



NETWORKS



# Guide

## Load Indices

Issuing Authority:	Network Assets		
Content Owner:	Dorney. Ray (ESB Networks)		
Document Number:	DOC-101121-HFJ	Version:	1.0
Document Status:	Approved	Status Date:	11/08/2022

**The Requirements of this document shall be complied with by all users.  
Feedback on this document is welcome and should be given to the Content Owner.  
Requests for derogation(s) shall be referred to the Content Owner.**

# Contents

- Foreword ..... 4
- Introduction ..... 5
- i. Scope ..... 5
- ii. Mandatory References ..... 6
- 1. Definition of Load Indices and Load Indices Risk Points..... 7
  - 1.1 Load Indices Definition..... 7
  - 1.2 Load Indices Risk Points Definition ..... 7
- 2. Load Indices Rankings and Thresholds ..... 8
- 3. Load Indices Methodology ..... 9
- 4. Summary and Next Steps ..... 10
- Derogations ..... 11
- Terms & Definitions Used ..... 12

# List of Tables

*Table 1: Mandatory References* .....6  
*Table 2: Load Indices category definitions applicable to ESB Networks from PR5 onwards* .....7  
*Table 3: Load Indices risk point weightings applicable to ESB Networks from PR5 onwards* .....7  
*Table 4: Load Indices rankings and thresholds applicable to ESB Networks from PR5 onwards* .....8  
*Table 5: Terms & Definitions*.....12

## Foreword

ESB Networks committed to develop a Load Indices (LI) approach for introduction and first use in the Price Review 5 (PR5) period (2021 – 2025) in order to manage and track changes in the peak loading at its High Voltage (HV) stations and to use this as another tool to prioritise reinforcement activities.

The LI approach was developed as part of the “[Smarter HV and MV Customer Connections Innovation Project](#)” (previously known as “the Planning and Security of Supply Standards Review Innovation Project”), under the ‘Connecting Renewables’ roadmap, which was one of eight roadmaps within the overall [ESB Networks’ Innovation Strategy](#). The approach was developed in consultation with stakeholders and subsequently approved by the regulatory authority, the Commission for Regulation of Utilities (CRU).

The LI approach, developed by ESB Networks, was used to inform the PR5 submission and to correlate this against the proposed HV reinforcement plans and the LI approach has now been embedded into business as usual.

This is a new document which outlines the LI approach to be used from PR5 onwards.

There are no superseded documents to this document.

## Introduction

LIs are a network output measure to indicate station and network utilisation, at present and forecast into the future. The approach is another tool which can be used to manage and track changes in the peak loading at HV substations and to demonstrate the effectiveness of distribution reinforcement activities.

In line with ESB Networks Innovation Strategy, ESB Networks committed to the regulatory authority to develop a LI approach and chose to develop the approach as part of the "[Smarter HV and MV Customer Connections Innovation Project](#)".

As part of a technical consultancy contract supporting this innovation project, ESB Networks sought specialist advisory support from EA Technology to advise and recommend a LI framework for collating information on the utilisation of relevant electricity distribution network assets (specifically HV station transformers) and for tracking changes in their utilisation over time.

ESB Networks also carried out its own research and analysis on LIs. Using this research and analysis and informed by the EA Technology recommendations, ESB Networks developed a LI methodology applicable to the electricity distribution network in Ireland.

The LI approach proposal was consulted upon in August 2019 (See "[Public Consultation on ESB Networks' Load Indices Proposal](#)" DOC-120819-FCI).

The LI approach was subsequently approved by the regulatory authority and was first used in preparation and submission of PR5 proposals.

ESB Networks have committed to the regulatory authority to use this LI approach from PR5 onwards.

This document has been prepared to outline the LI approach to be used by the Distribution Planning and Customer Access Department within the Asset Management Directorate at ESB Networks from PR5 onwards.

### i. Scope

This document details the LI Methodology to be used by the Distribution Planning and Customer Access Department within the Asset Management Directorate at ESB Networks from PR5 onwards.

The LI process applies to major HV network substations (i.e. 110kV/38kV, 110kV/MV and 38kV/MV).

The document is structured as follows:

- Section 1 outlines the definitions of LIs and LI Risk Points;
- Section 2 presents the LI rankings and thresholds applicable for the PR5 period;
- Section 3 outlines the LI Methodology; and
- Section 4 provides a summary and discusses the next steps.

## ii. Mandatory References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies.

*Table 1: Mandatory References*

Document No.	Title
<a href="#">DOC-170220-FOM</a>	The Distribution System Security and Planning Standards

# 1. Definition of Load Indices and Load Indices Risk Points

This section presents an overview of the definition of LI and LI Risk Points as they are the two fundamental concepts that underpin the LI methodology.

## 1.1 Load Indices Definition

LIs are a measure of HV station asset utilisation and are linked with regulatory submissions and reporting.

The LI measures the loading level of station HV transformers against the firm capacity of those assets, using loading levels (percentage of firm capacity) and duration (hours/year) metrics.

A scale of 1 to 5 is used, with 5 representing a heavily loaded asset and 1 a lower loaded asset. Whilst LIs are typically calculated on an annual basis, the tracking of LI changes over time can also provide a useful overview of asset loading status. For example, a rising LI indicates growing load and higher loading of assets. The outcomes can be used to provide an overview of network performance and be used to assist in prioritisation of investments or targeting of specific projects for delivery.

