

PROPOSAL OF EV FIRE SAFETY IN URGENT NEED

PRESENTED BY CIRCUIT BREAKERS





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01

THE BACKGROUND

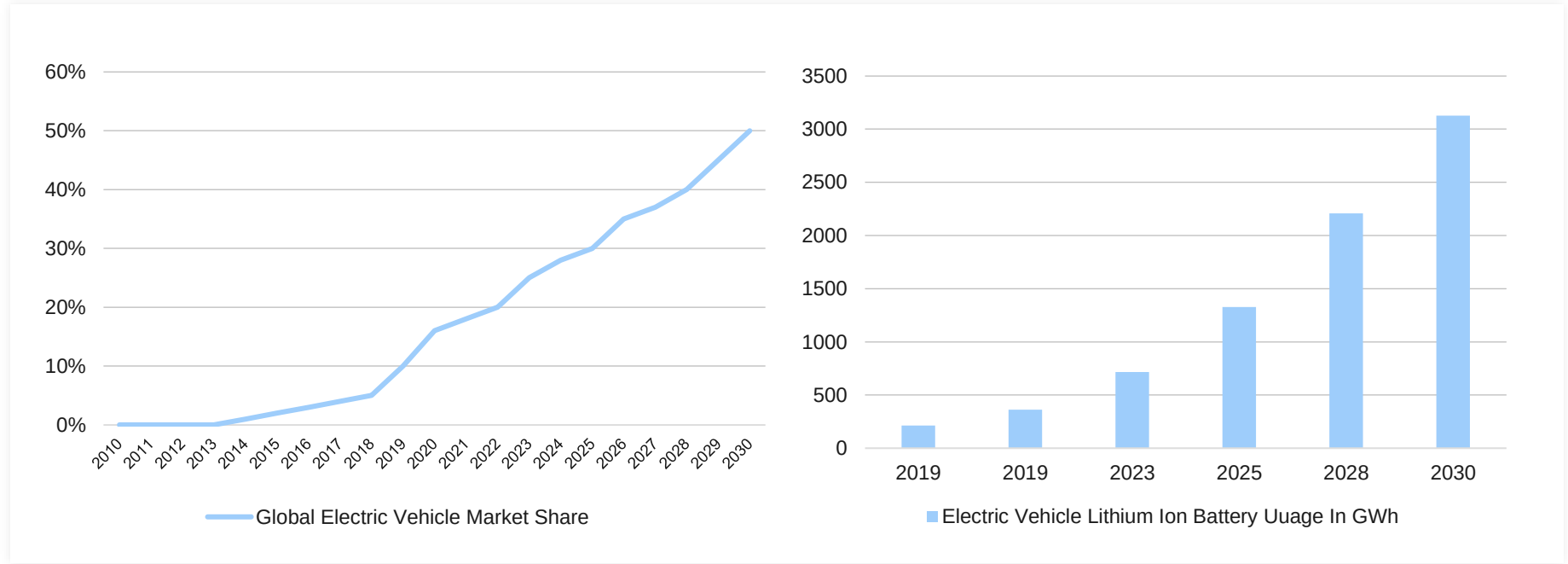
WHY IS IT URGENT?



01 The Future Market Share Outlook for the Electric Vehicle



It is anticipated that the transportation of Electric Vehicles via ships will increase.





01

**THERMAL RUNWAY**

Massive temperature rise of LiB leads to explosion.

02

**NO SYMPTOM**

The only way to predict it in advance is through heat detection.

