

Part 3F: Electrical Rules

Proposal Summary for Consultation

This document is part of a series of documents to support consultation on changes to the existing Design, Construction and Equipment rules (the DCE rules). Other documents that form part of the consultation package include:

- *Invitation to Comment* - An overview of the consultation package and summary of the proposals, including information on how to have your say on the proposals.
- *Proposal summaries* - Details of the proposed changes for each of the four Rule topics being consulted on in this package: Watertight and Weathertight; Stability, Drainage, Freeboard and Subdivision; Electrical; and Radio Equipment. This document is the proposal summary for Electrical.
- *Draft Maritime Rules and draft Maritime Transport Instruments (MTI)* – a set of rules and MTIs for each of the four Rule topics.
- A template to support preparation of your submission.

These documents, and other supporting information, can be accessed at www.maritimenz.govt.nz/public/consultation/DCE-40-series-package-2/

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Purpose of this document

1. Maritime New Zealand - Nō te rere moana Aotearoa (Maritime NZ) is proposing significant reform of the Maritime Rules for vessel design, construction and equipment (the DCE Rules) for domestic commercial vessels.
2. This document provides the detailed analysis of the proposed new Electrical Rules and Maritime Transport Instrument (MTI). It explains our understanding of the issues and current situation (the 'status quo') under the present rules and sets out the analysis and rationale behind the proposed changes. Any potential impacts we have identified from the proposed amendments are also described. The information included is intended to meet the Government's Regulatory Impact Analysis requirements.
3. This document should be read in combination with the Invitation to Comment (which provides an overview of the proposed changes) and other documents that form part of the consultation package, available on Maritime NZ's website at www.maritimenz.govt.nz/public/consultation/DCE-40-series-package-2/.

Note: The word 'ship' is used in the Maritime Transport Act 1994 and the proposed Rules and MTIs. This term is used to refer to any kind of boat or craft and does not refer to a craft of a specific size. For the avoidance of doubt, the terms vessel, ship and boat can be used interchangeably. This document uses the term 'vessel'.

Introduction to Electrical

4. The electrical system on a commercial vessel is critical to safety. Most aspects of a commercial vessel rely on electricity, and a commercial vessel cannot operate without it. The electrical system must be able to supply electricity in a safe and reliable way to the systems and equipment on a vessel that need it, during normal operation and during an emergency. The need for reliability extends to back-up systems – batteries or generators – to provide electrical power to essential equipment if the main power supply becomes unavailable.
5. The proposed approach to the new Electrical Rules aligns requirements across the rules for passenger, non-passenger, fishing and sailing vessels, where practical.

Reasons the Electrical rules need to change

6. The proposed new rules address a range of issues with the current electrical rules:
 - **Separate electrical rules based on vessel type are not justified.** The current rules are in ten different locations largely based on vessel type.¹ Much of this content is the same or similar and is repeated across the rules for different vessels. Some requirements are inconsistent between vessel types with no clear reason why.

¹ Part 40A and Appendices 7 and 8 of Part 40A (passenger vessels); Part 40C and Appendix 4 of Part 40C (non-passenger vessels); Part 40D and Appendices 3 and 5 of Part 40D (fishing vessels); Part 40E and Appendix 5 of Part 40E (sailing vessels).

- **The current rules are 25 years old and have not kept pace with developments in the sector.** Three significant changes are not reflected in the current rules.
 - The move to 'drive by wire'. Traditional control systems on a vessel operate mechanically. But increasingly, control systems are electronic or electro-mechanical and routed through a centralised control system (i.e. a computer). There are no rules to support these systems.
 - The move to lithium-ion (li-ion) batteries. These batteries are compact, widely available, and are being used to replace conventional batteries. However, doing so comes with fire safety, health and system incompatibility risks which are not addressed by the current rules.
 - Electrical propulsion. Vessels driven by electric motors powered by banks of li-ion batteries are becoming increasingly common. As noted, the current rules do not address li-ion batteries. They also do not address electric motors used for main propulsion.
- **The rules require many existing vessels to comply with a standard they cannot reasonably meet.** The 2014 amendments to the electrical systems rules required many existing vessels to comply with AS/NZS 3004.2. To meet this requirement, an existing vessel that predated the standard would need to be stripped out and re-wired. This is difficult and very expensive to do and was never intended.
- **Requirements to have an alternative source of electricity to power essential equipment are inconsistent between vessel types; and standards for some vessels are not set at the right level.**
 - Alternative power requirements are not clearly specified or are not addressed for many systems essential for safety, including for electronic control systems and alarms.
 - Navigation lights are a critical safety requirement, but many vessels are not required to have an alternative source of power to keep navigation lights working if the main power source fails.²
 - Many vessels are not required to have emergency lighting if the main lighting fails.
- **When the rules require a vessel to have an alternative power source, in most cases the capacity required is unnecessarily high.** Under the current rules, when an alternative (emergency) power supply is required, a vessel must have enough power to supply all electrically powered equipment on the vessel for 12 hours. For smaller vessels this requires multiple batteries, which are heavy, expensive, and take up valuable space. Twelve hours of emergency capacity is unwarranted for most vessels, because they operate close to shore and rescue, or assistance is likely within a few hours. In addition, capacity for all electrical items is unnecessary, as non-essential electrical items can be turned off in an emergency. This issue has been addressed through a class exemption.
- **Requirements for electric engine starting are inconsistent between vessels, and incomplete.** It is standard practice to have a dual battery system when an engine is

² The Convention on International Regulations for Preventing Collisions at Sea requires navigation lights to be displayed from sunset to sunrise. Maritime Rules give effect to the Convention in Rule Part 22.

started by battery. In an emergency – for example if the engine battery is flat – the other battery can be connected temporarily to start the engine. This is a requirement in the United Kingdom (UK), Australia, and in the Standard AS/NZS 3004.2. The current rules only require this for fishing vessels.

- **The current rules do not address the persons who carry out marine electrical work.** The importance of electrical work is reflected in the requirement (since 1926) for land-based electrical work to be carried out by qualified and registered electrical workers who are accountable to the Electrical Workers Registration Board.³ In contrast, persons who carry out marine electrical work are not subject to specific qualifications or accountabilities.
- **The current rules do not clearly address the role of the vessel operator.** Some electrical rules place duties on the owner of the vessel to carry out activities and ensure compliance. These duties are often shared with the master although the master is typically an employee of the operator and lacks authority over the operation. The rules do not address the role of the operator, although they control decisions about the operation of the vessel.

Summary of proposed changes to electrical rules

7. The proposed changes to the current electrical rules are based on risk.

- Requirements are standardised between vessel types. Differences are based on vessel size and operating area, rather than vessel type.
- Equipment that is important to the safety of the vessel and people on board has been defined as ‘essential equipment’. Requirements for essential equipment have been clarified, and all essential equipment will require an alternative source of power.
- Requirements for existing vessels have been clarified, and minimum standards have been specified.
- Responsibilities of operators have been clarified and responsibilities of people carrying out marine electrical work have been specified.

8. The main changes proposed in the draft Electrical Rules and MTI are outlined in the tables below under the following six headings.

- **Proposal 1: Specifying requirements for li-ion batteries**
- **Proposal 2: Specifying requirements for electric propulsion**
- **Proposal 3: Removing the requirement for existing vessels to comply with AS/NZS 3004.2, and specifying minimum electrical safety requirements as an optional alternative**
- **Proposal 4: Extending requirements to have alternative power, reducing the required capacity of alternative power and revising switchboard arrangements:**

³ The Electrical Wiremen’s Registration Act 1925 took effect on 1 April 1926. The current legislation is the Electricity Act 1992 and associated regulations and notices.

