Nuclear Power in the Maritime Energy Transition

Patrick Ryan
ABS Chief Technology Officer

Impact of MEPC 80

Carbon Intensity

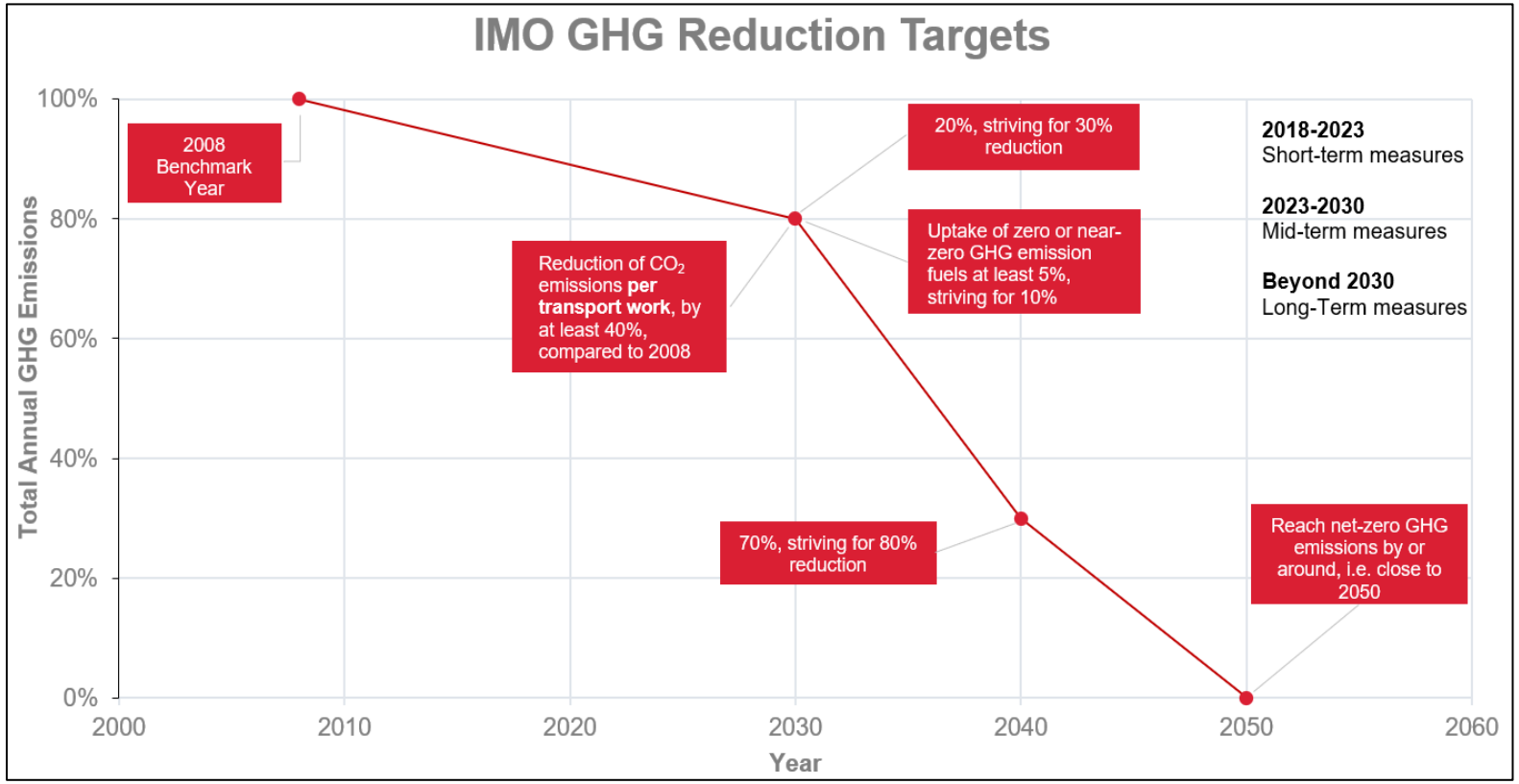
- 40% reduction by 2030
- Uptake of zero or near zero technologies, fuels/energy sources by at least 5%, striving for 10%