03

**REIGNITION**

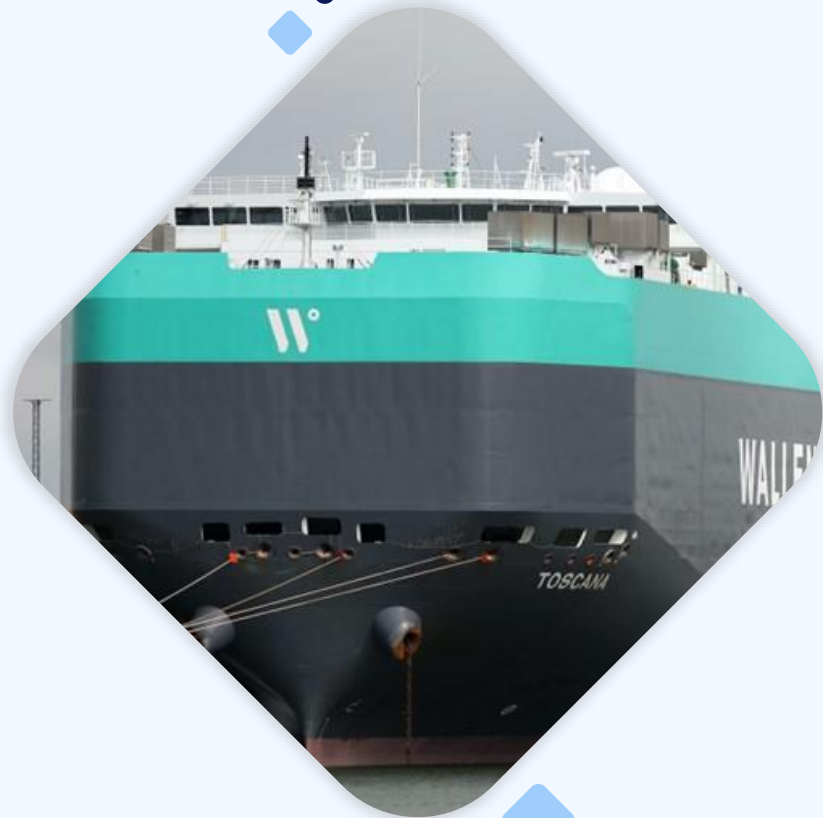
Lithium-ion batteries can reignite over time.



TRAGEDY OF PCTC

It has been reported that a PCTC that belongs to a ship charter company has been on fire, causing a single casualty and multiple injuries, as well as thousands of vehicles left on sea.





02

PROBLEM ANALYSIS

WHAT IS THE MAIN PROBLEM?

**SSE7**

(2020. 3)

China's proposal to amendments in SOLAS about EV vehicles

MSC105

(2022.4)

Following discussion, the Committee agreed to include in its post-biennial agenda an output on "Evaluation of adequacy of fire protection, detection and extinction arrangements in vehicle, special category and ro-ro spaces in order to reduce the fire risk of ships carrying new energy vehicles"

SSE9

(2023.2)

Statement by the delegation of Panama : There is a compelling need for us to adopt provisions to minimize the risk of fires onboard this sort of ship, taking into account the cargo being carried, particularly electric vehicles and identifying detection and extinguishing systems required in order to extinguish fires onboard in the cargo spaces."

**Discussion
on Practical Solutions.**



The batteries of electric cars are located in waterproof and dustproof metal package.

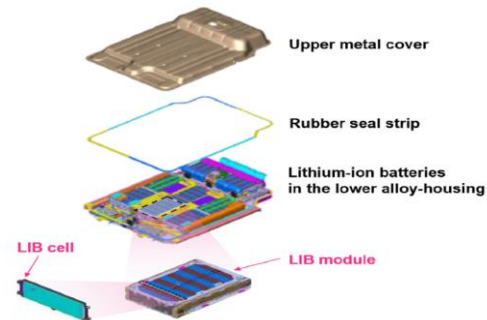
The location of **lithium-ion battery pack** in an electric vehicle
(i.e. Volkswagen ID.3)