- requiring alternative (emergency) power for navigation lights, lighting and electronic control systems and alarms
 - reducing the required capacity/duration of alternative power by linking requirements to operating limits
 - separating and labelling at the switchboard the circuits that provide power to essential equipment.
- **Proposal 5: Extending requirements to have two independent sources of power for electric engine starting to all vessel types**
 - **Proposal 6: Specifying responsibilities of persons who carry out marine electrical work, and re-aligning responsibilities of operators.**
9. The tables provide a summary of the proposed changes, the rationale for those changes and potential impacts.

Implementation

10. The Rule and MTI that will implement this proposal are set out below.
- Part 3F: Maritime (Design, Construction and Equipment – Electrical) Rules [year].
 - Maritime Transport (Electrical) Instrument [year].

Timing / Commencement date

11. The Rules and MTI are expected to come into force in 2026. Note that this date is subject to analysis of submissions received during consultation, and Ministerial agreement to any changes subsequently made in response.
12. Under Proposal 3, an existing vessel would have two years to meet minimum electrical safety requirements as an alternative to complying with AS/NZS 3004.2.
13. Under Proposal 4, an existing vessel would have five years to meet requirements for:
- Alternative power arrangements for navigation lights, lighting and electronic control systems and alarms.
 - Labelling circuits at the switchboard that provide power to essential equipment.

Products envisaged to support implementation

14. Maritime NZ will provide a short guide for the sector explaining the changes introduced by the new Electrical Rules.

What do the changes mean for my ship/vessel/boat?

15. A 'snapshot' of the proposed changes to the electrical rules is included in Appendix 1 to this document.

Please note that this document sets out the main changes that are proposed but does not include all changes that may have an impact on an operation. Therefore, we strongly recommend you also refer to the draft rule and maritime transport instrument.

Proposal 1: Specifying requirements for li-ion batteries

What we are proposing

The installation of li-ion batteries on a vessel would need to comply with the requirements specified in the revised version AS/NZS 3004.2. The matters that would be addressed in the new version of this standard include:

- location
- fire safety
- ventilation
- battery management system (BMS)
- monitoring and alarms
- charging
- testing.

As an alternative to complying with AS/NZS 3004.2, the installation of li-ion batteries would also be able to comply with the IEC 60092 series of standards or the rules of a classification society.

The design of an electrical system that incorporates a li-ion battery would need to be approved by a Design Approver Electrical (DA_E), and the installation of li-ion batteries would need to be approved by a surveyor who has been recognised as competent to survey electrical work.⁴

Note: The revised version AS/NZS 3004.2 is expected to be published in 2025. Submitters will have an opportunity to comment on this proposal during later public consultation rounds if the revised standard is not available to access during this consultation.

Status quo

The current rules do not address the use of li-ion batteries.

Li-ion batteries provide the source of energy for electrically propelled vessels. Although this work appears to be closely scrutinised by surveyors, it is happening outside of a rule's framework.

Replacement of conventional batteries by li-ion battery packs is becoming increasingly common for functions such as engine starting or to provide an alternative power source for essential equipment such as radiocommunication equipment or bilge pumps. A technical advisory group⁵ has advised Maritime NZ that this replacement is happening without the oversight of an electrical surveyor.

⁴ A DA_E and a Surveyor–Electrical Systems are persons who are recognised under Maritime Rules Part 44 as having the competence, qualifications and experience to carry out electrical design approval / electrical survey.

⁵ Maritime NZ convened a technical advisory group to help review the current electrical rules.

What is the problem / rationale for the change?

Li-ion batteries that are not installed correctly may damage the vessel and put persons on board at risk.

- Li-ion batteries may produce a higher current output than the system was designed for, which can damage wiring or circuitry.
- Incorrectly installed li-ion batteries can damage essential equipment, for example, radio, navigation, steering, bilge pumps, or cause it to perform poorly while the vessel is at sea.
- There have been multiple reports overseas and in New Zealand of fires associated with li-ion batteries installed on vessels (or installed in equipment on vessels).
- Li-ion batteries that are punctured or physically damaged can release gases or electrolytes that can cause severe health problems or explosions.

Impact of the proposed change

Benefits of the proposed changes include reducing the risk of fire and consequent risk to the vessel and any persons on board; reducing the risk of dangerous gases endangering the health of persons on board; protecting essential equipment on the vessel from being damaged; and protecting electrical wiring and circuitry on the vessel from being damaged.

Clarifying the need to have surveyor approval could increase costs for any operators who intend to swap conventional batteries for li-ion batteries without following a sound process. Costs could vary from several hundred to several thousand dollars depending on the vessel involved. In addition to surveyor fees, costs could include alterations to the electrical system and alterations to provide appropriate ventilation and/or fire protection to the space in which the li-ion battery or battery bank is located. These are the 'actual' costs of meeting the Maritime Transport Act requirements to carry out activities safely.

Options analysis

The following two options were considered:

Option 1: (Status quo). Rules do not address the use of li-ion batteries.

Option 2: (Preferred option). New rules that require the installation of li-ion batteries to conform to AS/NZS 3004.2; or the IEC 60092 series of standards; or the rules of a classification society.

How do the options compare against the status quo

The following criteria have been used to assess the alternative option. Refer to Table 1 for an assessment against these criteria.

<i>The changes provide flexible and adaptive regulation:</i>	Option 2 is adaptive because it would introduce new rules to address emerging technology. The detailed requirements are in the MTI, which is expected to be faster to amend in response to further developments, compared to rules.
<i>Rules are clear and easier to understand and apply:</i>	Option 2 would provide clarity to the sector about how to approach the use of li-ion batteries.
<i>Maritime safety is maintained or enhanced:</i>	Option 2 would improve safety by ensuring that the risks associated with using li-ion batteries are properly addressed.
<i>Changes are practical and economically viable:</i>	Option 2 would be practical to implement and refers to recognised standards. Short term costs may increase for operators who prefer to swap conventional batteries with li-ion batteries without following a sound process. In the long term these costs will be offset by reductions in damage due to incorrect installation.

Table 1: Comparing options against the status quo. New rules addressing the installation of Li-ion batteries

	1. Status Quo	2: New rules addressing the installation of li-ion batteries
Provides flexible and adaptive regulation	0	+
Rules that are clear and easier to understand and apply	0	++
Maritime safety is maintained or enhanced	0	++
Changes are practical and economically viable	0	+
Overall assessment	0	++

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing /the status quo/counterfactual

Preferred option
Introducing new rules that address the installation of li-ion batteries (Option 2) is the preferred option. It meets all criteria and is better or much better than the status quo.
What are the marginal costs and benefits of the preferred option?
<p>Short term costs may increase for operators who prefer to swap conventional batteries with li-ion batteries without following a sound process (noting that these are the ‘true’ costs of running an operation safely).</p> <p>Short term costs would be offset over the long term through reductions in damage or the risk of damage caused by incorrect installation of li-ion batteries.</p>

Table 2: Marginal costs and benefits of new rules addressing the installation of li-ion batteries, compared to taking no action

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Vessel operators	<p>The changes reflect the true costs of installing li-ion batteries. In this sense, they do not impose additional costs.</p> <p>The change will be a cost for operators who install li-ion batteries without following good practice.</p>	Low	<p>Medium</p> <p>The impact of the change is difficult to quantify. Information about swapping conventional batteries for li-ion batteries is anecdotal.</p>
Persons doing marine electrical work	<p>Marine electrical workers will need to adjust to the new rules, especially if they have been installing li-ion batteries without following good practice.</p>	Low	<p>Medium</p> <p>The new requirements are straightforward. However, competence may be an issue for some workers.⁶</p>

⁶ Proposal 6 addresses this issue by placing specific duties on persons who carry out marine electrical work

Additional benefits of the preferred option compared to taking no action

Vessel operators	Vessel operators would benefit in the long term. The rules would reduce the risk of damage to their vessels and the risk of harm to persons on board.	Medium An incident is possible, and the consequences could be major.	Medium Data is not available about the extent to which li-ion batteries are being adopted.
People who work on or travel on commercial vessels	People on existing vessels with li-ion batteries would be less exposed to risk of harm.	Medium An incident is possible, and the consequences could be major.	Medium Data is not available about the extent to which li-ion batteries are being adopted.
The regulatory system	The proposal would correct a known gap in the rules and promote a consistent approach.		

