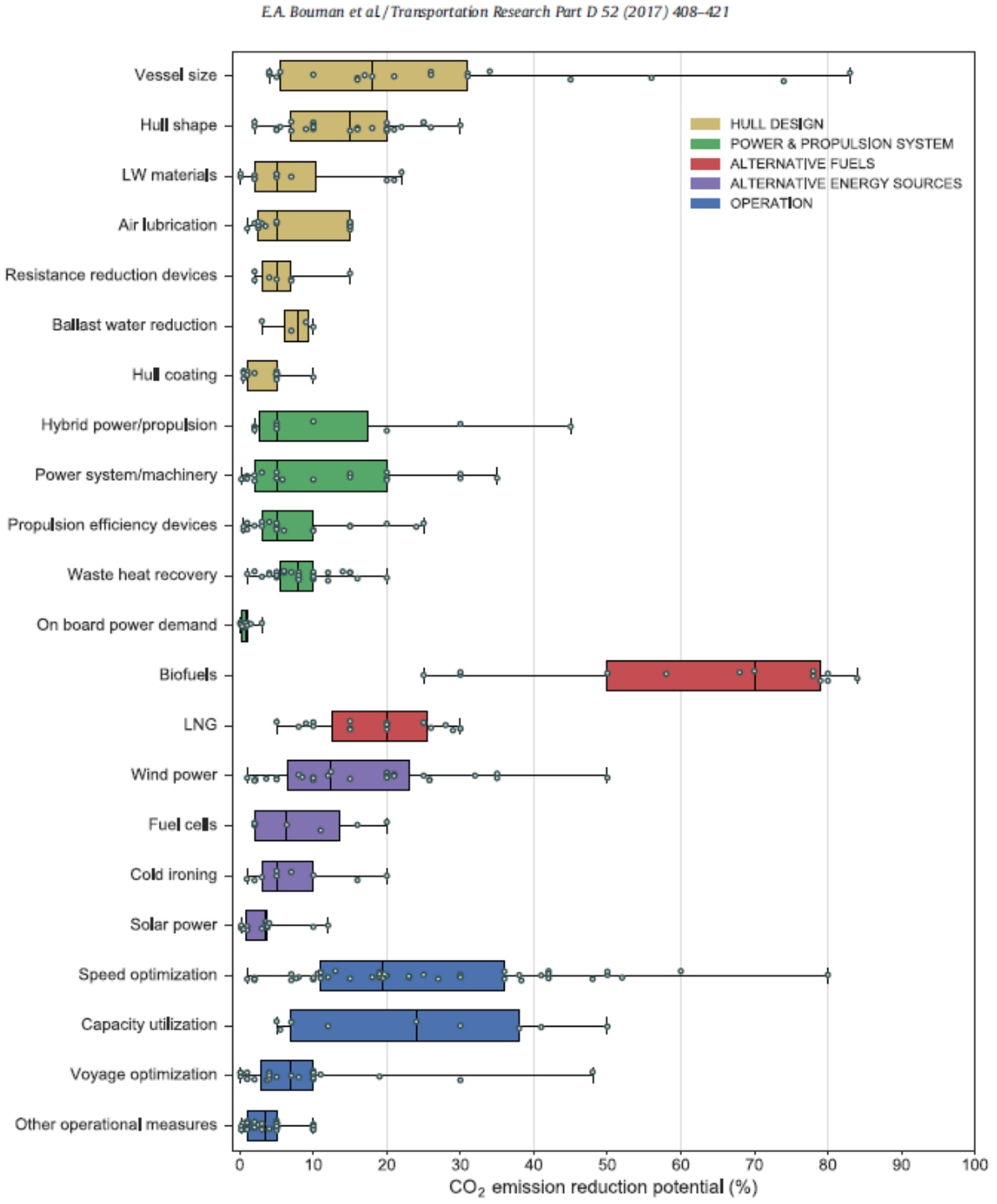
DECARBONISATION OF SHIPPING POTENTIAL MEASURES

Dr. Arne Fredheim
Research Director Energy and Transport, SINTEF Ocean
Adjunct Professor NTNU/AMOS

Potential measures and effects (Bouman et al. 2017)