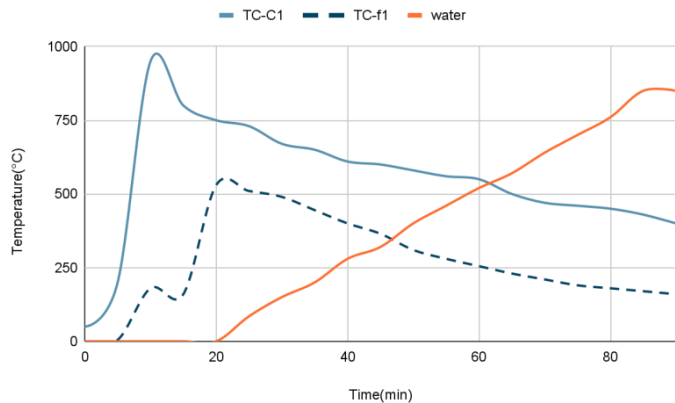


Before unbolting the LIB pack



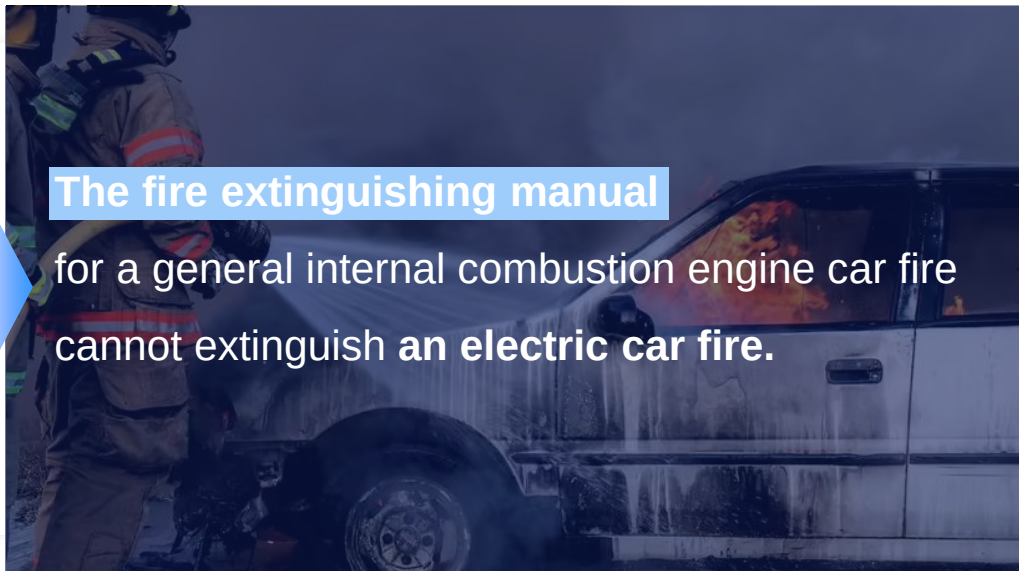
The structure of a LIB pack

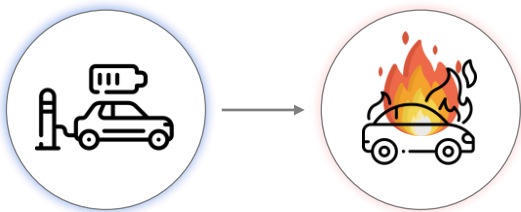




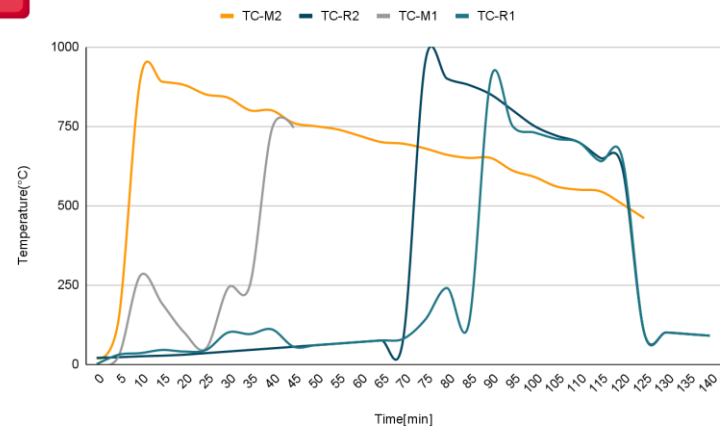
The fire extinguishing manual

for a general internal combustion engine car fire
cannot extinguish an electric car fire.