GHG Emissions

- Net zero by or around, i.e. close to 2050

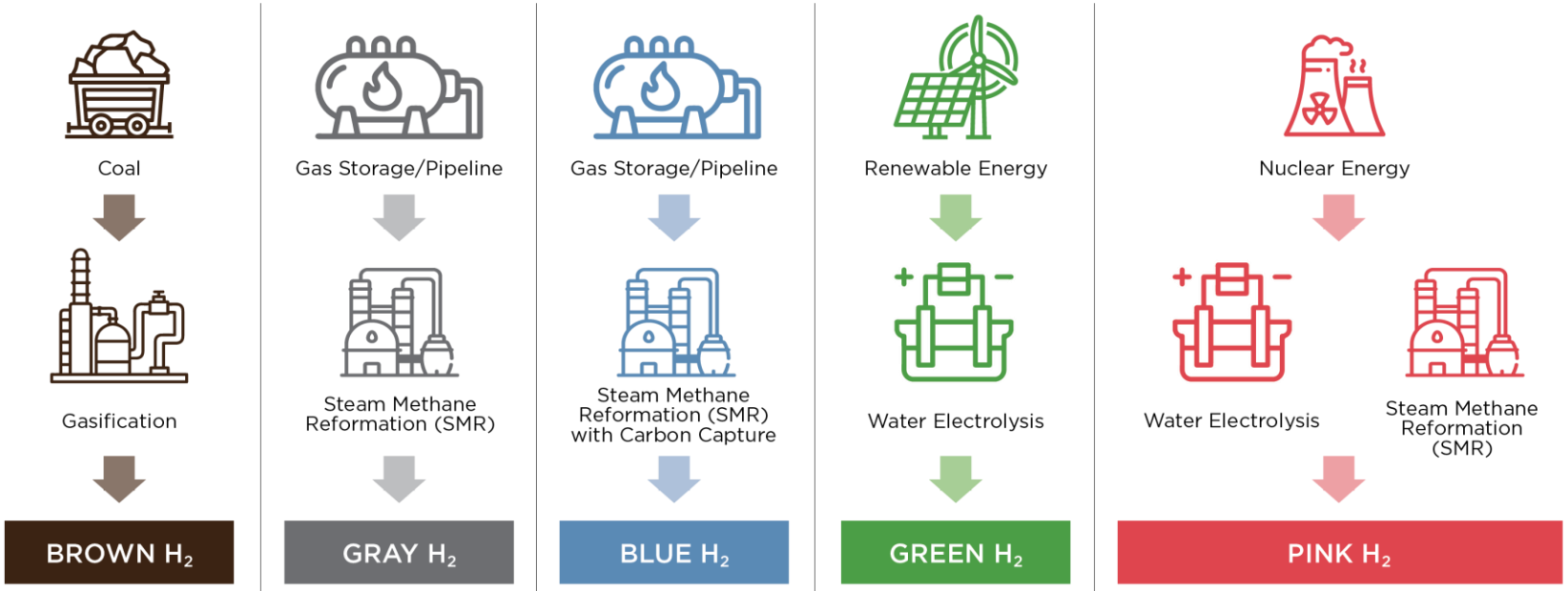
Indicative Checkpoints

- 20%, striving for 30% by 2030
- 70%, striving for 80% by 2040



Future Fuels

Below image assists to address total life cycle impact of emissions for transport work:

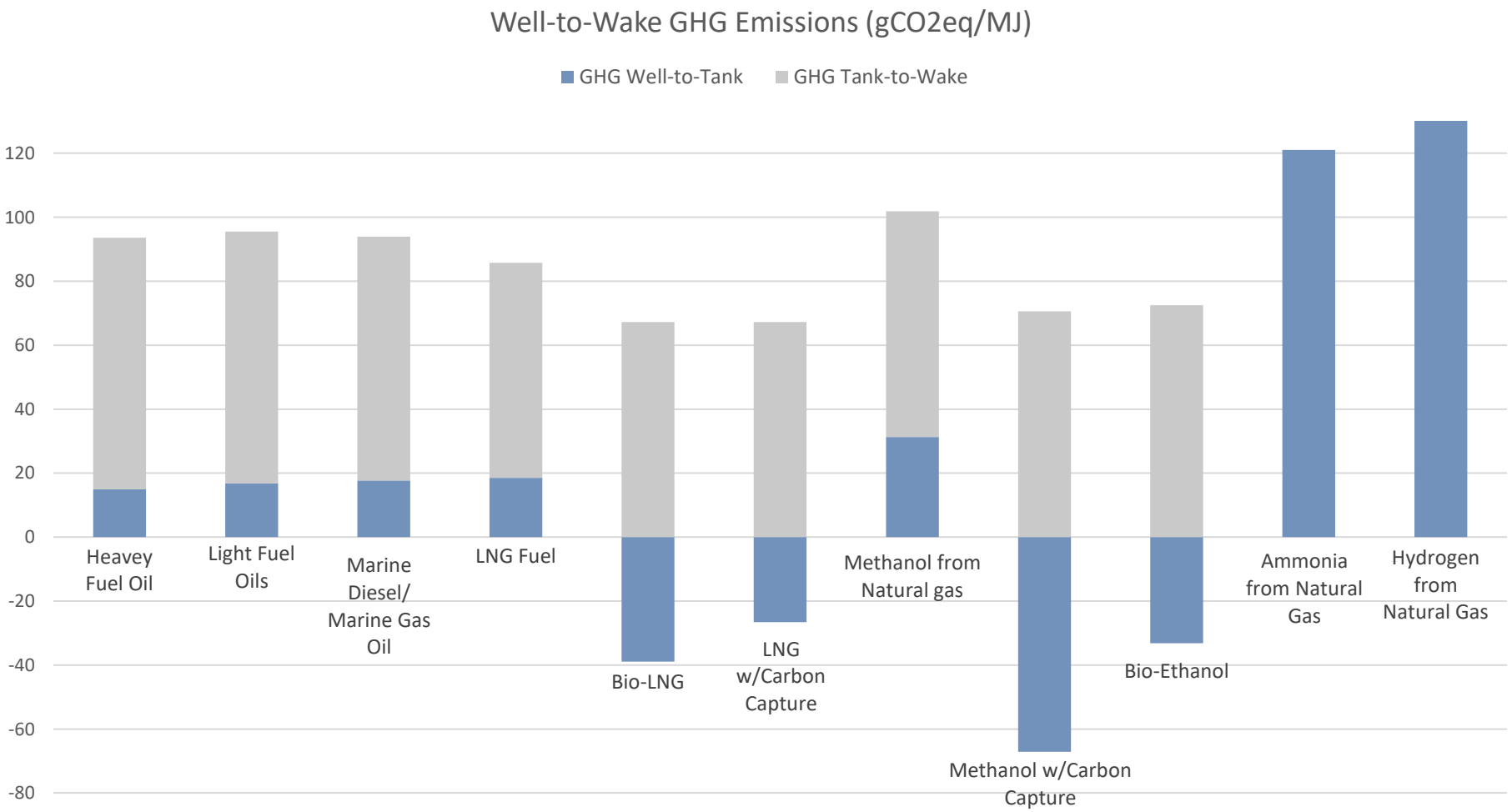


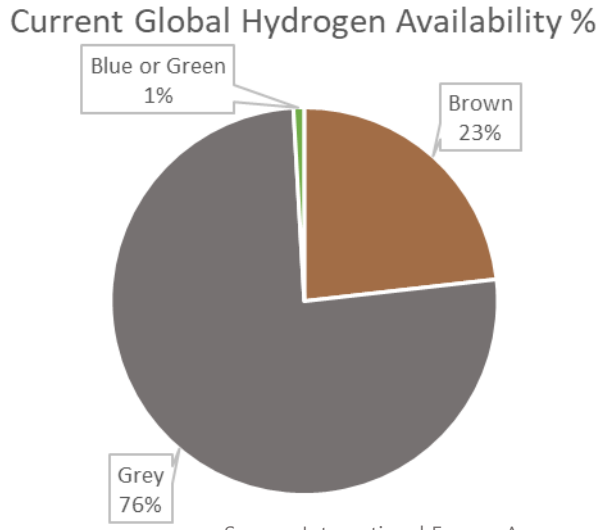
- Industrialized process
- More available
- Less costly
- GHG and carbon emissions from production
- Not included in MEPC 80's mid- or long-term reduction targets

- Included in MEPC 80's mid- and long-term reductio n targets
- High cost
- Low availability

- Included in MEPC 80's mid-and long-term reduction targets
- Strong opportunity for competitive fuels
- Not widely developed

Future Fuels





Source: International Energy Agency (IEA) Global Hydrogen Review 2022

Nuclear – Maritime Use Cases

Nuclear-Electric Propulsion

- Reactors fitted for high power
- Zero-carbon switch
- Reduce or eliminate bunkering

Nuclear-generated Fuels/Power

- Floating power barge for grid electricity
- Suitable for arrays of microreactors or small modular reactors
- Produce synthetic green fuels

Commercial Nuclear Benefits - Ships

Safety

- Inherent/Passive Safety Features
- Automated Control
- Reduced Waste

Operational

- Zero GHG Emissions
- Increased Speed
- Replacement rather than refueling
- Long Fuel Cycles

Technical

- Small Footprint
- Scalable
- High Power Density

Economical

- Factory Fabrication
- Modular Construction
- Reduced Operational Expenses

Commercial Nuclear Benefits

Offshore

- Zero GHG emissions
- Replacement rather than refueling
- Long fuel cycles

In Port

- Electricity to shore
- Support production of green synthetic marine fuels

- Available space away from population centers or areas with land restrictions.
- Readily available water as a heat sink.
- Desalinated/pure water available for hydrogen production from steam methane reforming or electrolysis.

Commercial Nuclear Challenges

Safety

- Zero GHG emissions.
- Replacement rather than refueling.
- Long fuel cycles.

Regulatory

- International (IAEA,IMO).
- Flag State.
- Coastal State.