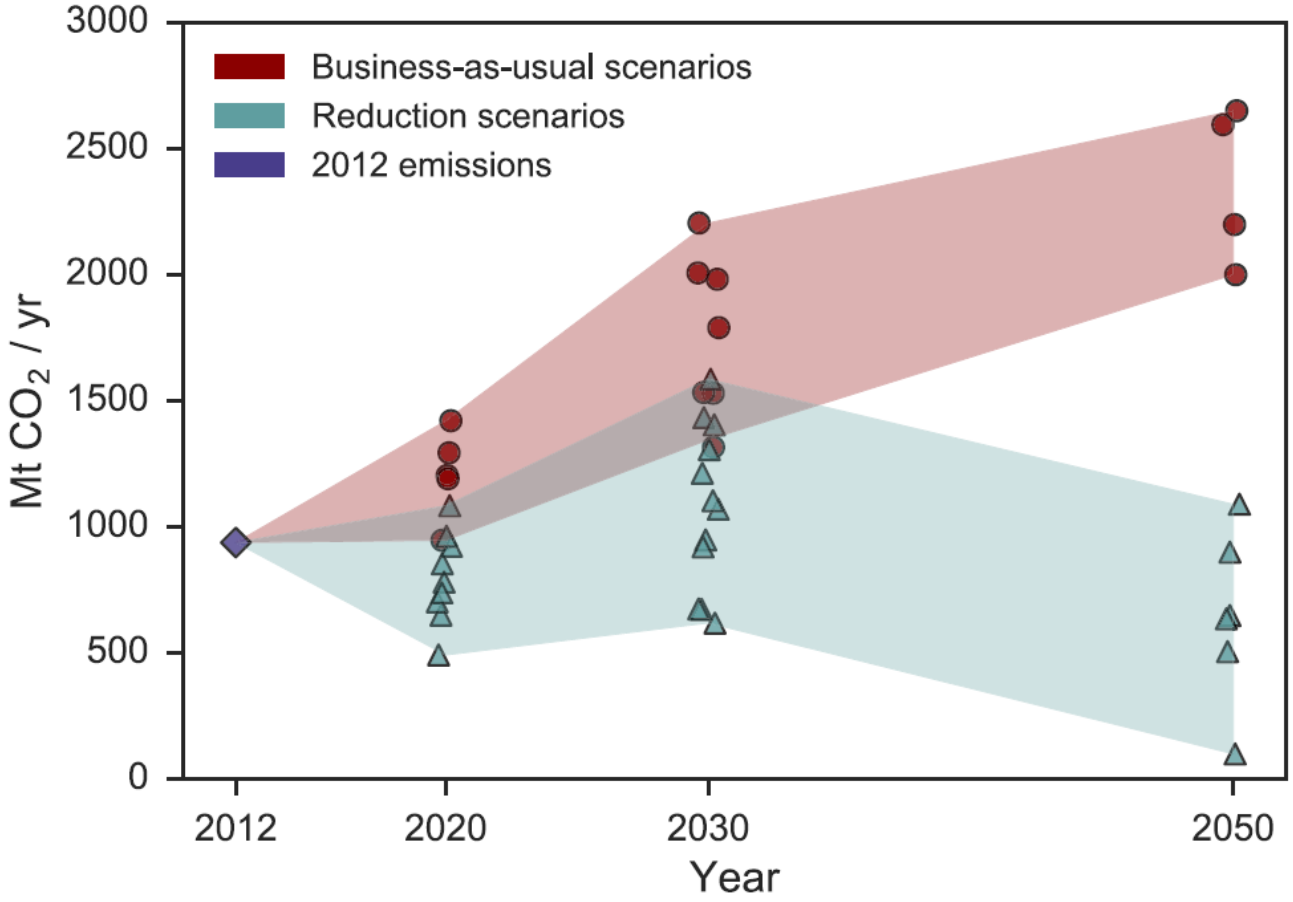
- A review of more than 150 studies of different measures
- Five main categories
  - Hull design
  - Power and propulsion system
  - Alternative fuels
  - Alternative energy sources
  - Operation
- Most effect other than alternative fuels
  - Vessel size (hull design)
  - Speed optimization (operation)
  - Capacity utilization (operation)



