Safety of Fuel Cell Installations

Towards goal based and innovation friendly Interim Guidelines utilizing recognized safety standards – IEC 60079-10-1:2015

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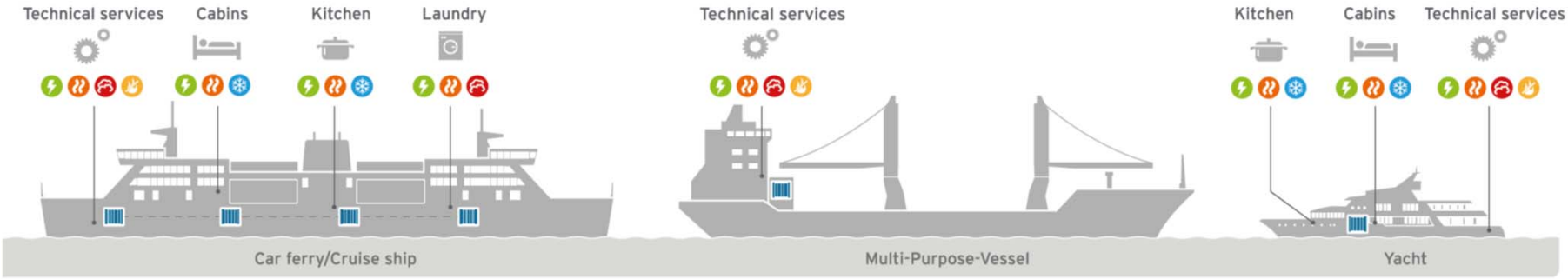
CCC 6, IMO, London, 10 September 2019

Fuel Cells – Principles and Applications

- e4ships R&D projects and full scale demonstrators utilize different…

…Primary fuels …Outputs

- and will be applied on different seagoing ship types:



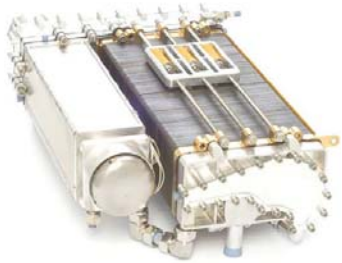
The e4ships R&D Consortium

≡ 6 Shipyards, 6 Owners, 12 Suppliers,
1 Class, 6 Research Inst., 2 Associations

Maritime Fuel Cell Application / R&D Projects

Pa-X-ell 2

- HT PEM
- Methanol, LNG



MultiSchIBZ

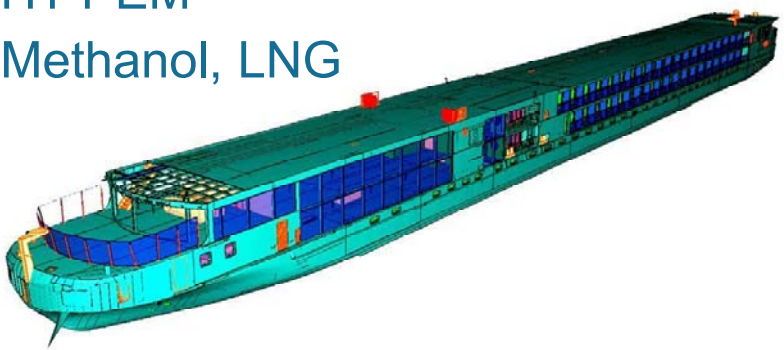
- SFOC
- LF Diesel, LNG

ELEKTRA