Question:

E 1.1 Do you agree that the design and installation of li-ion batteries should comply with AS/NSZ 3004.2; IEC standards; or classification society rules, and be approved by an electrical surveyor?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 2: Specifying requirements for electric propulsion

What we are proposing
<p>Electric propulsion equipment on a vessel would need to comply with the requirements specified in either:</p> <ul style="list-style-type: none"> - the revised version of AS/NZS 3004.2 - the rules of a classification society. <p>Note: The revised version AS/NZS 3004.2 is expected to be published in 2025. Submitters will have an opportunity to comment on this proposal during later public consultation rounds if the revised standard is not available to access during this consultation.</p>
Status quo
<p>The current rules do not address electric propulsion.</p>
What is the problem / rationale for the change?
<p>Electric propulsion has been introduced to commercial operations in recent years and is expected to become more widely used. The absence of a rule framework creates uncertainty and leads to churn as parties determine what requirements should apply.</p>
Impact of the proposed change
<p>Introducing rules provides certainty and a level playing field. This proposal is expected to be cost neutral or reduce transaction costs.</p>

Options analysis

Three options were considered:

Option 1: (Status quo). Rules do not address electric propulsion.

Option 2: New rules that specify detailed requirements for electric propulsion systems.

Option 3: (Preferred option). New rules that recognise established standards for electric propulsion systems.

How do the options compare against the status quo

The following criteria have been used to assess the alternative option. Refer to Table 3 for an assessment against these criteria.

The changes provide flexible and adaptive regulation: Option 3 is adaptive because it would introduce new rules to address emerging technology. It is flexible because the detailed requirements are contained in standards referenced in the MTI. Locating the requirements in an appendix to the MTI is expected to result in a faster amendment process compared to rules as the technologies develop and standards are revised.

Rules are clear and easier to understand and apply: Option 3 is clear and easy to understand. It references established classification society rules, or requirements that would be included in the new version of AS/NZS 3004.2. For new and complex technology, this is a better approach than developing rules specific to New Zealand (Option 2).

Maritime safety is maintained or enhanced: Option 3 would improve safety by ensuring that the risks associated with using electric propulsion are properly addressed. Option 2 could also do this but would take significant time to develop.

Changes are practical and economically viable: Option 3 would be practical to implement. It recognises established standards that have already been developed or (in the case of AS/NSZ 3004.2) would be released soon. Option 2 would require significant investment to develop requirements which would then only be recognised in New Zealand.

Table 3: Comparing options against the status quo. Specifying requirements for electric propulsion systems.

	1. Status Quo. No rules address electric propulsion	2: Develop NZ rules for electric propulsion	3. Reference established standards for electric propulsion
Provides flexible and adaptive regulation	0	+	++
Rules that are clear and easier to understand and apply	0	+	++
Maritime safety is maintained or enhanced	0	+	+
Changes are practical and economically viable	0	-	++
Overall assessment	0	+	++

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing/the status quo/counterfactual

Preferred option
Referring to established standards covering electric propulsion (Option 3) is the preferred option. It would be better than developing specific New Zealand rules and much better than the status quo.
What are the marginal benefits and costs of the preferred option?
Providing rules for electric propulsion systems provides certainty, reduces churn and supports a consistent approach. There are no obvious costs associated with this proposal.

Table 4: Marginal costs and benefits of specifying requirements for electric propulsion

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Vessel builders, owners, operators, and surveyors	Would need to become familiar with the new rules.	Low	High Proposal is straightforward, & Maritime NZ has engaged with the sector. Classification society rules are already being used.
Additional benefits of the preferred option compared to taking no action			
Vessel builders, owners and operators	Provides certainty and reduces churn.	Low	High Most vessels are conventionally propelled. This improvement would only impact a small number of vessels.

Question:

E 2.1 Do you agree that electric propulsion systems should comply with the new version of AS/NZS 3004.2 or with IEC standards or classification society rules?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 3: Providing existing vessels with an option to comply with minimum electrical safety requirements as an alternative to complying with AS/NZS 3004.2

What we are proposing
<p>The proposed new rules include an option for existing vessels to meet minimum standards of electrical safety specified in the MTI, instead of complying with the standards specified in the rules. The minimum requirements address:</p> <ul style="list-style-type: none"> - overcurrent protection - labelling the switchboard where an inverter is used - insulation of cables and safe wiring at the switchboard - earthing of electrical circuits - installation of electrical fittings and equipment - connection to shore power. <p>A two-year transition period from the commencement date of the new rules is proposed to give operators of existing vessels time to get remedial work done, where this is needed to meet the minimum electrical safety requirements.</p> <p>This option would not be available for new vessels.</p>
Status quo
<p>The current rules / regulatory environment</p> <p>A 2014 amendment to the electrical systems rules (“the amendment”) incorporated by reference the electrical standard AS/NZS 3004.2. This standard describes detailed installation requirements for electrical work on a vessel, including a requirement to install marine grade electric cable. The effect of the amendment was to require most existing vessels of less than 24 metres in length to comply with AS/NZS 3004.2.</p> <p>Surveyors and operators advised Maritime NZ of the difficulty in complying. An initial fix proposed as part of a 2017 rule amendment ‘omnibus’,⁷ did not proceed for technical reasons.</p>
<p>Our understanding of current practice</p> <p>Costs of \$200,000, \$70,000 and \$40,000 have been reported by different operators to strip out rewire and refit their existing vessels to comply with the 2014 rule amendment. It appears that other operators have not been required to meet the rules, and that the 2014 rule change has not been consistently applied.</p>

⁷ An omnibus rule change is when one amendment Rule Part makes a series of minor and technical changes to a range of Rule Parts.

What is the problem / rationale for the change?

The 2014 rule amendment has generated considerable concern in the sector, which has called for change. The costs to comply with AS/NZS 3004.2 are substantial and disproportionate relative to the safety benefits.

The 2014 rule amendment appears to have been inconsistently applied, resulting in 'an uneven playing field' that undermines the integrity of the regulatory system. In cases where vessels do not comply with AS/NZS 3004.2, electrical surveyors have spoken of vessels that do not meet basic standards of electrical safety.⁸

Fixing the current situation is not straightforward. The requirement to comply with AS/NZS 3004.2 cannot be removed without putting something in its place. The earlier standards that applied when older vessels entered the fleet are obsolete and no longer available, and in many or most cases the design documentation to which older vessels were originally built cannot be referred to because it has been lost.

Impact of the proposed change

The proposed minimum electrical safety standards have been developed to ensure that existing vessels can meet a baseline level of electrical safety that is practicable to achieve at reasonable cost, without needing to fully comply with current standards. It is thought that many existing vessels will already meet some of the requirements but perhaps not all. This means that some remedial work may be required to meet the proposed minimum standards. For example, vessels may need to install overcurrent protection against electric shock.⁹ Other potential work could include work to tidy up the switchboard or ensuring that the system is correctly earthed.

The cost of this work could range from \$500 to \$5,000 depending on the size and complexity of the vessel and the work that needs doing. Some operators could face delays securing tradespeople to carry out the work, particularly those located outside of the main centres.

The proposed minimum electrical safety standards would have no impact on new vessels entering the fleet, as these would need to comply with the standards proposed in the MTI.¹⁰

⁸ Refer Technical Advisory Group.

