Reefer Containers

Third Generation Refrigerants: Challenges

Warming Impact from Power Consumption

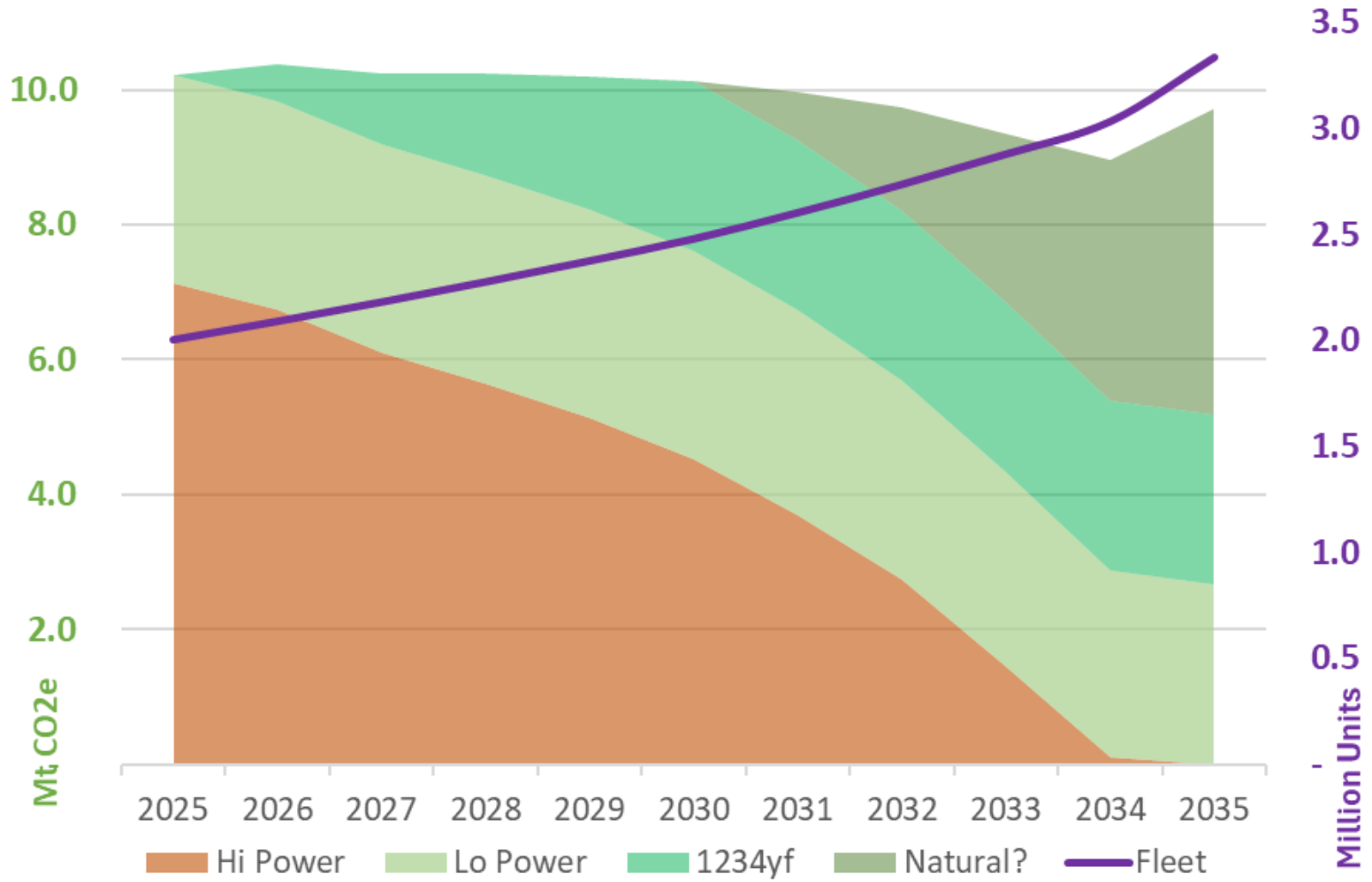
- Over a 15 year life, >***93% of total warming impact is from power consumption***
- New efficient reefers consume <1.5 kW average over all transit conditions and even below 1kW at set point.
- Older designs consume around 3.0 kW average – double that of new machines
- New models from all manufacturers today use inverters, variable speed motors and smart software to give lower power consumption
- 55% of the fleet are higher power-draw models for retirement over the next 8 years
- 45% of the fleet are younger, low-power consumption designs

How to Reduce the Warming Impact of Reefers

- Reduce power consumption with more efficient designs – ***by far the biggest single factor to lower the environmental impact***
- Work to further reduce refrigerant leaks by improved design
- Improve insulation efficiency – though it will be difficult with ISO dimensional limitations by more than a few %
- Use ultra-low GWP refrigerants which are safe and give low power consumption
- Low power consumption enables more reefers to be carried on each ship – high power reefers mean less units can be carried due to ship power limits
- Ensure the current reefer fleet has a full service life with availability of refrigerant to service prior to loading cargo in the rare cases it is required

Reefer Fleet Trajectory – Size and Warming Impact

- Fleet Growth of 4.5% replaces old, hi-power units with new, low power units
- R1234yf is essential to transition phaseout of 134a in new reefers
- Despite c.65% fleet growth over 10 years, total warming impact does not rise



Industry Decisions and Challenges

- 4.5% growth and replacing retirements over the next 7 years needs 1.45 million new reefers at a cost of c.$24 billion / 21€ billion
- Until 3rd generation platforms are available, what refrigerant will buyers choose for these reefers? R1234yf or R134A?
- Can owners service them in Europe for a 15 year life to load export cargo?
- 3rd generation reefer systems will take 7 to 10 years to develop and may have a higher power consumption than today's low-power machines
- What gas/platform technology will manufacturers choose to develop and reefer operators want to buy 7 to 10 years from now?
- R134a's phasedown requires transition refrigerants for new reefers for the next 7 years minimum and 15+ years for servicing over their operating life