Due to the **structural characteristics of electric vehicle batteries**,
Suppression of electric vehicle fires is a high-risk operation
that may involve re-ignition and thermal runaway.



03 Circuit Breaker of Electric Vehicle Fires



1

Fire Blanket



2

Electric Vehicle Fire Extinguishing Nozzle



3

Pocket Type Dipping tank



03 Circuit Breaker of Electric Vehicle Fires

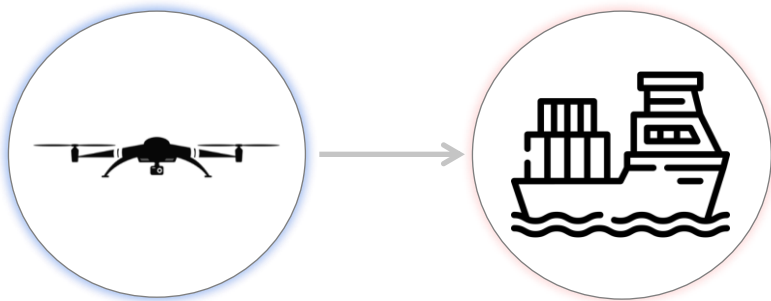


KAION



HYPALON FISH TANK





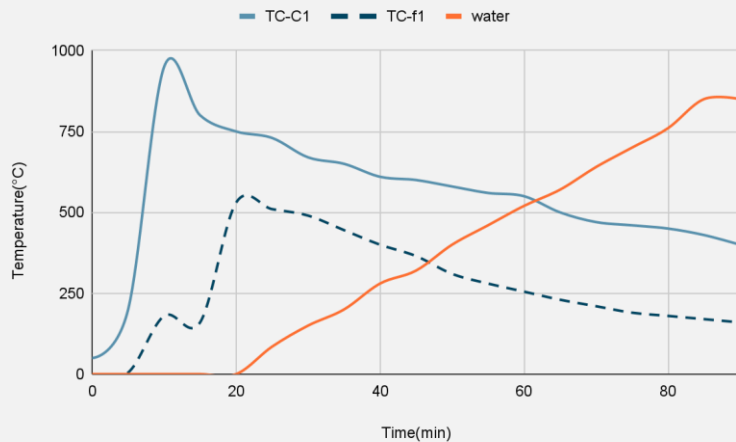
DRONE





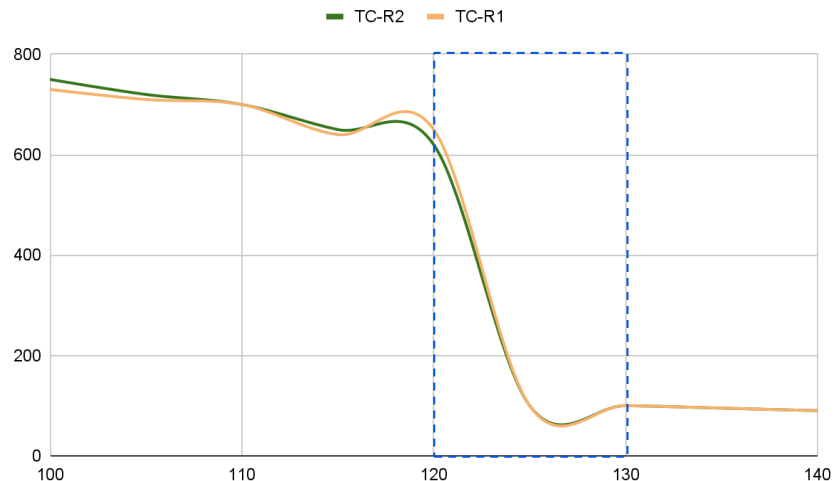
Normal Water Canon

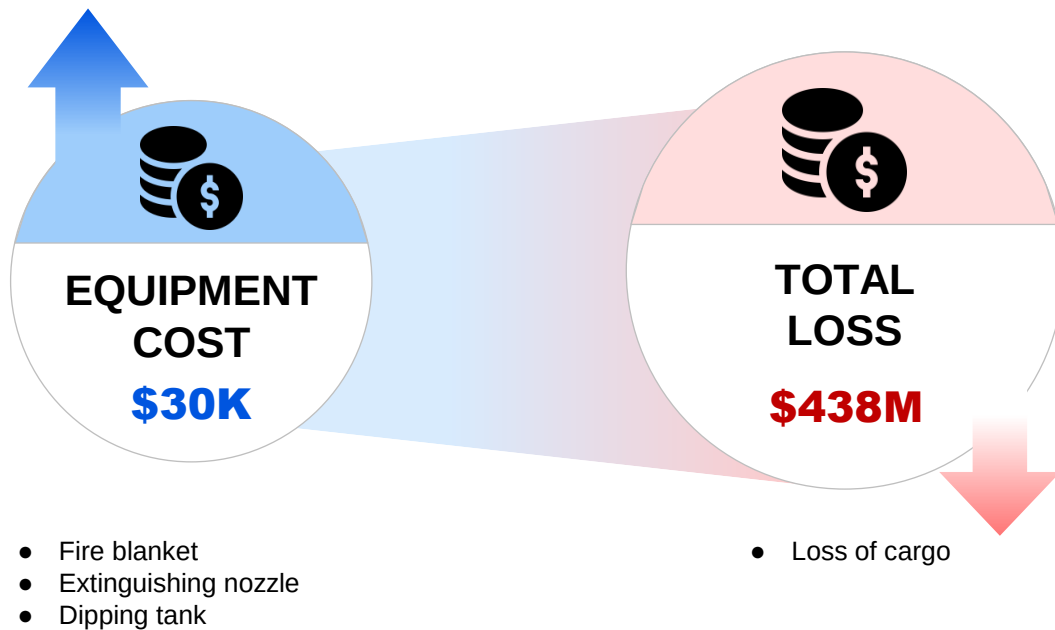
A slight temperature changes during general fireproofing



Dipping tank

Rapid drop in temperature when dipping in tank







Risk Control Option



CATEGORY	RCO NO.	SCENARIOS	TYPE		CATEGORY
SHIP RELATED	C 18	FIRE/ EXPLOSION	Prevention (P)	Mitigation (M)	EQUIP.

C 18- Introduction of electric vehicle fire extinguishing system



Cost-Benefit Assessment: CBA



RCO ID	ΔPLL	ΔR	ΔC	$\Delta GCAF$
C18	2.2×10^3	4.3×10^2	67,402	1,566,863
A3	3.3×10^3	6.7×10^2	690,497	10,338,951

six times the
economic benefit



C 18- Introduction of electric vehicle fire extinguishing system

A 3 - Increase in statutory minimum crew capacity



03

SOLUTION

HOW CAN WE SOLVE THIS PROBLEM?



A PROPOSAL FOR AMENDMENT OF SOLAS

To enhance the electric vehicle fire suppression capability on RORO ships



SOLAS
Regulation 20