⁹ Traditionally, overcurrent protection meant having a fuse on a circuit. Modern systems require a residual current device or RCD. These have been required on land since 1991 in Australia and 2003 in New Zealand. They have been required for commercial vessels in Australia since 2013.

¹⁰ AS/NZS 3004.2, the IEC 60092 series of standards, or the rules of a classification society.

Options analysis

Two options were considered:

Option 1: (Status quo). Continue to require existing vessels to comply with AS/NZS 3004.2.

Option 2: (Preferred option). New rules that give existing vessels the option of complying with AS/NZS 3004.2 or a set of minimum electrical safety standards specified in an MTI.

How do the options compare against the status quo

The following criteria have been used to assess the options. Refer to Table 5 for an assessment against these criteria.

<i>The changes provide flexible and adaptive regulation:</i>	Option 2 would increase options for existing vessels. Locating the requirements in a schedule to the MTI is expected to result in a faster amendment process compared to rules.
<i>Rules are clear and easier to understand and apply:</i>	Option 2 would include two pages of clearly set out basic requirements in an appendix schedule to the MTI. The final MTI would be available on Maritime NZ's website. In contrast, the electrical standards must be purchased.
<i>Maritime safety is maintained or enhanced:</i>	Option 2 would ensure that existing vessels meet a basic level of electrical safety.
<i>Changes are practical and economically viable:</i>	Option 2 describes a set of basic requirements that an existing vessel could readily achieve. It would provide a sensible solution to the current situation and strikes an appropriate balance between cost and safety. The cost of Option 2 could range from \$500 to \$5,000 depending on vessel size and the complexity and condition of the electrical system. These potential costs are a small fraction of the cost of complying with AS/NZS 3004.2, which could range from \$20,000 to \$200,000 depending on vessel size and complexity. ¹¹

¹¹ It is assumed that small low complexity vessels would cost substantially less than larger and higher complexity vessel.

Table 5: Comparing options against the status quo. Providing existing vessels with an option to comply with minimum electrical safety requirements as an alternative to complying with AS/NZS 3004.2

	1. Status Quo	2: Option for existing vessels to comply with a set of minimum electrical safety requirements specified in a MTI
Provides flexible and adaptive regulation	0	++
Rules that are clear and easier to understand and apply	0	++
Maritime safety is maintained or enhanced	0	++
Changes are practical and economically viable	0	+
Overall assessment	0	++

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing/the status quo/counterfactual

Preferred option
Providing an option for existing vessels to comply with a set of minimum electrical safety requirements (Option 2) is the preferred option. It meets all criteria and is significantly better than the status quo.
What are the marginal costs and benefits of the preferred option?
<p>Vessel operators could face costs of \$500 to \$5,000 for remedial work to meet minimum electrical safety requirements. This contrasts with the reported costs of up to \$200,000 to fully comply with AS/NZS 3004.2.</p> <p>People who work on or travel on existing vessels that meet minimum electrical safety requirements will have less exposure to the risk of electric shock or the consequences of an electrical system failure. Correcting a known issue would support the integrity of the regulatory system.</p>

Electrical Proposal Summary

Table 6: Marginal costs and benefits of removing the requirement for existing vessels to comply with AS/NZS 3004.2, and specifying minimum electrical safety requirements as an alternative

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Existing vessel operators	Vessels may require some remedial work to meet the proposed minimum electrical safety standards.	Medium Estimated cost range of \$500 to \$5,000	Medium Electrical surveyors have reported examples of poor electrical safety. Due to lack of data, the precise impact is uncertain.
Additional benefits of the preferred option compared to taking no action			
Existing vessel operators	An estimated 1,500 – 1,800 vessels could benefit by not having to comply with AS/NZS 3004.2.	High Costs to upgrade an existing vessel could range from \$20,000 to \$200,000	Medium The high compliance cost is theoretical. Operators may be operating without complying with AS/NZS 3004.2
Existing vessel operators	A vessel that meets a minimum level of electrical safety is less likely to have electrical issues.	Medium	Low – Medium The electrical system will meet minimum safety standards. The impact of these improvements is hard to quantify.
People who work on or travel on commercial vessels	People on existing vessels would benefit from better electrical safety standards by being less exposed to risk.	Medium	
Regulators / the regulatory system	The proposal would correct a known issue with the rules.	Medium Non-compliance undermines the integrity of the regulatory system.	Low Difficult to assess the effects of the current issue, and the extent to which the proposal will restore confidence in the system

Question:

- E 3.1 Do you agree with the proposal to give operators of existing vessels an option to comply with a set of minimum electrical safety requirements specified in an MTI, as an alternative to complying with AS/NZS 3004.2?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 4: Changes to arrangements for alternative electrical power

What we are proposing

There are three parts to the proposals for alternative power.

Part 1 – Essential equipment would require an alternative source of electrical power

All vessels would require an alternative source of electrical power to ensure that essential equipment on a vessel can continue to operate if the main power source fails. Essential equipment is defined in the proposed new rule to mean navigation lights, emergency lighting, radio power and light, electronic control systems and alarms, and electrically powered bilge pumps.

Navigation lights. Vessels of less than 12 metres operating in restricted limits / inshore fishing limits would be able to carry battery-operated navigation lights to use if the main navigation lights fail. This would be an alternative to having a hard-wired alternative power source.

Emergency lighting. Existing vessels, and vessels of less than 12 metres in length overall operating in restricted limits or inshore fishing limits would be able to use a rechargeable torch or a battery-operated lamp as emergency lighting.

Part 2 – Reducing the capacity of alternative electrical power required

The capacity of the alternative source of electrical power required for most vessels would reduce from 12 hours to:

- 2 hours for vessels operating in enclosed water limits
- 3 hours for vessels operating in inshore limits and inshore fishing limits
- 6 hours for vessels operating in coastal limits.

Vessels operating in the offshore limits and the unlimited area would continue to require 12 hours alternative power capacity.

Part 3 – Essential equipment circuits at the switchboard

On all vessels, circuits that provide power to essential equipment would need to be clearly labelled at the switchboard.

On a new vessel, these circuits would also need to be arranged separately at the switchboard.

These proposals are designed to ensure that non-essential circuits can easily be identified and turned off in an emergency – leaving power available to run essential equipment.

Transition arrangements

Existing vessels would have five years to meet the new requirements, from the date when the new rules come into force.

What is the problem / rationale for the change?

Commercial vessels cannot operate safely without electrical power. In simple terms, the propulsion engine feeds electricity to a battery, which in turn supplies power to equipment and appliances on the vessel. If the engine fails, no electricity is generated. If the battery fails, no electricity is available to supply essential equipment.¹² An alternative source of electrical power - usually a second battery or battery bank - ensures that electricity is always available to supply essential equipment.¹³

The current rules require alternative power (also called emergency power) for some (but not all) essential equipment on some (but not all) vessels. The rationale for which vessels require alternative power, and which equipment on those vessels require it, is unclear.

Radio and radio light. All vessels currently require an alternative power supply. This proposal is not a change for these items.

Electric bilge pumps. All fishing and sailing vessels and all post 27 May 2004 passenger and non-passenger vessels require an alternative power supply under the current rules. This policy could be a change for around 900 pre-27 May 2004 passenger and non-passenger vessels.

Navigation lights. More than half the New Zealand commercial fleet does not require an alternative power source for navigation lights. If the main power system fails these vessels are effectively invisible to other vessels after dark, placing the vessel and their crew, and other vessels and crew in the vicinity at risk of collision and significant harm.¹⁴ The purpose of navigation lights is to prevent vessels colliding at night. The Convention on International Regulations for Preventing Collisions at Sea¹⁵ requires navigation lights to be displayed from sunset to sunrise. Australia requires all commercial vessels to have an emergency source of electrical power for navigation lights installed on all vessels after 30 November 2009.¹⁶ The UK requires an emergency source of electrical power for navigation lights installed on all vessels.¹⁷

Emergency lighting: Emergency lighting is important to safety. It helps people on board to safely operate equipment, move around the vessel, and, if necessary, evacuate the vessel if the main power is lost. Most vessels in the fleet do not require arrangements to provide emergency lighting.¹⁸

Alternative power source for control systems and alarms: Systems and equipment on many vessels are now controlled by electronic means, but the rules do not address what

¹² This description is illustrative. The electrical system on a vessel is more complicated than described here.