Operational

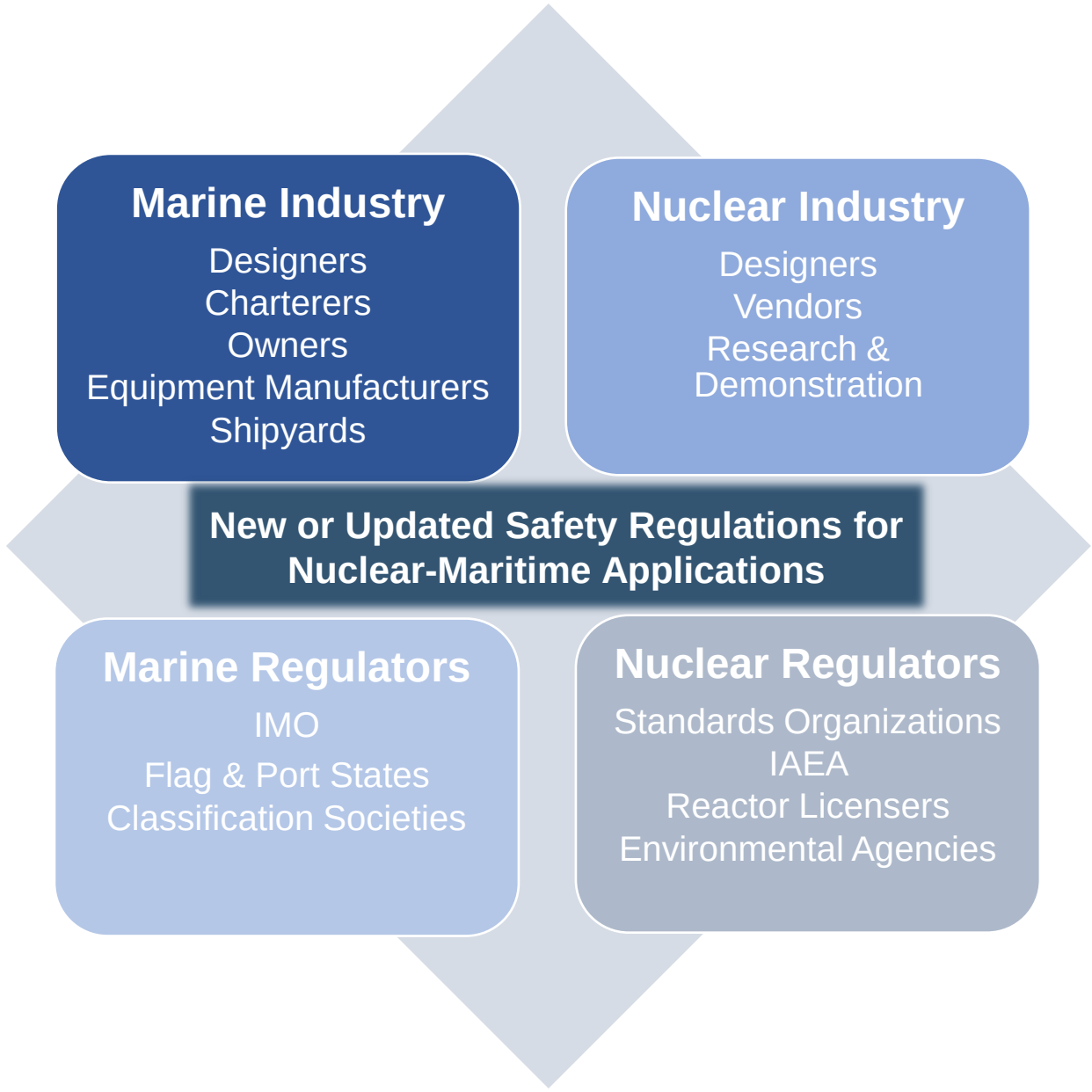
- Nuclear maintenance at shipyards.
- Terminal considerations.
- Crew training requirements.
- End of life considerations.

Commercial/Social

- Capex requirements for construction.
- Trade location limitations.
- Public perception and acceptance.
- Public/private partnerships.

Regulatory Demand

- Nuclear licensing developed for onshore applications.
- Historical military experience is promising but can’t be translated directly to commercial uses.
- Collaboration between marine and nuclear industries and governments is needed.
- Classification is well-suited to facilitate collaboration between industry and regulators.



Next Steps

Develop Classification Requirements for nuclear systems on marine units with focus on:

- Goal-based standards
- Risk and safety assessments
- Designated interface between classification and nuclear regulators

Connect with Us

Connect with us for some activities to:

- Identify specific technical and regulatory issues.
- Identify solutions to address barriers.
- Learn how to engage in national and international regulatory development.

Potential Activities

ABS Supporting Services

- Advisory / Publications
- New Technology Qualifications
- Concept & Feasibility Studies
- ABS Group Consulting

Industry & Academic Partners:

Engage in research and development solutions with:

- Government Agencies
- Standards Associations
- Scientific Institutes
- Universities

Thank you

For more information, please visit www.eagle.org