Summary of BAU and reduction scenarios

(Bouman et al. 2017)

- A potential of 75% towards 2050 with realistic combined measures
  - A factor of 4-6 per unit transported
- Necessary to ensure absolute reduction from shipping



Pathways to zero-carbon shipping by 2035

(OECD/ITF 2018 Decarbonising maritime transport 2018)

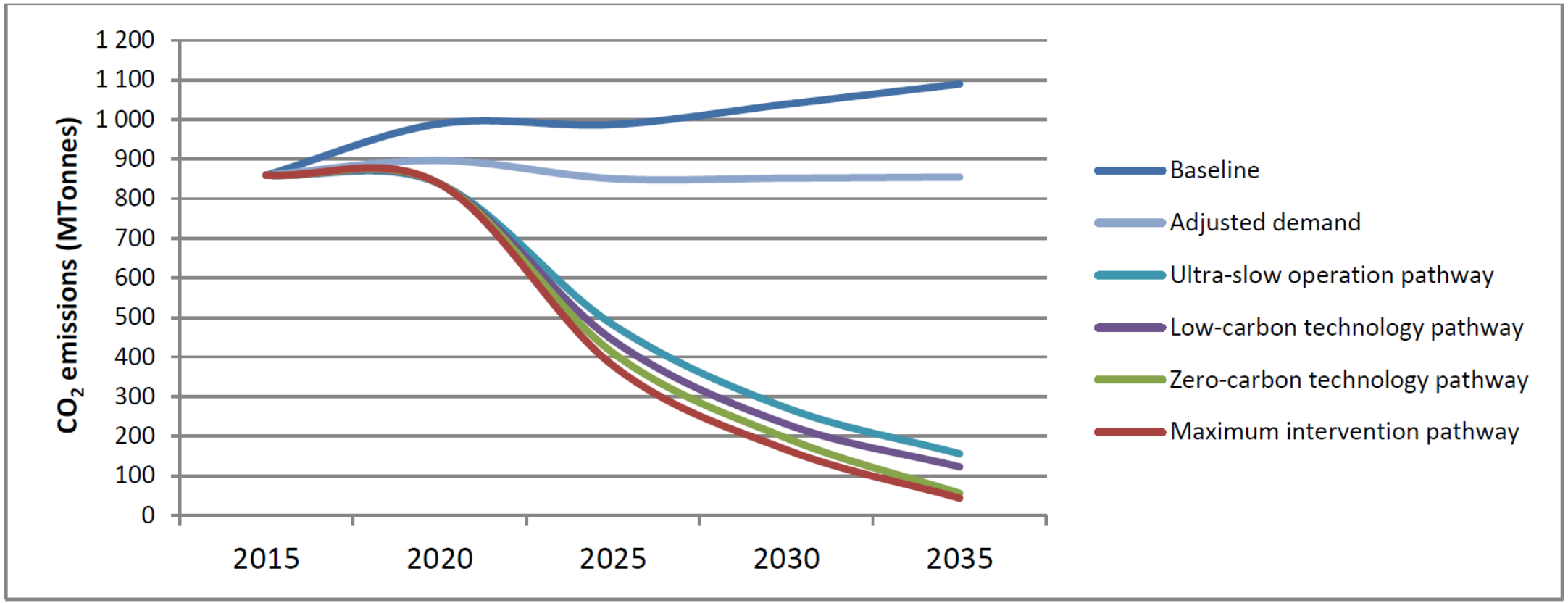
- Categories of measures
  - Technological
  - Operational
  - Alternative fuels/energy
- Points at four potential decarbonisation pathways and their components
  - Maximum intervention
  - Zero-carbon technology
  - Ultra-slow operations
  - Low-carbon technology

Pathway	Operational measures	Technical measures	Carbon factor reduction due to alternative fuels	Electric ship penetration
"Maximum intervention"	Maximum	Maximum	80%	10%
"Zero-carbon technology"	Moderate	Maximum	80%	10%
"Ultra-slow operation"	Maximum	Maximum	50%	-
"Low-carbon technology"	Moderate	Maximum	75%	-

