Safety in Design

Guidance for the Electricity Industry

Published November 2016

eea | Electricity Engineers' Association

What is ‘Safety in Design?’

“The integration of hazard identification and risk assessment methods early in the design process to eliminate or minimise the risks of injury throughout the life of the product being designed.”

Changes for Designers

Taking safety into account is not a new concept for designers, but the safety outcomes achieved have been inconsistent and could be improved

The new Health and Safety at Work Act 2015 formally recognises the requirement to design for safety:

39 Duty of PCBU who designs plant, substances, or structures

Link directly to the wording of the act here

New Zealand Legislation

Health and Safety Reform Bill

Hon Simon Bridges

Health and Safety Reform Bill

Government Bill
192—1

EEA's Work

Steering Group
- Mike Whaley (Powerco)
- Norman Geary (Meridian Energy)
- Johan Hendriks (Alpine Energy)
- Andrew Renton (Transpower)

Requirements

- Scalable
- ESI specific
- Generic and flexible for different users (i.e. distribution, generation etc)
- Practical to use
- Address cultural as well as technical issues

Safety in Design Guide

Objectives

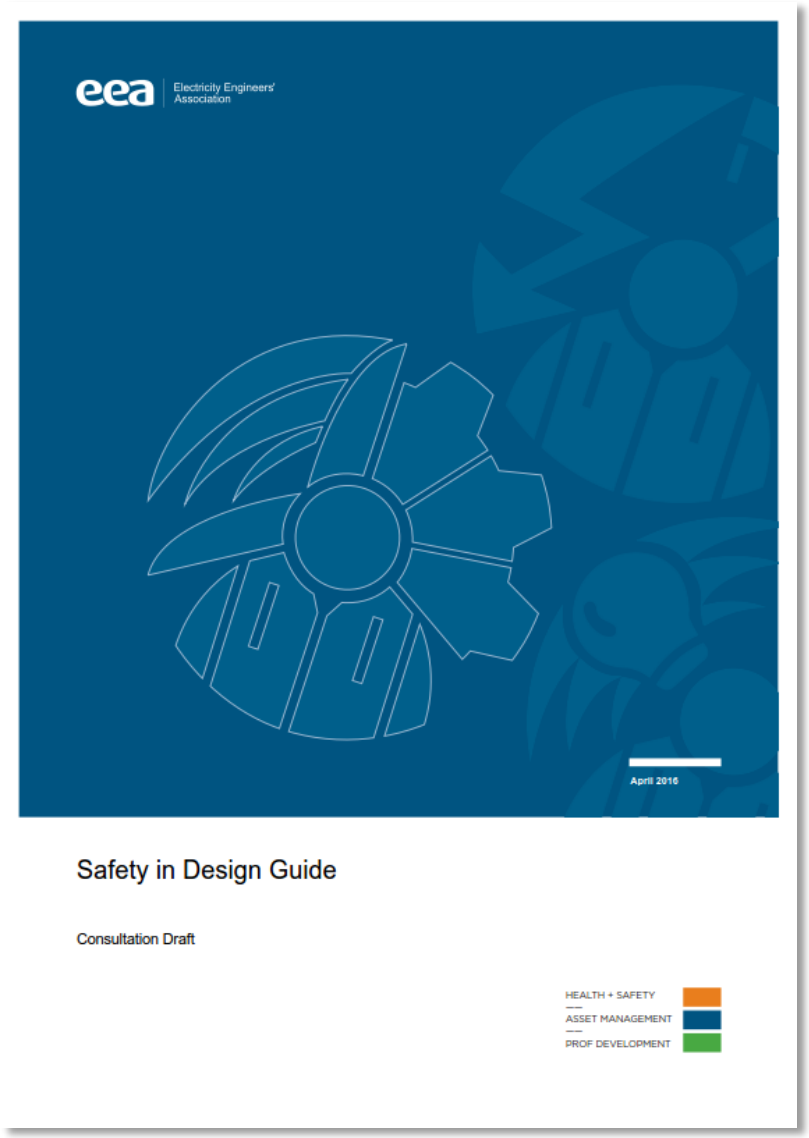
Assist electricity businesses to develop processes which:

- Provide designs that are safe
- Document design decisions
- Continuously improve the safety of designs
- Meet statutory obligations

Targeted to operational and maintenance workers, construction managers, project managers, safety professionals, executives, designers and engineers.