- LT PEM
- Hydrogen

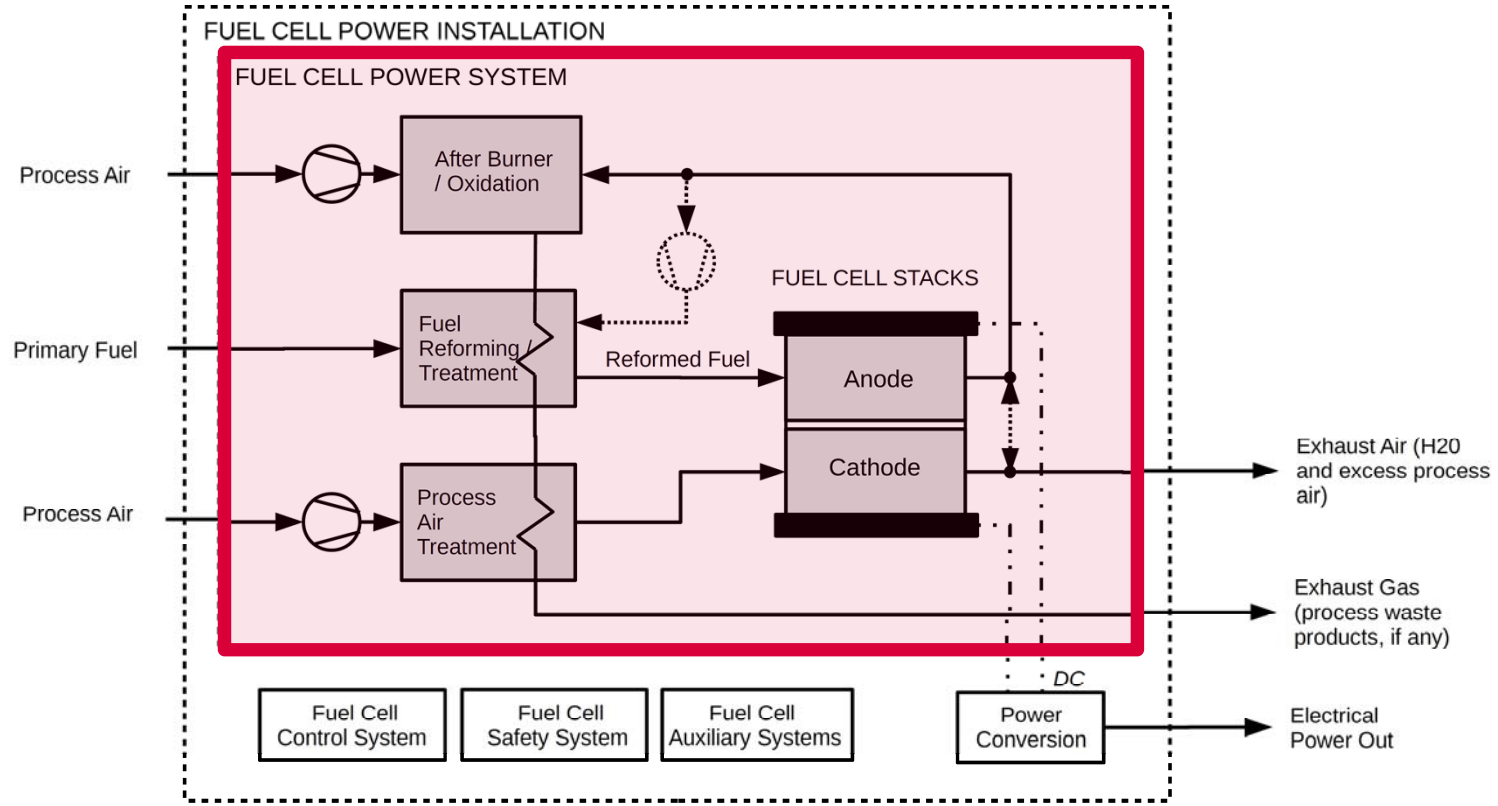
RiverCell 2

- HT PEM
- Methanol, LNG



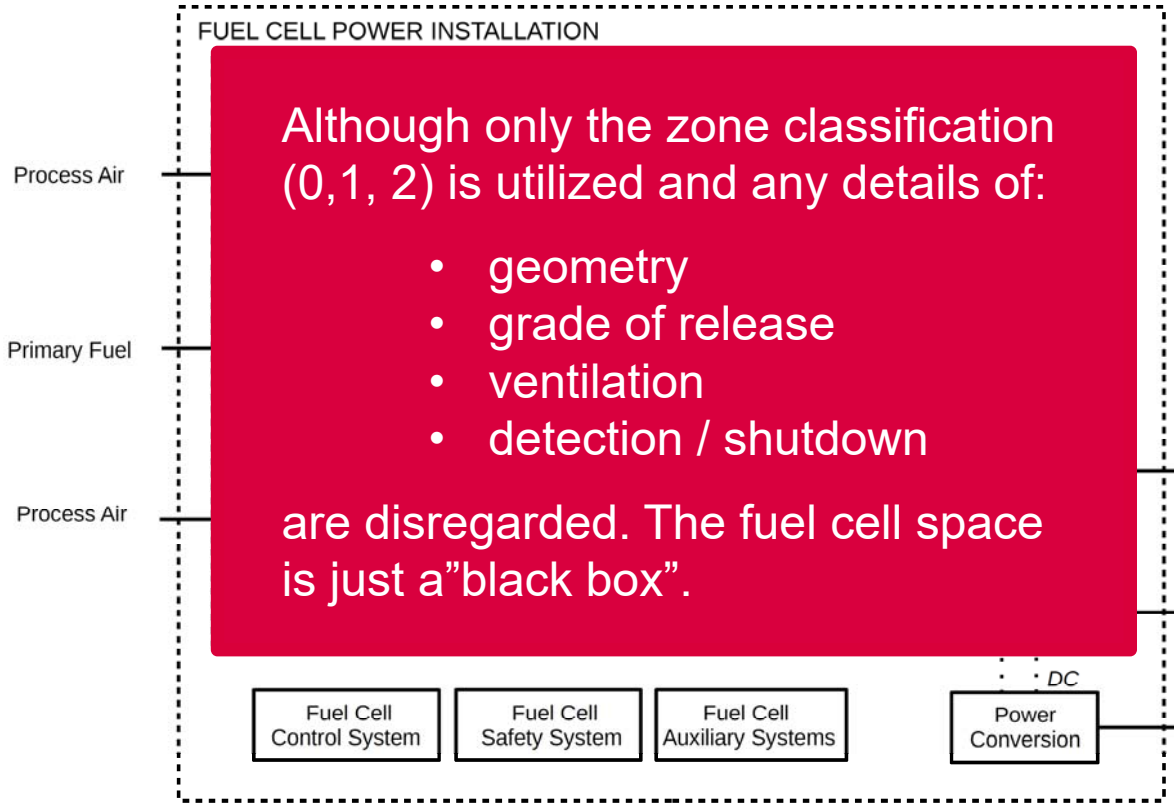
What‘s going on in the Fuel Cell Space?

- The **Fuel Cell Space** contains elements that are sources of release of hydrogen rich gas, potentially posing explosion risks:



Area Classification acc. to draft IG Par. 4.2

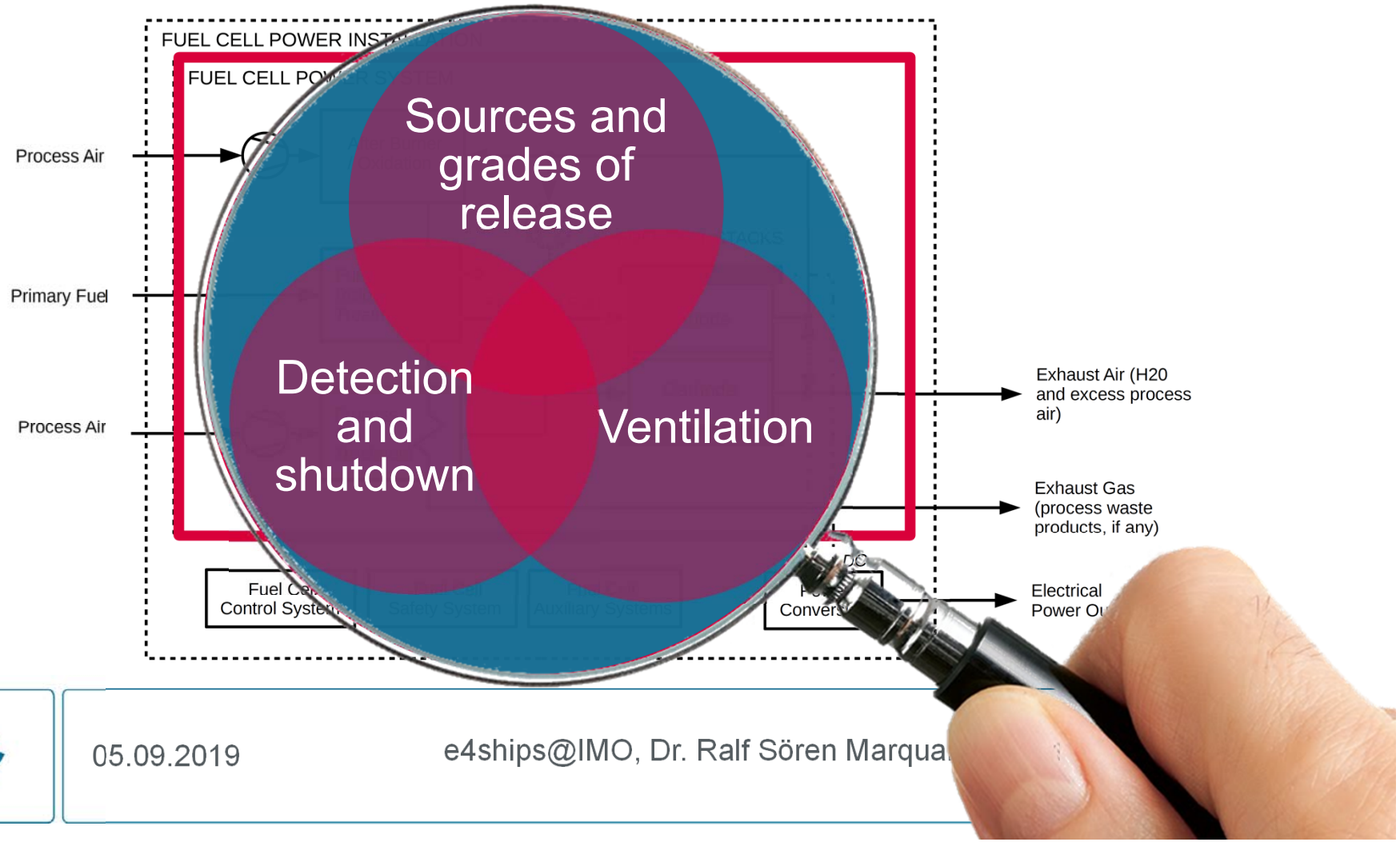
- Principles of IEC 60079-10 to be used for the selection of electrical apparatus and the design of electrical installations:



[4.2.5 In cases where the prescriptive provisions in 4.2.2 are deemed to be inappropriate, area classification by calculation according to IEC 60079-10 should be applied for verification in consultation with the Administration.]