Protection of vehicle, special category and ro-ro spaces

6 Fire -extinction

6.1 Fixed fire-extinguishing systems

6.2 Portable fire extinguishers

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SOLAS



SOLAS
Regulation 20

Protection of vehicle, special category and ro-ro spaces

6 Fire -extinction

6.1 Fixed fire-extinguishing systems

6.2 Portable fire extinguishers

6.3 Fire fighting Equipments for Electric Vehicle Fires

6.3.1 Fire fighting Equipment for Electric Vehicle Fires shall be provided at each deck level in each hold or compartment where vehicles are carried, spaced intended for the carriage of electric powered motor vehicles with battery packs in them for their own propulsion

6.2.3.1 at least one **Pocket Type Dipping tank** with the provisions of the Fire Safety Systems Code

6.2.3..2 at least one **Fire Blanket** with the provisions of the Fire Safety Systems Code

6.2.3.3 at least one **Electric Vehicle Fire Extinguishing Nozzle** with the provisions of the Fire Safety Systems Code

FSS CODE

FSS CODE

Chapter 1

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Chapter 17



FSS CODE

Chapter 1

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Chapter 17

Chapter 18



Firefighting Equipment for Electric Vehicle Fires

1. Application

This chapter specifies detailed requirements for special firefighting equipment to mitigate the spread of electric vehicle fires, as required by Chapter II-2 of the SOLAS Convention.