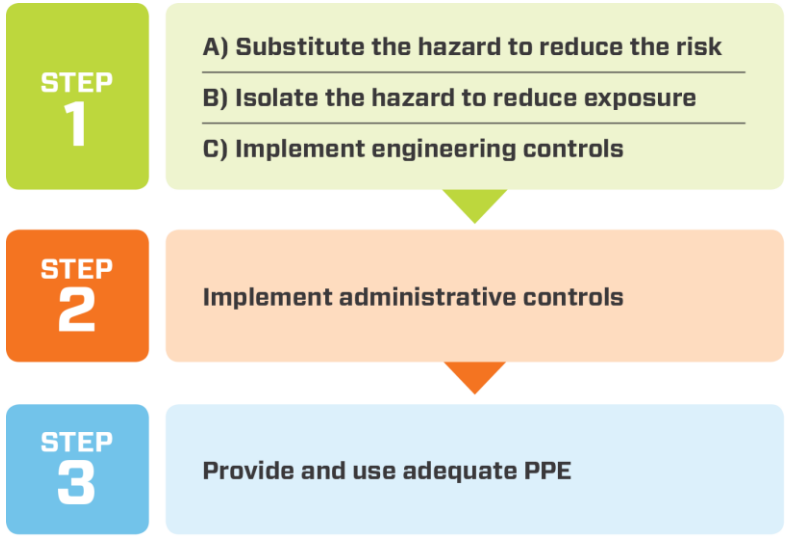
Guide Structure

- Part A: An introduction
- Part B: A general overview of SiD
- Part C: SiD Framework
- Part D: Lifting Performance in SiD
- Part E: Supporting Information (Appendices)



Design Process

- Risk identification
- Risk elimination, substitution, control mitigation etc



			Consequence				
			Trivial	Minor	Moderate	Major	Catastrophic
			Trivial or no treatment required	Injury with short-term recovery	Injury with medium term recovery	Severe or permanent injury or fatality	Multiple fatalities
Likelihood	Frequent	Routinely seen in this industry	High 11	High 13	Extreme 20	Extreme 22	Extreme 25
	Likely	Occasionally seen, 2 or 3 times per year	Moderate 5	High 12	High 15	Extreme 21	Extreme 24
	Possible	Seen less than once per year	Moderate 4	Moderate 7	High 14	High 17	Extreme 23
	Unlikely	Occurs once every few years	Low 2	Moderate 6	Moderate 9	High 16	High 19
	Rare	Hypothetical occurrence	Low 1	Low 3	Moderate 8	Moderate 10	High 18

Asset Life Cycle

Considerations throughout the asset life Cycle:

- Constructability
- Operating procedures
- Maintenance procedures
- Competence requirements
- Future proofing
- Decommissioning