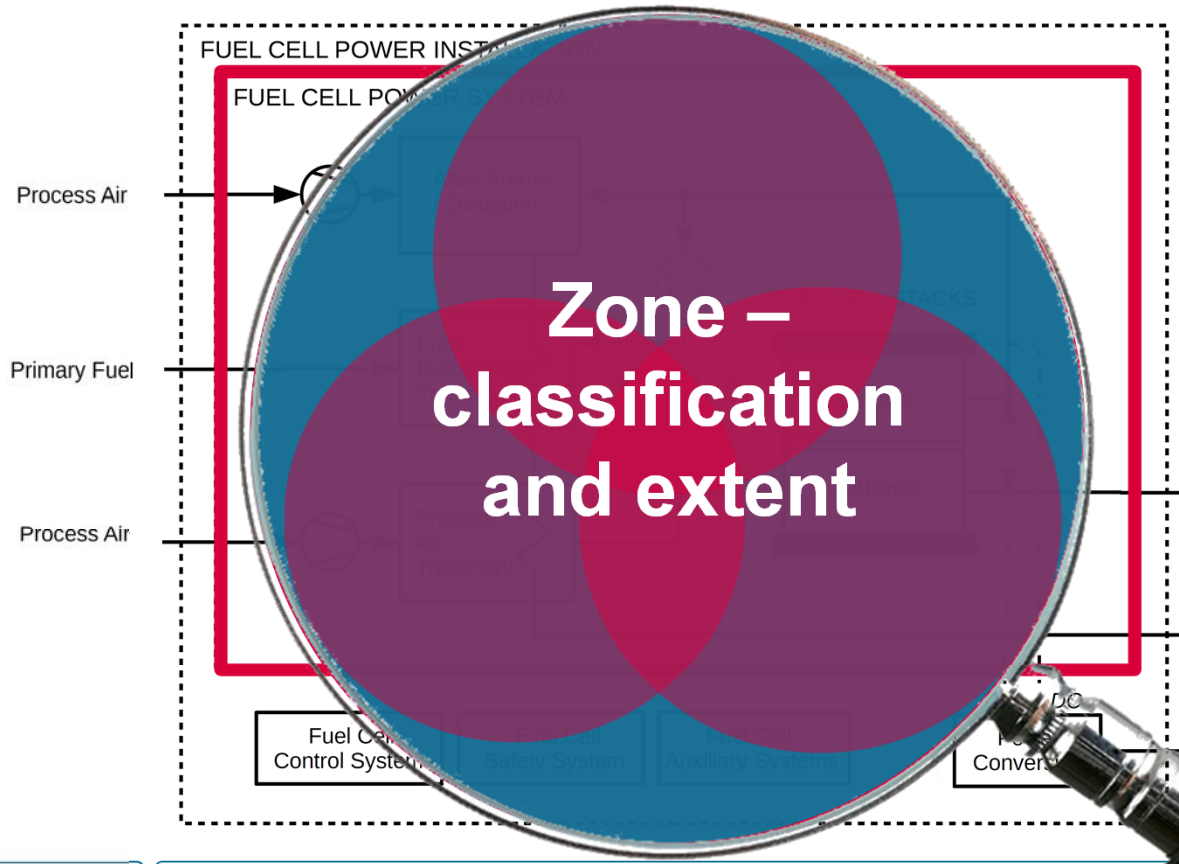
Let‘s analyse the safety of Fuel Cell Spaces!

- CESA *promotes looking into all influencing factors and their interrelation by means of IEC 60079-10-1:2015:*



Let‘s analyse the safety of Fuel Cell Spaces!

- CESA promotes utilizing IEC 60079-10-1:2015 in order to fulfil the principles of this standard:



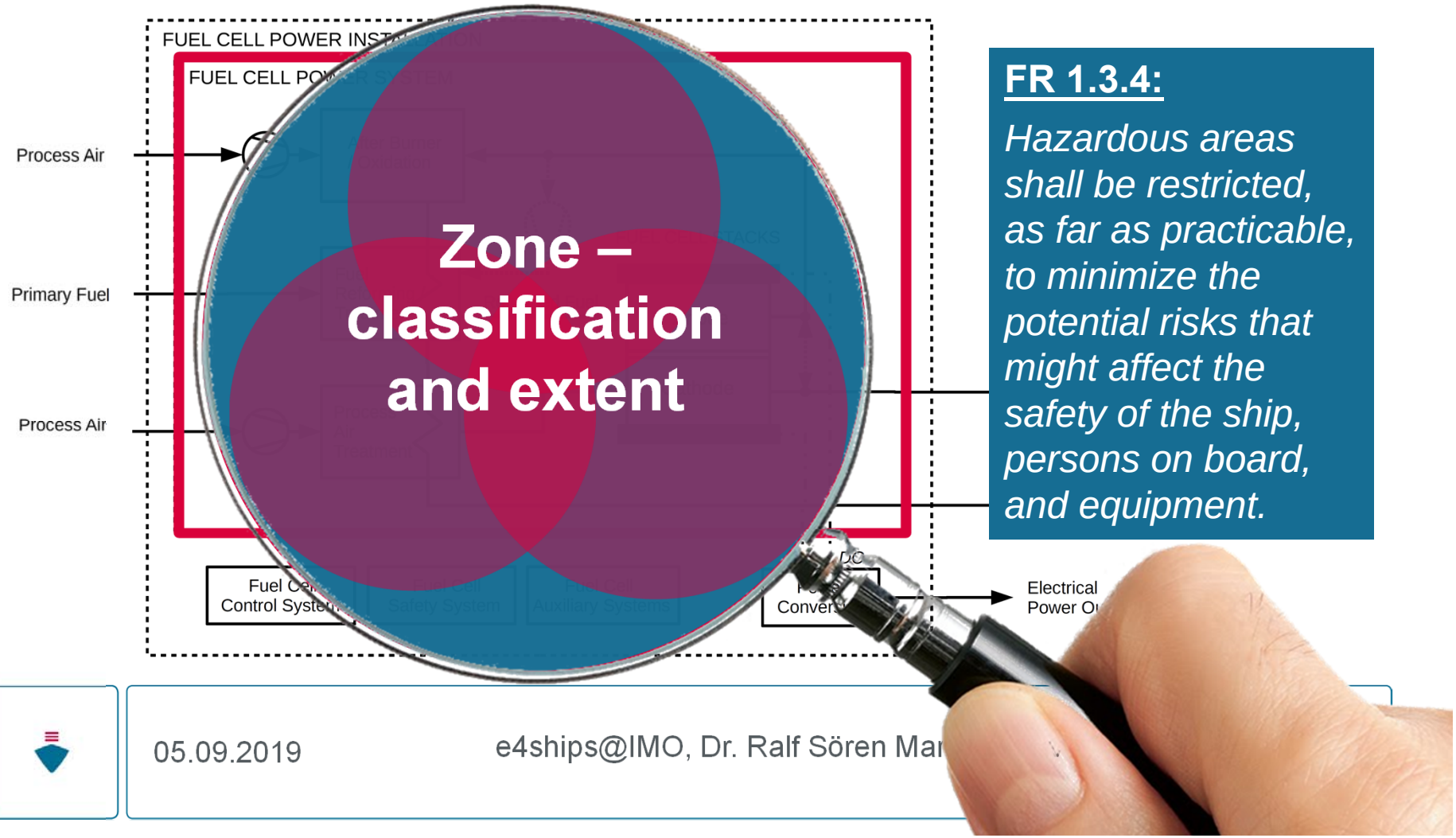
IEC goal:

In particular, zone 0 and zone 1 areas should be minimized in number or extent by design or suitable operating measures.

In other words plants and installations should be either zone 2 or non-hazardous. (…)

Let‘s analyse the safety of Fuel Cell Spaces!

- CESA points out that the IEC principle to minimize hazardous zones is identical to the draft functional requirement (FR) 1.3.4:



FR 1.3.4:

Hazardous areas shall be restricted, as far as practicable, to minimize the potential risks that might affect the safety of the ship, persons on board, and equipment.

CESA Submission CCC 6/3/6 – Summary

Quantification of the safety of fuel cell powered ships by flexible guidelines making full use of the IEC methodology

- Different fuel cell types and arrangements require provisions taking detailed account of the design specifics;
- implemented by functional and goal-based standards;
- utilizing reliable international standards and advanced analysis tools (e.g. CFD) where necessary;
- to optimise the safety and cost-effectiveness of the installation;
- and ensuring consistent implementation world-wide.

Prescriptive requirements not addressing all aspects would hamper fuel cell development, endangering the implementation of the IMO GHG strategy towards the zero emission ship.

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- More info:
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- Thank you for your kind attention!

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