2. Definitions

2.1 'Pocket Type Dipping tank' refers to a tank equipment designed to be installed around the vehicle in the event of an electric vehicle fire, filled with water to cool down the battery in a thermal runaway condition and suppress the fire.

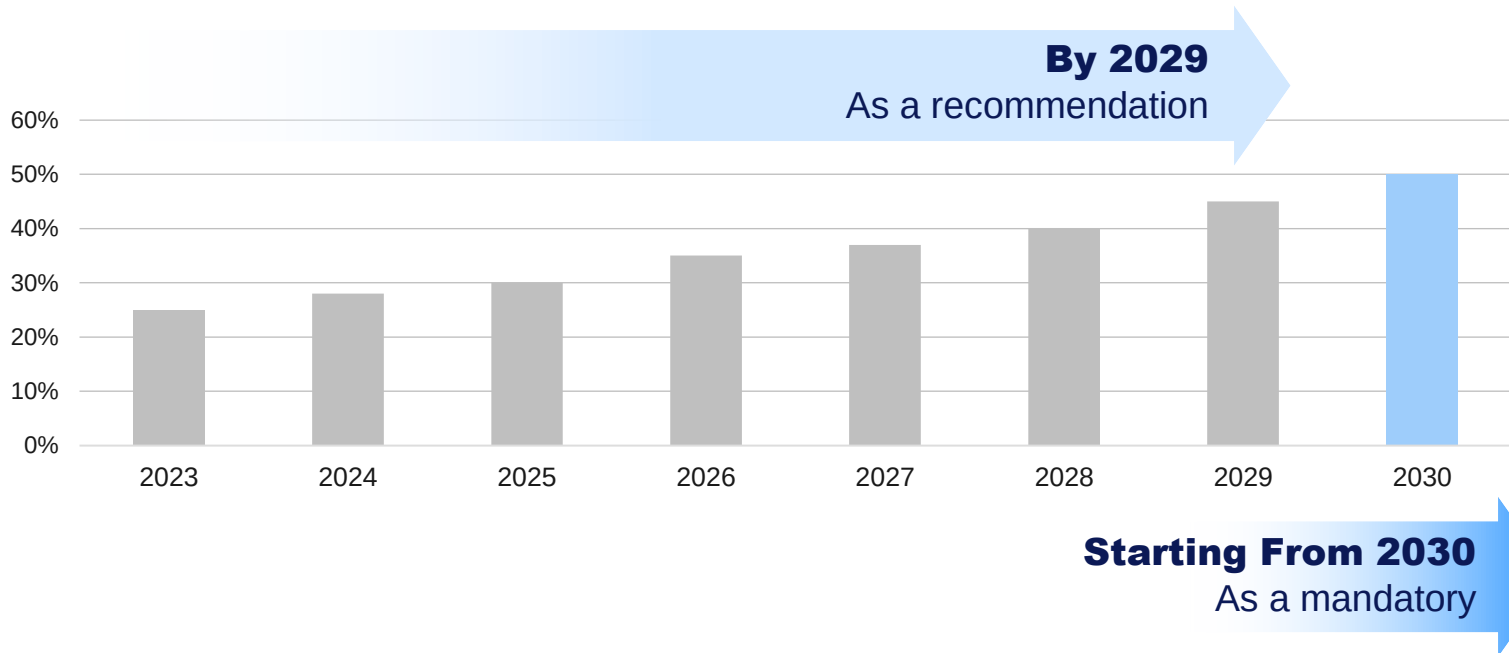
2.2 'Fire blanket' refers to equipment made of non-combustible material used to cover the burning electric vehicle in the event of a fire, blocking oxygen to extinguish the fire.

2.3 'Electric Vehicle Fire Extinguishing Nozzle' refers to a nozzle designed to be positioned under the vehicle in order to provide a continuous and stable water spray for the purpose of cooling the battery pack located underneath the vehicle.

