Green Corridors - A Collaborative Approach in Unlocking Deployment of the New Fuels

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Maersk Mc-Kinney Møller
Center for Zero Carbon Shipping

- The Maersk Mc-Kinney Møller Center for Zero Carbon Shipping & Green Corridors
- The inherent challenge in the green transition for the maritime industry
- A methodological approach to closing the cost gap
- Concluding remarks

Maersk Mc-Kinney Møller Center for Zero Carbon Shipping

Our vision and mission

Our vision is to sustainably decarbonize the maritime industry by 2050

Our mission is to be an independent and significant driver of a sustainable maritime decarbonization

Our approach to decarbonization

Not-for-profit
Money earned by or donated to the Center is used entirely to finance Center work,

Independent
We are un-biased, solution agnostic and have no vested interest in any technology. We work collaboratively and bring together key players across the value chain.

Science-based
We commit to climate science and use a data driven approach to explore viable decarbonization pathways.

Our Partners share the zero-carbon vision and are committed to collaborative climate action

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bp
CF
Cargill
DP WORLD
equinor
Hapag-Lloyd
JOHN SWIRE & SONS
MAERSK
MAN Energy Solutions
Future in the making
MITSUBISHI HEAVY INDUSTRIES, LTD.
MITSUI & CO.
NORDEN
NYK LINE
NIPPON YUSEN KAISHA
seaspan
RioTinto
Royal Caribbean Group
Stolt Tankers
Sumitomo Corporation
SIEMENS energy
TOPSOE
TotalEnergies

ALLEN & OVERY
BCG BOSTON CONSULTING GROUP
DanishShipping
DANISH MARITIME AUTHORITY
ecoinvent
Global Centre for MARITIME DECARBONISATION
Environmental Defense Fund
GLOBAL MARITIME FORUM
Gorrissen Federspiel
HUR Ocean
Centre for the Fourth Industrial Revolution
Maritime and Coastguard Agency
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sea
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS
SSI
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MINERVA GAS
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MPC CONTAINER SHIPS
IHS Markit
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BLUE SKY MARITIME COALITION
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X-PRESS FEEDERS
MEYER WERFT
PAPENBURG 1795
PORT OF GOTHENBURG
Woodside Energy
E&S Tankers
WÄRTSILÄ
DORIAN LPG
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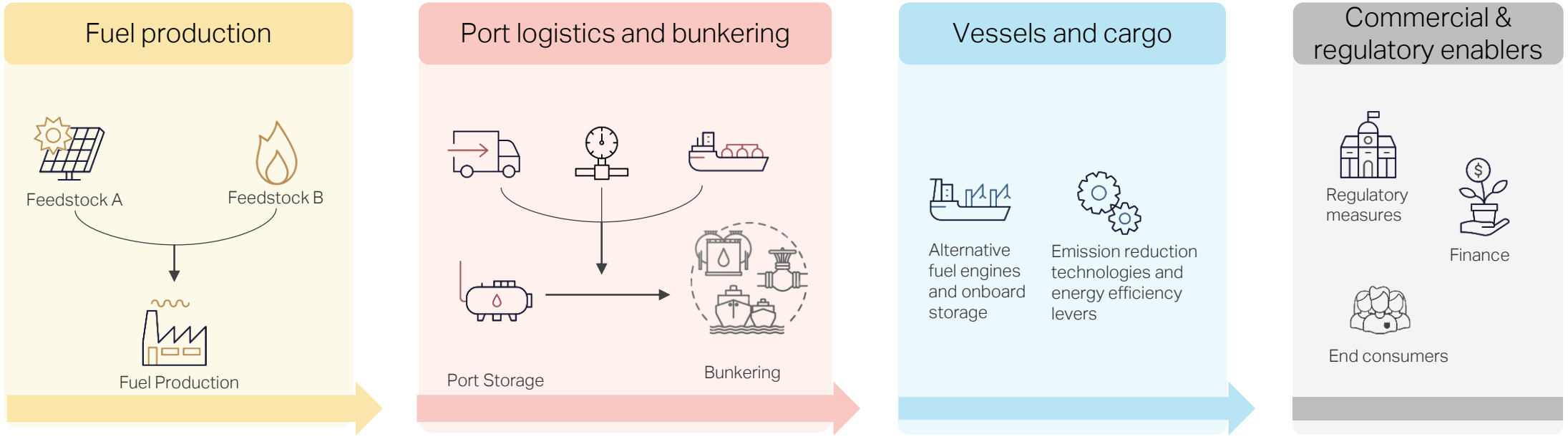
Green (shipping) corridors: Deployment of alternative on commercial trade