¹³ Larger vessels will have an engine-powered generator.

¹⁴ This includes passenger and non-passenger vessels of less than 12m in length, and fishing vessels of less than 45m in length.

¹⁵ Known as the 'COLREGS'. Maritime Rules give effect to the Convention in Rule Part 22.

¹⁶ Through its adoption of the Annex to IMO Resolution MSC.253(83) *Adoption of the performance standards for navigation lights, navigation light controllers and associated equipment*.

¹⁷ Refer MCA Workboat Code.

¹⁸ Emergency lighting is not required for passenger and non-passenger vessels operating within restricted coastal limits that are either less than 12m in length or that are pre pre-27 May 2004 ships of any length; or any fishing vessel less than 45m in length.

happens with electronic controls if the main power becomes unavailable.¹⁹ This is a significant risk, as a failure could mean the master cannot steer the vessel and that other essential systems do not work.

Alternative power capacity: The radio-communication and bilge rules (read together) require 12 hours of alternative electrical power capacity. The provisions are based on SOLAS requirements applying to large ocean-going ships. The sector has expressed concern that the current alternative power capacity requirements are unreasonable / impracticable. Battery banks are heavy, expensive and take up valuable space; and 12 hours is excessive for vessels operating close to shore. To address these concerns, Maritime NZ has issued class exemption EXA-940 Maritime Transport (Class Exemption — Radiocommunication Equipment) Notice 2023.

Switchboard arrangements for essential equipment: When the main power system is unavailable in an emergency, appliances such as heaters or refrigerators can put the vessel at risk by draining power required for essential equipment. The master needs the ability to control electricity use on the vessel, by switching off non-essential items. The current rules do not address switchboard arrangements for essential equipment, although this is required under AS/NZS 3004.2.

Impact of the proposed changes

These proposals are expected to have a minimal impact on new vessels, since they are easily accommodated during the design and build process and reflect current standards and sector practice.

The impacts for existing vessels are discussed below. The benefits of these proposals are difficult to estimate as they address low frequency but high consequence events. Loss of power to essential systems is not common but is not unheard of and has the potential to cause serious harm to persons on board and loss of the vessel. With a collision, both vessels could be seriously impacted.

Alternative source of electrical power for navigation lights: Around 1,000 passenger and non-passenger vessels and 150 fishing vessels of less than 12 metres in length overall that operate within restricted limits or inshore fishing limits will be able to use battery-operated LED navigation lights as an alternative source of power, at a cost starting around \$100.

Passenger and non-passenger vessels of 12 metres or more already require emergency power for navigation lights. Around 150 fishing vessels of 12 metres or more would require wired alternative power to navigation lights at a cost of \$500 to 1,500.

Alternative source of electrical power for emergency lighting: Around 2,200 existing vessels are not required to have emergency lighting. Vessels that do not have emergency lighting would be able to carry battery-operated torches or lanterns as emergency lighting, at a cost less than \$100.

¹⁹ Only fixed fire detection and alarm systems require a second source of power to ensure that the systems continue to function in an emergency.

Electronic control systems and alarms: These systems tend to be associated with vessels that are newer, and/or more complex. Data on the number of vessels impacted is not available, but the cost impact is thought to be minor as most systems should already meet the proposed requirements.

Reduced emergency power capacity: Reducing the required battery capacity provides a saving of many hundreds of dollars, particularly for smaller vessels as the current battery capacity required is bulky, heavy and expensive. The benefits of this proposal are difficult to quantify because it would formalise arrangements that have been in place through exemptions since 2021.

Switchboard arrangements for essential equipment: Reducing the capacity of alternative power a vessel holds could pose some risk if all electrical appliances on the vessel continue to draw power in an emergency. Labelling essential circuits and arranging them separately on the switchboard would help to ensure that the master can keep operating the vessel in an emergency without precious power being wasted. Newer vessels are likely to meet or largely meet this requirement already. For older existing vessels, labelling circuits for essential equipment could cost several hundred dollars if a marine electrical worker is engaged to do it.

Options analysis

Three options were considered.

Option 1: (Status quo). Most vessels would not require alternative power for navigation lights, general lighting and alarms and control systems. The Class Exemption EXA-940 regarding the capacity of alternative power would remain in place until it expires in 2028. The rules would remain silent in terms of configuring the switchboard to identify essential circuits.

Option 2: (Preferred option). All vessels would require an alternative source of electrical power to ensure that navigation lights, lighting, electronic control systems and alarms continue to function if the main power source fails. The capacity of the alternative source of power required for most vessels would reduce based on operating limits; circuits that provide power to essential equipment would need to be labelled at the switchboard and arranged separately on new vessels.

Option 3: The changes proposed in Option 2 would only apply to new vessels entering the fleet.

How do the options compare against the status quo

The following criteria have been used to assess the alternative option. Refer to Table 7 for an assessment against these criteria.

<i>The changes provide flexible and adaptive regulation:</i>	Options 2 and 3 are adaptive and would align requirements with those of comparable jurisdictions.
<i>Rules are clear and easier to understand and apply:</i>	Option 2 would set clear requirements that apply to all vessels. Option 3 would be less clear, as it would result in dual requirements depending on the date the vessel entered the system.
<i>Maritime safety is maintained or enhanced:</i>	Option 2 would result in better and more consistent safety standards. Option 3 would have much less impact because it would apply to new vessels entering the fleet, and the fleet replacement rate is estimated to be less than 2% per year.
<i>Changes are practical and economically viable:</i>	Option 2 is straightforward to implement. It confirms benefits put in place on a temporary basis through exemptions. It could impose modest costs on up to 2,000 operators (the actual number is unknown.) These costs would be a small fraction of the potential consequences if the main power supply to essential equipment fails and arrangements for alternative power are not in place.

Table 7: Changes to requirements to have an alternative source of electrical power

	1. Status Quo	2. Alternative power arrangements for new and existing vessels	3. Alternative power arrangements for new vessels entering the fleet
Provides flexible and adaptive regulation	0	+	+
Rules that are clear and easier to understand and apply	0	++	+
Maritime safety is maintained or enhanced	0	++	+
Changes are practical and economically viable	0	+	+
Overall assessment	0	++	+

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing/the status quo/counterfactual

Preferred option
Option 2 (alternative power for navigation lights, lighting, electronic control systems and alarms; reduced capacity of alternative sources of electrical power; alternative power circuits to be labelled and arranged separately on the switchboard) is the preferred option. It meets all criteria and is better than the status quo.
What are the marginal costs and benefits of the preferred option?
<p>The safety benefits are difficult to quantify. Comparable jurisdictions such as Australia and the UK already require these measures, and the costs would be a small fraction of the potential costs of collision due to lack of navigation lights, or injuries due to working in or moving around the vessel in the dark, or loss of steering and/or the ability to control the vessel.</p> <p>Around 1,150 passenger, non-passenger and fishing vessels of less than 12 metres in length overall that operate within restricted limits or inshore fishing limits could incur costs of \$100 or more to make alternative arrangements for navigation lights if the main lights fail. Around 150 fishing vessels of 12 metres or more would require wired alternative power to navigation lights at a cost of \$500 to \$1,500.</p>

Electrical Proposal Summary

Around 2,200 vessels could use battery operated torches or lanterns as emergency lighting at a cost of less than \$100. The numbers of vessels that have emergency lighting now is not known.