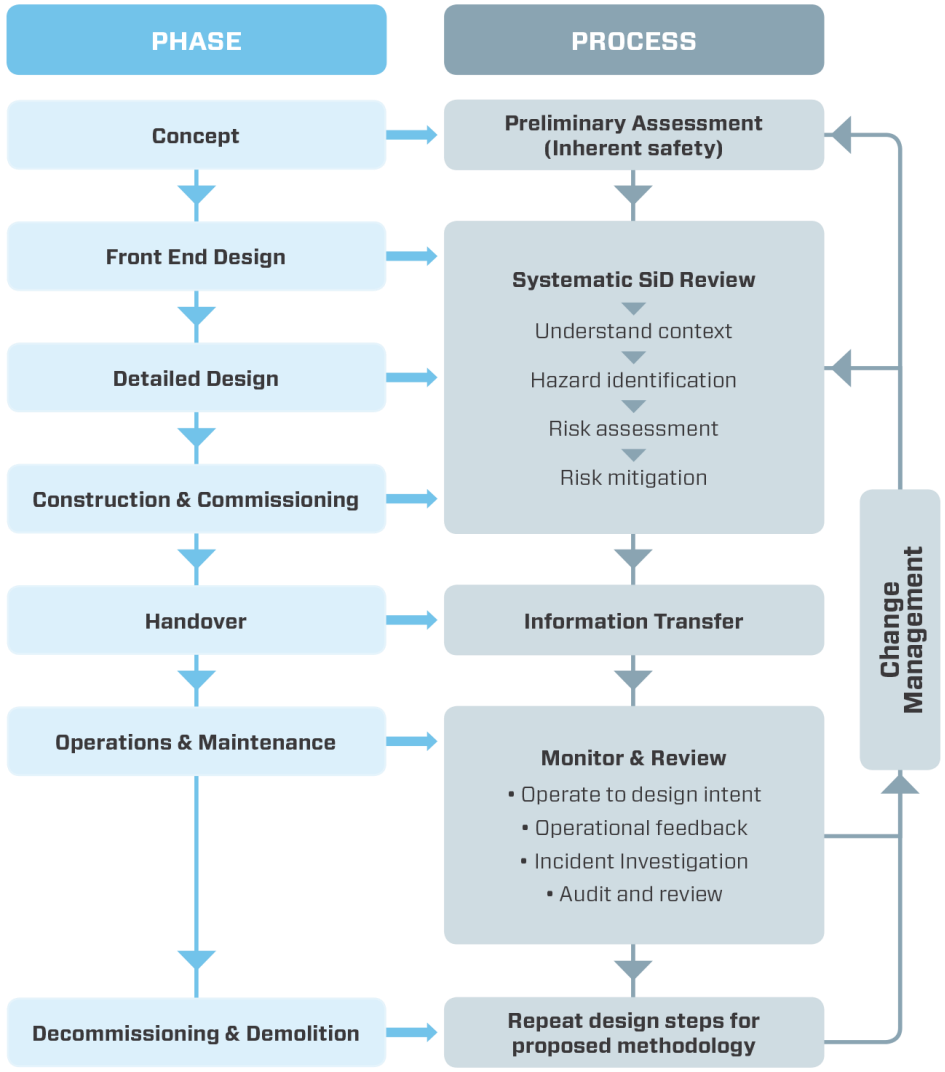
Sid Framework – Enablers

- Leadership
- Awareness and Capability
- Design Standards
- Assurance

Activity	Board	Executive Leaders	Technical (engineering and safety)	Project Managers
Routinely ask for progress/performance/inclusion of SiD				
Hold the executive accountable for maintaining their obligations				
Ensure adequate funding and support is available for SiD requirements				
Incorporate adequate technical approval into business case approval processes				
Clearly define SiD obligations for outsourced providers				
Provide adequate resources to undertake SiD				
Establish KPIs and objectives for SiD				
Ensure assurance programmes (audits etc.) include SiD				
Maintain training and capability of teams for SiD				
Approve design changes based on SiD requirements				

SiD Framework - Process

- Preliminary Assessment
- Systematic Review
- Information Transfer
- Monitor and Review
- Change Management
- Decommissioning and Demolition



Lifting Performance

Implementation Questions

1) Who should be the overall owner of the SiD process ?
2) Who should lead the development of the SiD process ?
3) Who should be the custodian of the SiD process ?
4) How should effectiveness of SiD be measured ?
5) What are the linkages with other processes ?
6) What structural boundaries does it cross ?
7) Who will have authority over critical decisions about safety in design ?

Tools

Routine Tools

- Inherent Safety Assessment
- Field Checklist
- Hazard Identification Review (HAZID)
- HAZID Guidewords
- Risk Registers

Specialist Tools

- Hazard and operability study
- Safety Integrity level review
- Failure modes and effects analysis
- CHAIR study
- Bow tie Review
- Human factors review

Running a Successful Review

Design Sections (Nodes)

Attendees

Facilitation

Information availability

Time Use

Clear Terms of Reference

Case Studies

- Browne Street Voltage Support – Powerco
- Benmore Cooling Water Pumps replacement HAZOP and CHAZOP – Meridian Energy Limited
- SiD Process for Standard Designs – Powernet

- More – to be available at the SiD portal on the EEA website

Questions and Comments?