The definition of the different categories of LIs applicable to ESB Networks from PR5 onwards are in accordance with Table 2.

Table 2: Load Indices category definitions applicable to ESB Networks from PR5 onwards

LI ranking	Definition
LI1	Significant spare capacity
LI2	Adequate spare capacity
LI3	Highly utilised
LI4	Fully utilised, mitigation requires consideration
LI5	Fully utilised, mitigation required

## 1.2 Load Indices Risk Points Definition

The LI of the station can be converted into a LI Risk Point, by applying a LI-specific weighting / multiplication factor to the number of customers connected to that station. The LI risk point weightings applicable to ESB Networks from PR5 onwards are in accordance with Table 3.

Table 3: Load Indices risk point weightings applicable to ESB Networks from PR5 onwards

LI ranking	LI risk point weighting
LI1	1
LI2	1
LI3	1
LI4	20
LI5	100

The overall LI Risk Point score can also be used by the regulatory authority who may track changes in the levels to assess the appropriateness of reinforcement activities made over the PR period.

## 2. Load Indices Rankings and Thresholds

The LI rankings and thresholds applicable to ESB Networks from PR5 onwards are in accordance with Table 4.

Table 4: Load Indices rankings and thresholds applicable to ESB Networks from PR5 onwards

LI ranking	Loading (%)		Duration (hours/year)		LI risk point weighting
	Lower bound	Upper bound	Lower bound	Upper bound	
LI1	0%	<80%	n/a	n/a	1
LI2	80%	<95%	n/a	n/a	1
LI3	95%	<100%	n/a	n/a	1
LI4	100%	<120%	0	<168	20
LI5	100%	<120%	168	n/a	100
	Or 120%	n/a	n/a	n/a	



### 3. Load Indices Methodology

ESB Networks are adopting the LI rankings and thresholds shown in Table 4 for application from PR5 onwards.

The LI Methodology includes:

- The completion of an annual LI Report by the Distribution Planning and Customer Access Department within the Asset Management Directorate at ESB Networks, as part of the “Special Load Reading” (SLR) Report and Process.
  - The annual LI Report contains a record for each of ESB Networks’ stations with a LI rank and associated risk points assigned to each station, applying the LI rankings and thresholds shown in Table 4.
- The updating of the LI Tracker Report by the Distribution Planning and Customer Access Department within the Asset Management Directorate at ESB Networks.
  - The LI Tracker Report includes each annual LI Report for a particular PR period. This allows ESB Networks to monitor and track changes in the peak loading of its stations over time.
- Results from the LI Report and LI Tracker Report should be used to inform business plans and prioritise reinforcement projects.

## 4. Summary and Next Steps

This document details the LI methodology to be used by ESB Networks from PR5 onwards. This methodology was developed in consultation with stakeholders and approved by the regulatory authority.

The LI methodology provides a framework for collating information on the utilisation of electricity distribution network assets and for tracking changes in their utilisation over time. The LI approach allows heavily utilised stations to be identified, which can be used as an indicator for prioritising work programmes and investment plans. This is another tool that allows ESB Networks to deliver on its PR commitments efficiently and effectively. It also demonstrates one of the methods used by ESB Networks to monitor and manage assets aiming to upgrade them at the optimal time, which provides better value for money for customers and facilitates the Climate Action Plan objectives for the Electrification of Heat and Transport.

The LI methodology has been embedded into business as usual and was first used in the PR5 submission.

Going forward, ESB Networks have made a commitment to the regulatory authority to:

- Periodically review the LI methodology for each future price review, maintaining awareness of any changes in the Great Britain and Northern Ireland regulatory models and methodology for LIs; and
- Review this document as part of ESB Networks' document management system.

## Derogations

No derogations are recorded against the requirements of this document.

## Terms & Definitions Used

For the purposes of this document, the following terms and definitions apply.

Table 5: Terms & Definitions

Term	Definition
Shall	Designates a Company Requirement, hence conformance is mandatory.
Should	Designates a Company Recommendation where conformance is not mandatory, but is recognised as best practice.
May	Designates a Permissive Statement - an option that is neither mandatory nor specifically recommended.
The Commission for Regulation of Utilities (CRU)	Government body with responsibility for regulating the energy and water industry in Ireland, also referred to as 'the regulatory authority' in this document.
High Voltage (HV)	The lower limit varies but for distribution systems this is normally a class of nominal system voltage more than 35kV and up to 138kV.
Load Index / Load Indices (LI)	A Load Index is a measure of peak loading on a HV station against its firm capacity. A five-point scale is used to assign a Load Index between 1 and 5 to a HV Station; LI1 representing a lightly loaded station and LI5 representing a heavily loaded station.
Price Review (PR)	A financial review processed by the regulatory authority - the Commission for Regulation of Utilities (CRU).
Special Load Readings (SLR)	Special Load Readings are a set of coincident measurements of simultaneous load for all distribution substations. The readings are recorded four times annually with two readings in Winter and two readings in Summer.

**LastPage** – do not delete this bookmark