Around 2,000 vessels could require labelling of the switch board, which could cost around \$200 to \$300. The actual numbers of vessels affected is not known.

Table 8: Marginal costs and benefits of changes to requirements to have an alternative source of electrical power

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Operators of existing vessels	Label essential circuits on the switchboard.	\$200 - 300	Low Actual cost will depend on multiple factors.
Operators of passenger, non-passenger & fishing vessels <12m	Alternative power for navigation lights.	\$100	
Operators of fishing vessels >12m	Alternative power for navigation lights.	\$500 - \$1,500	
Operators of existing vessels	Alternative power for emergency lighting.	Less than \$100	
Additional benefits of the preferred option compared to taking no action			
Vessel operators	Lower capacity of emergency power required.	Saving in weight, space and cost.	Medium Operators may already be taking advantage of exemptions.
Vessel operators	Labelling of essential circuits at switchboard.	Difficult to quantify but could include reduced loss of life and reduced loss of the vessel.	Low Specific incident data is not available.

Additional benefits of the preferred option compared to taking no action (cont.)

Vessel owners and operators	Alternative power or alternative arrangements for navigation lights.	Difficult to quantify. All vessels benefit because navigation is safer if the possibility that some vessels could 'go dark' is reduced.	Low Low frequency high consequence event.
Vessel crew and persons travelling on vessels	Safety is improved if essential safety systems have 'back-up' power available.	Difficult to quantify but could include reduced injury or loss of life.	Low Difficult to quantify

Questions:

E 4.1 Do you agree that all vessels should have alternative sources of electrical power available for essential equipment (navigation lights, emergency lighting, radio power and light, electronic control systems and alarms, electrically powered bilge pumps)?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

E 4.2 Do you agree that alternative power circuits should be labelled on the switchboard so that non-essential circuits can be switched off in an emergency?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 5: New vessels with electric engine starting would require two batteries or battery banks with a changeover switch

<p>What we are proposing</p>
<p>All new vessels equipped with electric starting for the main propulsion engine would need to have both a dedicated battery / battery bank to start the engine and another battery / battery bank reserved for supplying the vessel's electrical services. A changeover switch would need to be installed to make it possible to start the propulsion engine(s) from either battery or battery bank.</p> <p>This proposal would not apply to existing vessels.</p>
<p>Status quo</p>
<p>The current rules / regulatory environment</p> <p>Under the current rules, if the sole means of starting the engine is by battery, fishing vessels require an alternative battery that can be directly connected to the starter motor via a changeover switch. Other vessel types are not addressed.</p>
<p>Our understanding of current practice</p> <p>Dual battery systems are required in standards, and (anecdotally) are common on commercial vessels, even if they are not required by the rules.</p>
<p>What is the problem / rationale for the change?</p>
<p>Being unable to start a car because the battery is flat is inconvenient. Being unable to start a vessel's propulsion engine could be life threatening. Without engine power the vessel could lose steering and drift. Propulsion failure has been associated with vessels turning side-on to waves and capsizing. Anecdotal evidence from the Coastguard is that flat batteries are a leading reason they are called to rescue recreational vessels.</p> <p>A dual battery system means that engine starting is possible from the alternative battery or battery bank. This increases vessel safety, as it is unlikely that both sets of batteries would be flat at the same time. Australia and the UK both require dual batteries / battery banks with starting possible from both using a changeover switch.</p>
<p>Impact of the proposed change</p>
<p>Dual batteries and a changeover switch would increase safety at sea. The cost of this proposal is expected to be minor, as it would be addressed during vessel design and construction</p> <p>Dual batteries and a changeover switch are common in newer vessels.</p>

Options analysis

Three options were considered:

Option 1: (Status quo). Continue the current approach. Fishing vessels would require a dual battery system with a changeover switch, but other vessel types would not.

Option 2: All vessels with electric engine starting would be required to have a dual battery system with a changeover switch.

Option 3: (Preferred option) New vessels with electric engine starting would require a dual battery system with a changeover switch.

How do the options compare against the status quo

The following criteria have been used to assess the alternative option.

<i>The changes provide flexible and adaptive regulation:</i>	Options 2 and 3 would be adaptive by responding to a gap in the current rules.
<i>Rules are clear and easier to understand and apply:</i>	Option 2 is straightforward as one set of requirements would apply to all vessels. Option 3 would be clear to understand but is more complex because it would set different requirements for existing and new vessels.
<i>Maritime safety is maintained or enhanced:</i>	Option 2 is a clear improvement in safety compared with the status quo. Option 3 would have less impact due to the low number of new vessels that enter the fleet.
<i>Changes are practical and economically viable:</i>	<p>Under Option 2 an estimated 1,000 to 2,000 operators would incur estimated costs of \$500 to \$1,500 to install dual batteries with a changeover switch. The benefits may not outweigh the costs as the likelihood of a failure event is low, and most operators work close to shore and proximate to assistance.</p> <p>Option 3 is straightforward to implement. It would have minimal cost impact as new vessels tend to come with dual battery systems.</p>

Table 9: Comparing options against the status quo. Two independent sources of electrical power for engine starting - all vessels

	1. Status Quo	2: All vessels with electric engine starting have a dual battery system	2: New vessels with electric engine starting have a dual battery system
Provides flexible and adaptive regulation	0	+	+
Rules that are clear and easier to understand and apply	0	++	+
Maritime safety is maintained or enhanced	0	++	+
Changes are practical and economically viable	0	-	+
Overall assessment	0	+	+

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing/the status quo/counterfactual

Preferred option
Option 3 (New vessels with electric engine starting have a dual battery system with a changeover switch) is the preferred option. It meets all criteria, is better than the status quo, and provides a balance between safety and cost.
What are the marginal costs and benefits of the preferred option?
New vessels would be safer because the risks associated with being unable to start the engine due to a flat battery will reduce. The impact on costs would be marginal.
New Zealand rules for new vessels would align with the comparable jurisdictions of Australia and the UK.

Table 10: Marginal costs and benefits of requiring vessels with electric engine starting to have a dual battery system with a changeover switch

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Vessel operators	New vessel requires a second battery / battery bank and a changeover switch	Marginal, as this feature is already common on new vessels	Medium
Additional benefits of the preferred option compared to taking no action			
Vessel operators	Reduced risks associated with flat battery, e.g. loss of vessel control, potential vessel loss	Low Low frequency high consequence events	Medium Incidents due to flat batteries are known to happen, but data is lacking
Crew and persons travelling on board	Vessel is safer to work on / travel on due to reduced risk of flat battery	Difficult to quantify	Medium Specific incident data is not available

Question:

E 5.1 Do you agree that new vessels with electric engine starting should have a dual battery system with a changeover switch?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 6: Specifying responsibilities of persons who carry out marine electrical work. Re-aligning responsibilities of operators

What we are proposing
<p>Persons who carry out marine electrical work would need to ensure that the work they do:</p> <ul style="list-style-type: none"> - is safe - complies with the Electrical Rules and MTI - is tested in accordance with the Electrical Rules and MTI - complies with the electrical design approval, where one is required. <p>In addition, they would need to provide records of inspections and tests to the vessel operator, along with a written statement confirming that the requirements listed above have been met.</p> <p>Vessel operators would have overall responsibility for ensuring that marine electrical work complies with the electrical rules and is appropriately surveyed. This would align their responsibilities under the electrical rules with their responsibilities under other rules and under maritime safety systems, for example, MOSS.</p> <p>Boat builders and masters would not have specific duties under the proposed new rules.</p>
Status quo and problem / rationale for the change
<p>Duties need to be specified for marine electrical workers because their work is not regulated. The current rules <u>do not</u> require persons who carry out marine electrical work to be qualified or experienced or carry out electrical work correctly. New Zealand does not have a recognised qualification for marine electrical work. Persons who carry out marine electrical work are not accountable to the Electrical Workers Registration Board in the way that electrical workers on land are.²⁰</p> <p>Persons who carry out marine electrical work may come from a range of backgrounds, and some may have limited understanding of the intricacies of marine work.²¹ The current rules require marine electrical work to comply with an electrical design approval issued by a Design Approver,²² but the technical advisory group advised that electrical surveyors regularly see work that does not comply with an electrical design approval or with relevant electrical standards.</p>

²⁰ Electrical workers on land must be formally qualified, registered and annually licensed. Deficient electrical work is regularly investigated by the Electrical Workers Registration Board (EWRB) and electrical workers are held to account for the work they do. Marine electrical work is not prescribed electrical work under the Electricity (Safety) Regulations 2010 and the scope of the EWRB does not include marine electrical work.