02 Proposal for Milestones for Incremental Implementation



Global Electric Vehicle Market Share





04

CONCLUSION

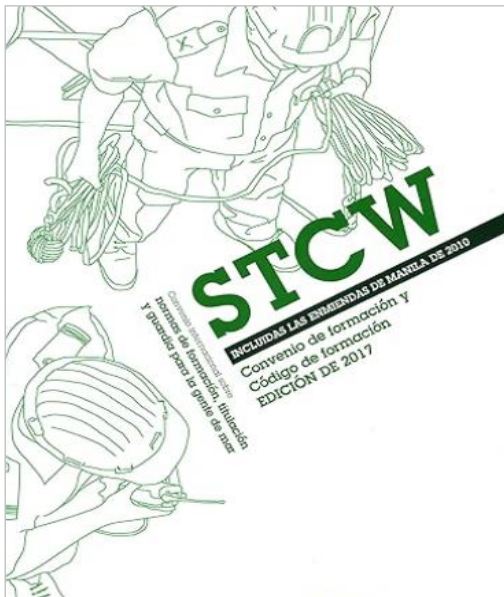


Systematic education and training for crew members on ships are necessary.

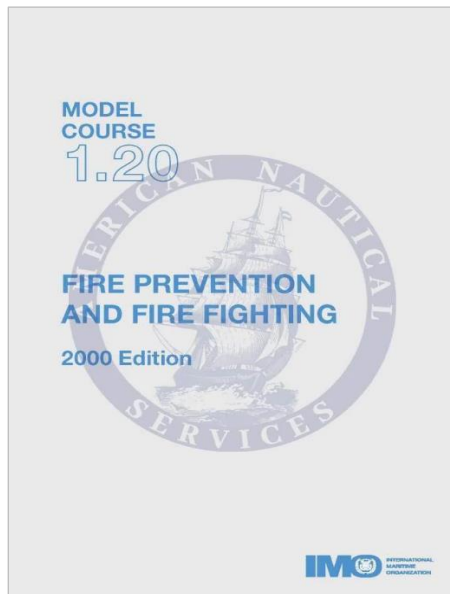




STCW Standards for Training, Certification and Watchkeeping



MODEL COURSE 1.20 FIRE PREVENTION AND FIRE FIGHTING



IMO

MSC

Maritime Safety committee

HTW

Human Element,
Training and Watchkeeping

Anticipated points through amendments



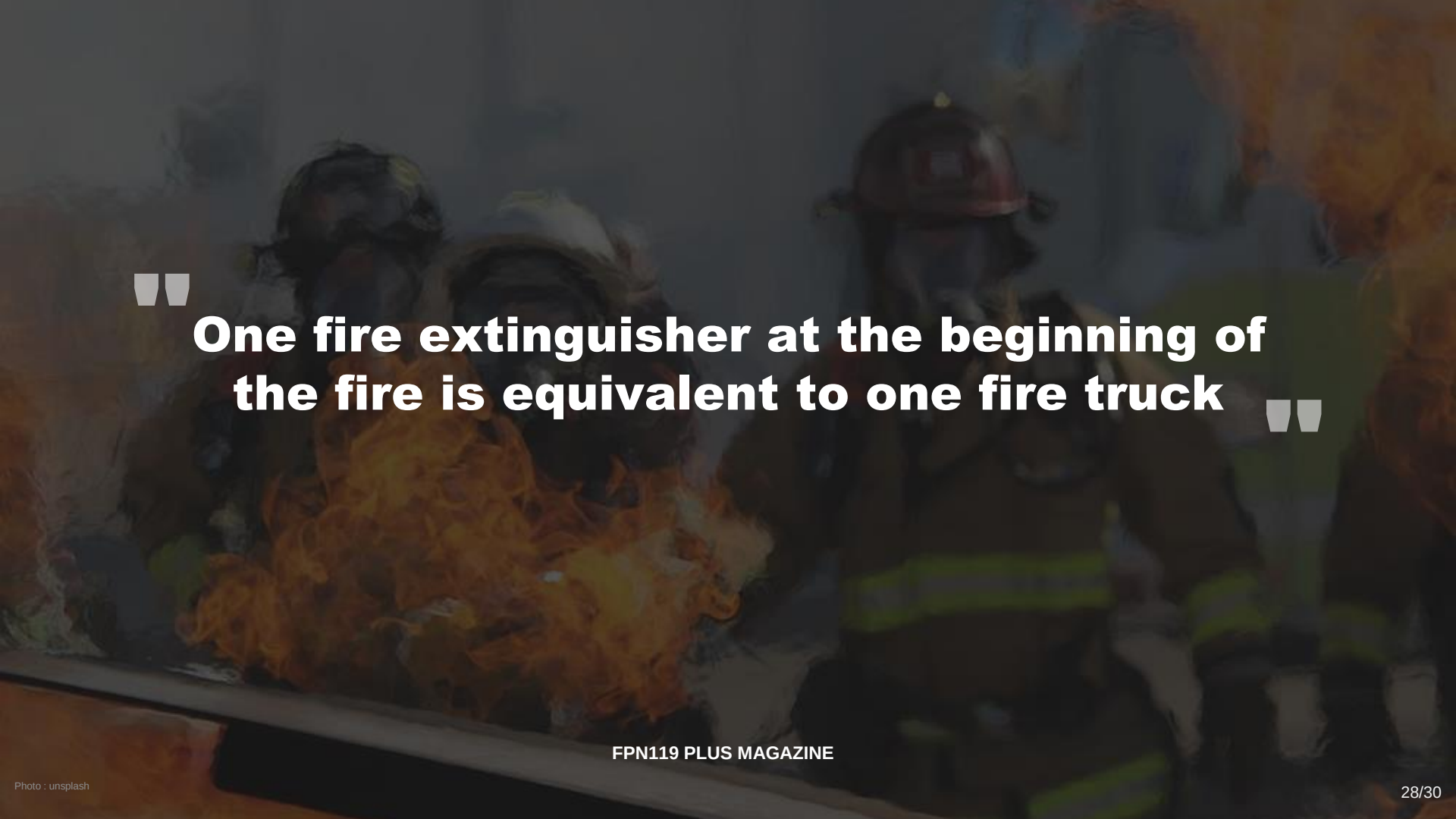
IMO Strategic Directions



SD 2 : Integrate new and advancing technologies in the regulatory framework

SD 6 : Address the human element

SD 7 : Ensure regulatory effectiveness



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**One fire extinguisher at the beginning of
the fire is equivalent to one fire truck** ”

THANK YOU

**WE ARE TEAM
CIRCUIT BREAKERS**





Our contents were created through the following sources

- Istock.com
- Deloitte Analysis, IHS Markit, EV-volumes.com 17
- Research Gate
- Kim Seong-il, 2023, A Study on the Improvement of Electric Vehicle Fire Response Capacity, Yeungnam University Graduate School of Engineering
- Industrial Distribution.com
- Gcaptain.com
- The 7th Session of the Sub-Committee on Ship Systems and Equipment, SSE 7, IMO
- The 105th Session of the Maritime Safety Committee, MSC 105, IMO
- The 9th Session of Sub-Committee on Ship Systems and Equipment, SSE 9, IMO
- Im Ok-geun, Kang Sung-wook, Kwon Min-jae and Choi Jung-yoon. 2021, "Real-scale fire suppression experiment for effectiveness analysis of lithium-ion battery fire response measures", Journal of the Korean Fire and Fire Fighting Association, vol.35, no.6 pp.21-29.
- Gettyimage.com
- fireisolator.com
- GM1.co.kr
- Wall Street Journal
- LexisNexis.com
- IMO
- SOLAS, KR-CON
- FSSCODE, KR-CON
- Freepik.com
- Kgnews.co.kr
- cdn.ggilbo.com
- safetimes.co.kr
- amazon.com
- amnautical.com
- FPN119 PLUS MAGAZINE