally sanction the transfer of operation of a De-synchronised Island from NGESO to the TO and vice versa. Part 1 of the certificate will be completed by NGESO and faxed to the TO.

DIOC Pro-forma Part 1

Each DIOC will have a unique code, generated by NGESO. If required, the TO may use their own additional code.

De-synchronised Island Definition

Textual description of extent of De-synchronised Island.

Grid / Supply Points

List of 4 figure codes of all Grid / Bulk supply points within the De-synchronised Island

Power Stations / Generating Units

List of all transmission / embedded BMU generation.

Boundary Circuits

List of Outaged ccts / apparatus forming the boundary to main System.

Applicable De-synchronised Island Procedure (DIP)

The title, number, version and date of the applicable DIP shall be entered in this section.

DIOC Pro-forma Part 2

De-synchronised Island Operational Release.

Once the TO has received the form, it will be checked for accuracy. Formal transfer will take place when the TO and NGESO Control Engineer agree a time / date and each party signs its copy of the form. This shall be logged in the appropriate control room logs.

DIOC Pro-forma Part 3

De-synchronised Island Operational Cancellation

At the point at which operation of the De-synchronised Island is to be transferred from the TO to NGESO, the DIOC shall be cancelled. Part 3 of the DIOC form shall be completed by agreement of a time / date and each party signs its copy. This shall be logged in the appropriate control room logs.

DE-SYNCHRONISED ISLAND OPERATION CERTIFICATE	DIOC No XXXX

Part 1
DE-SYNCHRONISED ISLAND DEFINITION

GRID/ SUPPLY POINT(S)

POWER STATION(S) / GENERATING UNIT(S)

BOUNDARY CIRCUITS

APPLICABLE DE-SYNCHRONISED ISLAND PROCEDURE (DIP)

Part 2: DE-SYNCHRONISED ISLAND OPERATIONAL RELEASE

NGESO CONTROL PERSON ……DATE……TIME……..

TO CONTROL ENGINEER……DATE…….TIME……

Part 3: DE-SYNCHRONISED ISLAND OPERATIONAL CANCELLATION

NGESO CONTROL PERSON ……DATE……TIME……..

TO CONTROL ENGINEER……DATE…….TIME……

Appendix B: Abbreviations & Definitions

Abbreviations

SHETL	Scottish Hydro-Electric Transmission Limited
TO	Transmission Owner

Definitions

STC definitions used:

Apparatus

~~Black Start~~

Code Effective Date

Generating Unit

Good Industry Practice

NGESO

NGET

National Electricity Transmission System

Outage

Partial Shutdown

Plant

System

System Restoration

Total Shutdown

Total System

Transmission

Transmission System User

User Site

Grid Code definitions used:

Balancing Mechanism

BM Unit

Demand

~~De-synchronised Island~~

Embedded

Event

Frequency

OC9 De-synchronised Island Procedure

Out of Synchronism

Reactive Power

Definitions used in this STCP 06-2:

De-synchronised Island:-	As defined in section 1.1.1 of this STC 06-02, where part of the Total System is operating Out of Synchronism with the main National Electricity Transmission System, but where there is no Total Shutdown or material Partial Shutdown (as determined by NGESO).