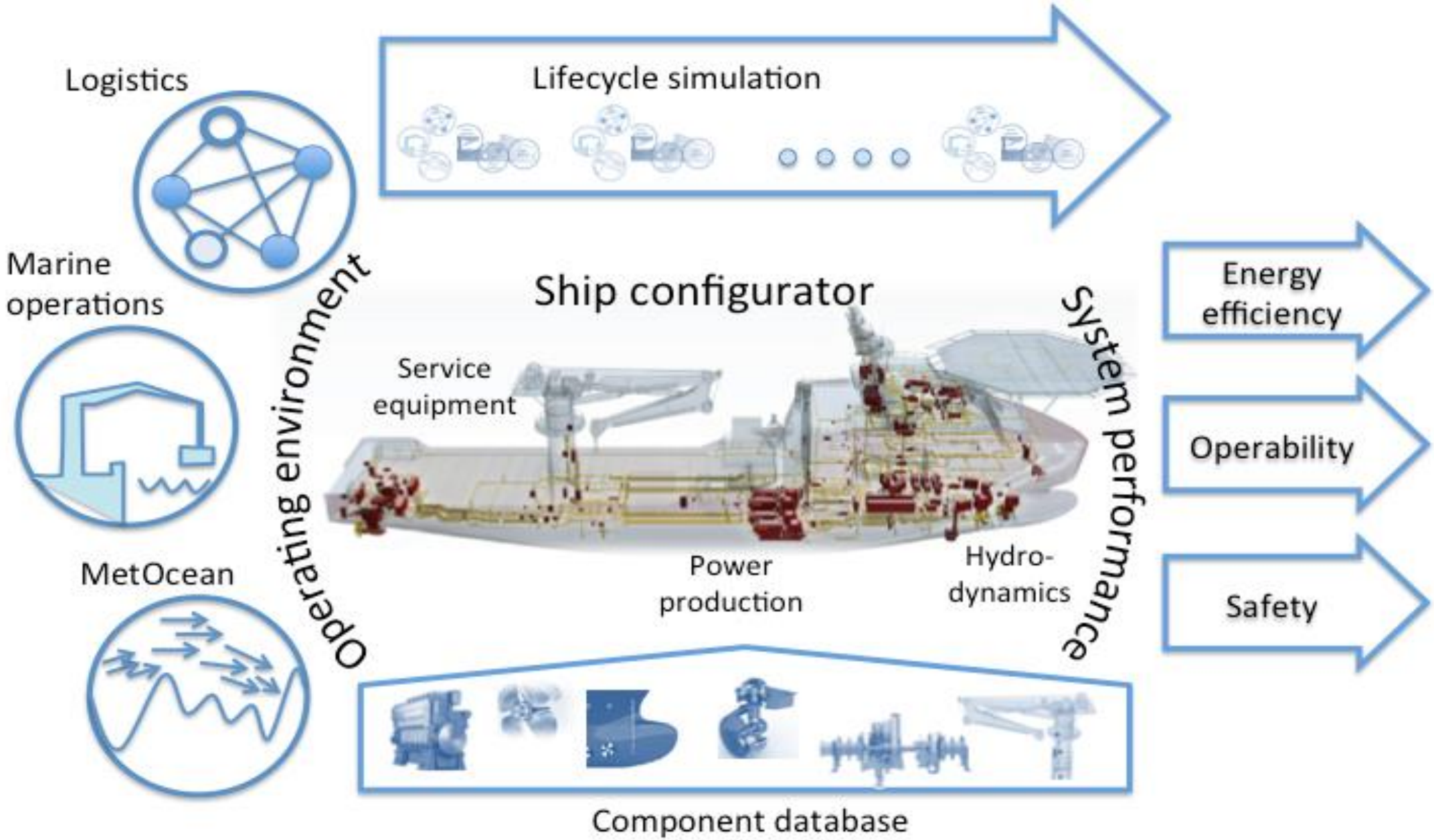
SINTEF

Decarbonisation pathways for shipping

(OECD/ITF 2018 Decarbonising maritime transport 2018)



SINTEF


Logistics
Marine operations
MetOcean
Lifecycle simulation
Ship configurator
Service equipment
Power production
Hydro-dynamics
Operating environment
System performance
Energy efficiency
Operability
Safety
Component database

SINTEF

Teknologi for et bedre samfunn