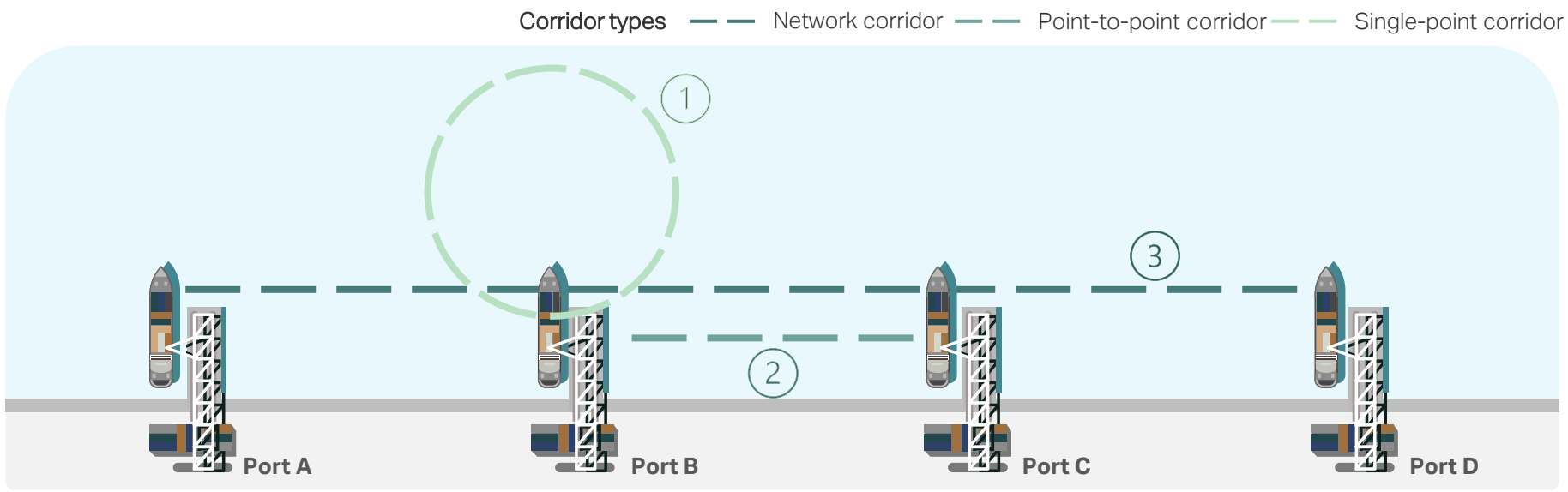


What are green corridors?

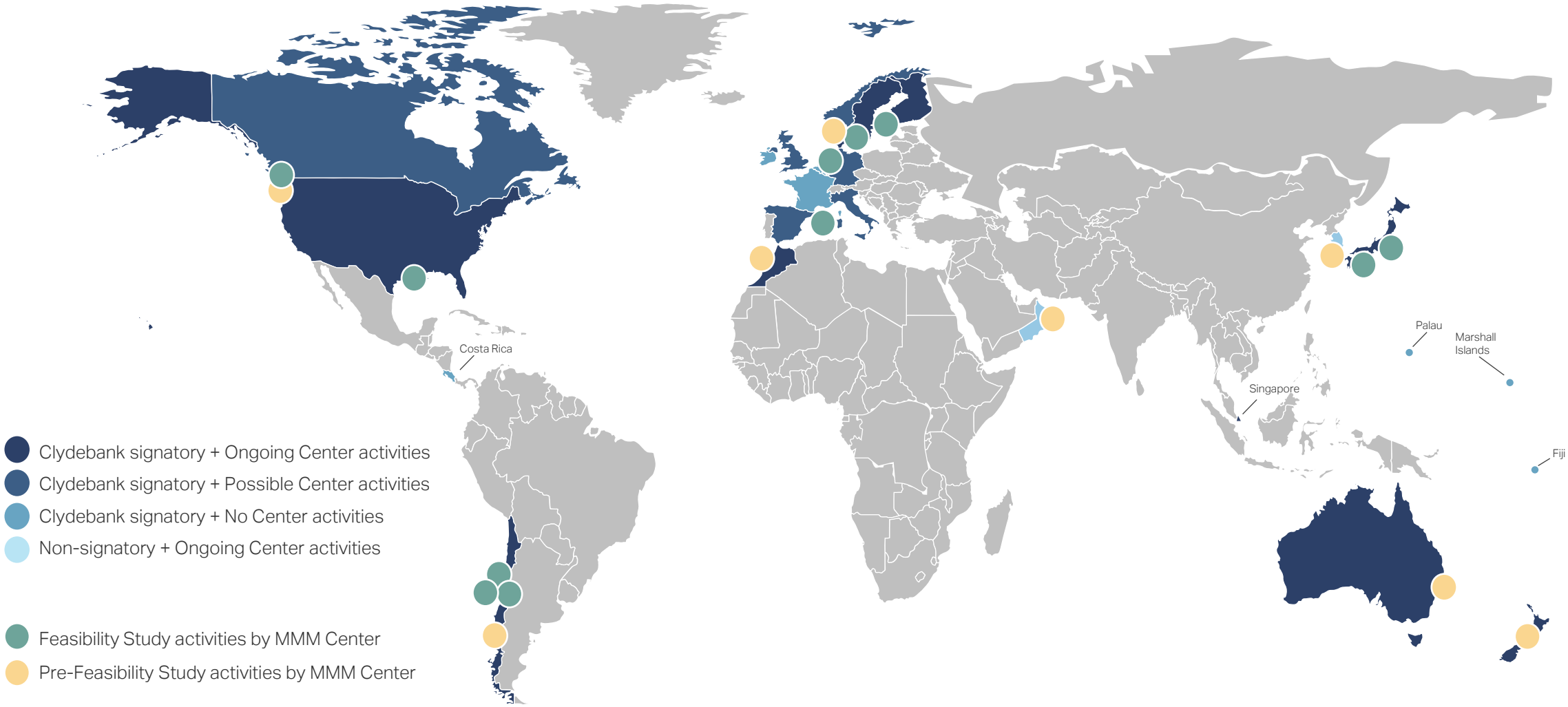
Green corridors are shipping routes on which there are commercially operating ships using **alternative fuels**