²¹ The technical advisory group advised that some marine electrical workers are trained in firms that specialise in marine electrical work. Others come from diverse backgrounds including auto-electricians, land-based electricians, and ship's engineers.

²² A Design Approver Electrical or DA_E is an electrical surveyor recognised for electrical design approval under Maritime Rule Part 44.

In some cases, these deficiencies pose a risk to the vessel and/or the people on board.²³

Developing qualifications and a licensing or registration scheme for marine electrical workers has been assessed as not practicable. The small number of workers doing this work means that the costs of a scheme would not be sustainable. In this context, requiring marine electrical workers to make a statement about their work is a practical step. It would require them to actively consider their work and confirm that it complies with the rules.

Responsibility for compliance should not sit with the boat builder. The current rules make the “builder of a ship” responsible for electrical compliance on a vessel. Commercial boat builders have no direct interaction with the maritime regulatory system,²⁴ and vessels in the fleet average around 28 years old.

The operator has control over the vessel and should have overall responsibility for compliance. New Zealand maritime safety systems generally address the vessel operator, as the party with most control over the vessel. The proposed new DCE rules continue this approach. Under the proposed new rules the operator would be responsible for employing electrical workers with appropriate skills and knowledge, receiving statements from those persons and ensuring that work is surveyed when it needs to be.

The master should not be accountable for matters outside of their control. The current rules make the master accountable for aspects of the electrical rules. Under New Zealand and international law, the master is responsible for the day-to-day running of the vessel while on a voyage. However, the operator has overall control of the vessel and makes decisions about vessel maintenance and alterations and the persons who are engaged to do electrical work.

Impact of the proposed change

There are no direct costs associated with this proposal, which represents a realignment of accountabilities, but no change in standards.

The refocusing of accountabilities on persons who carry out marine electrical work would mean that they could incur some indirect costs in providing copies of records of inspections and tests to the vessel operator, and a written statement confirming that the rule requirements have been met. Some may not wish to provide records and written statements about their work. This could have a negative short-term impact on the supply of services, but the proposal would have a long-term benefit.

The proposal would align the accountabilities of the operator with other rules and with sector practice and regulatory settings under the maritime operator safety system (MOSS). It should provide operators with assurance that electrical workers are doing their work correctly.

²³ From meeting with the Technical Advisory Group.

²⁴ Builders of vessels – or ‘boat builders’ have a somewhat indirect duty under section 18 of the Maritime Transport Act to “comply with the relevant provisions of [the Act] and any relevant rules”. They are not regulated by Maritime Rules and the provision in the current electrical rules is the only place they are addressed.

Options analysis

Three options were considered.

Option 1: (Status quo). Continue the current approach of allocating responsibilities for electrical compliance to the “builder of a ship”, the owner and the master.

Option 2: (Preferred option). Require persons who carry out marine electrical work to take responsibility for that work. The operator would have overall responsibility for ensuring that marine electrical work complies with the electrical rules and is appropriately surveyed.

Option 3: Establish a licensing regime for marine electrical workers. The operator would have overall responsibility for ensuring that marine electrical work complies with the electrical rules and is appropriately surveyed.

How do the options compare against the status quo?

The following criteria have been used to assess the alternative option.

<i>The changes provide flexible and adaptive regulation:</i>	Options 2 and 3 are both adaptive as they would address a deficiency in the current rules.
<i>Rules are clear and easier to understand and apply:</i>	Option 2 clearly specifies the relevant responsibilities. These would align with sector practice and other maritime regulatory settings. Option 3 would require a licensing regime to be established, which would be a complex and major undertaking.
<i>Maritime safety is maintained or enhanced:</i>	Options 2 and 3 would both improve safety. Persons who carry out marine electrical work would have more focus on ensuring electrical compliance. Clarity about the responsibilities of operators would mean they are more likely to ensure that electrical workers provide the required assurances and that the appropriate surveys are carried out.
<i>Changes are practical and economically viable:</i>	Option 2 is straightforward to implement. It would improve the regulatory system and have no cost or only minor costs. Option 3 would involve significant costs to establish and operate.

Table 11: Comparing options against the status quo. Specifying responsibilities of operators and persons who carry out marine electrical work

	1. Status Quo	2: Duties on persons who carry out marine electrical work. Operator responsibilities realigned.	3: Persons who carry out marine electrical work would be licensed. Operator responsibilities realigned.
Provides flexible and adaptive regulation	0	0	0
Rules that are clear and easier to understand and apply	0	+	-
Maritime safety is maintained or enhanced	0	+	+
Changes are practical and economically viable	0	+	-
Overall assessment	0	+	-

Key for qualitative judgements:

- ++ Much better than doing nothing/the status quo/counterfactual
- + Better than doing nothing/the status quo/counterfactual
- 0 About the same as doing nothing/the status quo/counterfactual
- Worse than doing nothing/the status quo/counterfactual
- Much worse than doing nothing/the status quo/counterfactual

Preferred option
Option 2 (Duties on persons who carry out marine electrical work. Responsibilities of operators clarified Duties on operators and persons who carry out marine electrical work) is the preferred option. It represents an improvement on the status quo.
What are the marginal costs and benefits of the preferred option?
Persons who carry out marine electrical work and vessel operators would face small administrative costs in providing and receiving records of inspections and tests, and written statements of compliance for marine electrical work.
These processes would encourage adherence to compliance with the rules, design approvals and electrical standards. This would benefit vessel operators commissioning the work, owners and operators who purchase vessels second-hand, and people who work or travel on commercial vessels.

Table 12: Marginal costs and benefits of placing new duties on operators and persons who carry out marine electrical work

Affected groups	Comment	Impact	Evidence Certainty
Additional costs of the preferred option compared to taking no action			
Vessel operators	May need to become familiar with the new rules and adjust processes.	Low	High Proposal is straightforward.
Vessel operators	May be impacted by provider shortages if some marine electrical workers exit the sector.	Uncertain	Low Not possible to estimate the impact.
Persons who carry out marine electrical work	Will need to provide records of inspections and tests, and a written statement of compliance to the vessel operator.	Low	High Land-based electrical workers have been doing this for decades.
Additional benefits of the preferred option compared to taking no action			
Vessel owners and operators	Can have more confidence in the work carried out by persons who carry out marine electrical work.	Low - Medium	Low – Medium Difficult to estimate. Information is anecdotal about- <ul style="list-style-type: none"> • the extent to which electrical work is non-compliant; and • the extent to which sector practice varies.
Vessel owners and operators	Will be operating in a 'level playing field' if marine electrical work is being carried out to a consistent standard.		
People who work on or travel on commercial vessels	Standards of electrical safety will improve.		
The regulatory system	The integrity of the regulatory system is maintained if participants work to a consistent standard.		

Questions:

E 6.1 Do you agree that the duties of vessel operators, and persons who carry out marine electrical work should be clarified in the rules?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

E 6.2 Do you agree that the persons who carry out marine electrical work should issue a written statement confirming that the work they did is safe, complies with the Electrical Rules and MTI, is tested in accordance with the Electrical Rules and MTI and complies with the electrical design approval, where one is required?

[Answers: Strongly agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

How to have your say

The deadline for providing comment on these proposals is **5pm on Friday 11 July 2025**.

16. This document is part of a package of documents on the proposed changes to the DCE rules. Information on this consultation will be available on Maritime NZ's website and through Maritime NZ's SeaChange newsletter.
17. Subject to interest, Maritime NZ will hold online information sessions on the proposals during the weeks of **3 to 6 June and 23 to 27 June**. Please contact us at the email address provided below if you would like to attend a session or if you would like us to contact you to discuss any of the proposals.
18. We welcome any feedback you would like to provide. Submissions can be made by completing the submission form on our website (<https://www.maritimenz.govt.nz/public/consultation/DCE-40-series-package-2/>), or in any other written form; and:
 - emailed to us at 40.series@maritimenz.govt.nz; or
 - posted to the Regulatory Reform Projects Team, Maritime NZ, PO Box 25620, Wellington 6140.
19. This document includes questions to help you focus your feedback. Answering the questions is optional.

Submissions are public information

20. Please let us know if your comments are commercially sensitive or if for some reason you consider they should not be disclosed. If your submission is subject to an Official Information Act (OIA) request, Maritime NZ will consider your confidentiality request in accordance with the grounds for withholding information set out in the OIA.
21. In addition, if you are an individual (that is your comments are made personally and not on behalf of a company or an organisation), please let us know if you have reasons that your identity should not be disclosed.
22. We will acknowledge all submissions that we receive.

Questions

23. The following questions have been included to help focus your feedback. Answering the questions is optional. All feedback is welcome.

Proposal 1: Specifying requirements for li-ion batteries

- E 1.1 Do you agree that the design and installation of li-ion batteries should comply with AS/NSZ 3004.2 or IEC standards or classification society rules and be approved by an electrical surveyor?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 2: Specifying requirements for electric propulsion

- E 2.1 Do you agree that electric propulsion systems should comply with the new version of AS/NZS 3004.2 or with classification society rules?

[Answers: Strongly agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 3: Removing the requirement for existing vessels to comply with AS/NZS 3004.2, and specifying minimum electrical safety requirements as an alternative

- E 3.1 Do you agree with the proposal to give operators of existing vessels an option to comply with a set of minimum electrical safety requirements specified in an MTI, as an alternative to complying with AS/NZS 3004.2?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 4: Changes to requirements to have an alternative source of electrical power

- E 4.1 Do you agree that all vessels should have an alternative source of electrical power available for essential equipment (navigation lights, emergency lighting, radio power and light, electronic control systems and alarms, electrically powered bilge pumps)?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

- E 4.2 Do you agree that alternative power circuits should be labelled on the switchboard so that non-essential circuits can be switched off in an emergency?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 5: All new vessels with electric engine starting would require a dual battery system with a changeover switch

E 5.1 Do you agree with the proposal to require all new vessels with electric engine starting to have a dual battery system with a changeover switch?

[Answers: Strongly Agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Proposal 6: Specifying responsibilities of operators, and persons who carry out marine electrical work

E 6.1 Do you agree that the duties of vessel operators, and persons who carry out marine electrical work should be clarified in the rules?

[Answers: Strongly agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

E 6.2 Do you agree that the persons who carry out marine electrical work should issue a written statement confirming that the work they did is safe; complies with the Electrical Rules and MTI; is tested in accordance with the Electrical Rules and MTI; and complies with the electrical design approval, where one is required?

[Answers: Strongly agree; Agree; Neutral; Disagree; Strongly Disagree; No comment]

Why/why not?

Appendix 1: ‘Snapshot’ of the proposed changes to the current electrical rules

Main changes	What would change	How the proposal would apply	Rule reference
Persons who carry out marine electrical work	<p>Marine electrical workers would need to:</p> <ul style="list-style-type: none"> - confirm that the work they do is safe; is tested; complies with the Electrical Rules and MTI; and complies with the electrical design approval where one is required. - provide records of inspections and tests, and a written statement to the vessel operator. 	Would apply to marine electrical work on all vessels when the new rules take effect.	Rule B1.4
Option of meeting minimum electrical standards	As an alternative to complying with AS/NZS 3004.2, existing vessels would be able to comply with minimum safety requirements described in the Schedule to the MTI.	Would apply to existing vessels of less than 45m LOA.	Rules C1.1 MTI 2.1(2)(b) & Schedule 1
Alternative source of electrical power	<p>Vessels would require an alternative source of electrical power that can provide power to essential equipment* if the main source of power fails.</p> <p>* navigation lights, emergency lighting, radio power and light, electronic control systems and alarms, and electrically powered bilge pumps</p>	Would apply to all vessels. Five year transition would apply for existing vessels.	Rule C3.1
Switchboard arrangements	Circuits providing power to essential equipment would need to be clearly labelled on the switchboard so that non-essential circuits can be easily switched off in an emergency.	Would apply to all vessels. Five year transition would apply for existing vessels.	Rule C3.2(4)(a)
	Circuits for essential equipment would need to be arranged separately on the switchboard.	Would apply to new vessels.	Rule C3.2(4)(b)
Alternative power capacity will reduce for most vessels	<p>The current 12 hours battery capacity would reduce for most vessels.</p> <ul style="list-style-type: none"> - Enclosed water limits 2 hours - Inshore limits & Inshore fishing limits 3 hours - Coastal limits 6 hours - Offshore and unlimited 12 hours (<i>no change</i>) 	Would apply to all vessels when the new rules take effect.	Rule C3.3

Electrical Proposal Summary

Main changes	What would change	How the proposal would apply	Rule reference
Navigation light alternative power	All vessels would need to have an alternative (i.e. emergency) source of power for navigation lights. Vessels of less than 12m operating in restricted limits / inshore fishing limits would be able to carry battery-operated navigation lights for use as alternative navigation lights if the main navigation lights fail.	Would apply to all vessels. Five year transition would apply for existing vessels.	Rule C4.1
Emergency lighting	All vessels would require emergency lighting. Existing vessels, and all vessels of less than 12 metres in length overall operating in restricted limits or inshore fishing limits, would be able to use a rechargeable torch or a battery-operated lamp as emergency lighting.	Would apply to all vessels. Five year transition would apply for existing vessels.	Rules C5.1 and 5.2
Electronic control systems and alarm systems	Networked, and integrated, alarm systems, electronic control and monitoring systems, and the software and hardware supporting them, would need to be designed and installed in accordance with the relevant rules of a classification society and have an alternative power supply.	Would apply to any vessel that has these systems. Five year transition would apply for existing vessels.	Rules C7.1 and C7.2
Electric propulsion	Electric propulsion components, systems and arrangements would need to comply with the rules of a classification society or (for vessels up to 50m LOA) the revised version of AS/NZS 3004.2 (due to be published in 2025).	Would apply to all vessels when the new rules take effect.	Rule C8.1 and MTI
Batteries used for engine starting	A new vessel with electric starting for the main propulsion engine would need a dedicated battery / battery bank to start the engine and another battery / battery bank to supply electrical services on the vessel. A changeover switch would be required so that the engine can be started from either battery / battery bank.	Would apply to new vessels with electric starting.	Rules C9.1(9) and MTI 2.5(2)
Lithium-ion batteries	An Electrical Design Approver / Electrical surveyor would need to approve the design and installation of a Li-ion battery.	Would apply to all vessels when the new rules take effect.	Rule C9.1(11)

Information on the locations and boundaries of operating limits can be found in Part 20 of the Maritime Rules, available on the Maritime NZ website