Green (shipping) corridors:
Deployment of alternative on commercial trade - Green corridor types

Main corridor types	Description
① Single point	Single-point corridors establish zero-emission shipping routes around **a particular location,** i.e., a port hub allowing round-trip bunkering
② Point to point	Point-to-point corridors are single-route green corridors between **2 ports.** Typically, more niche segments or based around a commodity transportation route
③ Network	Network green corridors establish routes between **3 or more ports** where vessels can sail on alternative fuels



Green corridor activities in the MMM Center



- Clydebank signatory + Ongoing Center activities
- Clydebank signatory + Possible Center activities
- Clydebank signatory + No Center activities
- Non-signatory + Ongoing Center activities

- Feasibility Study activities by MMM Center
- Pre-Feasibility Study activities by MMM Center

Agenda

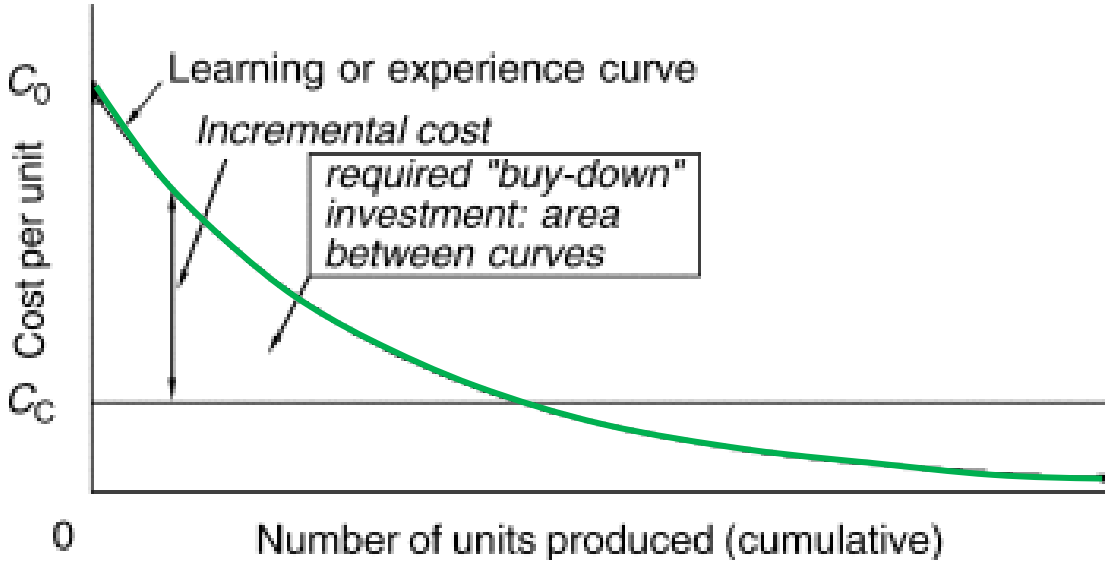
– The Maersk Mc-Kinney Møller Center for Zero Carbon Shipping & Green Corridors

– **The inherent challenge in the green transition for the maritime industry**

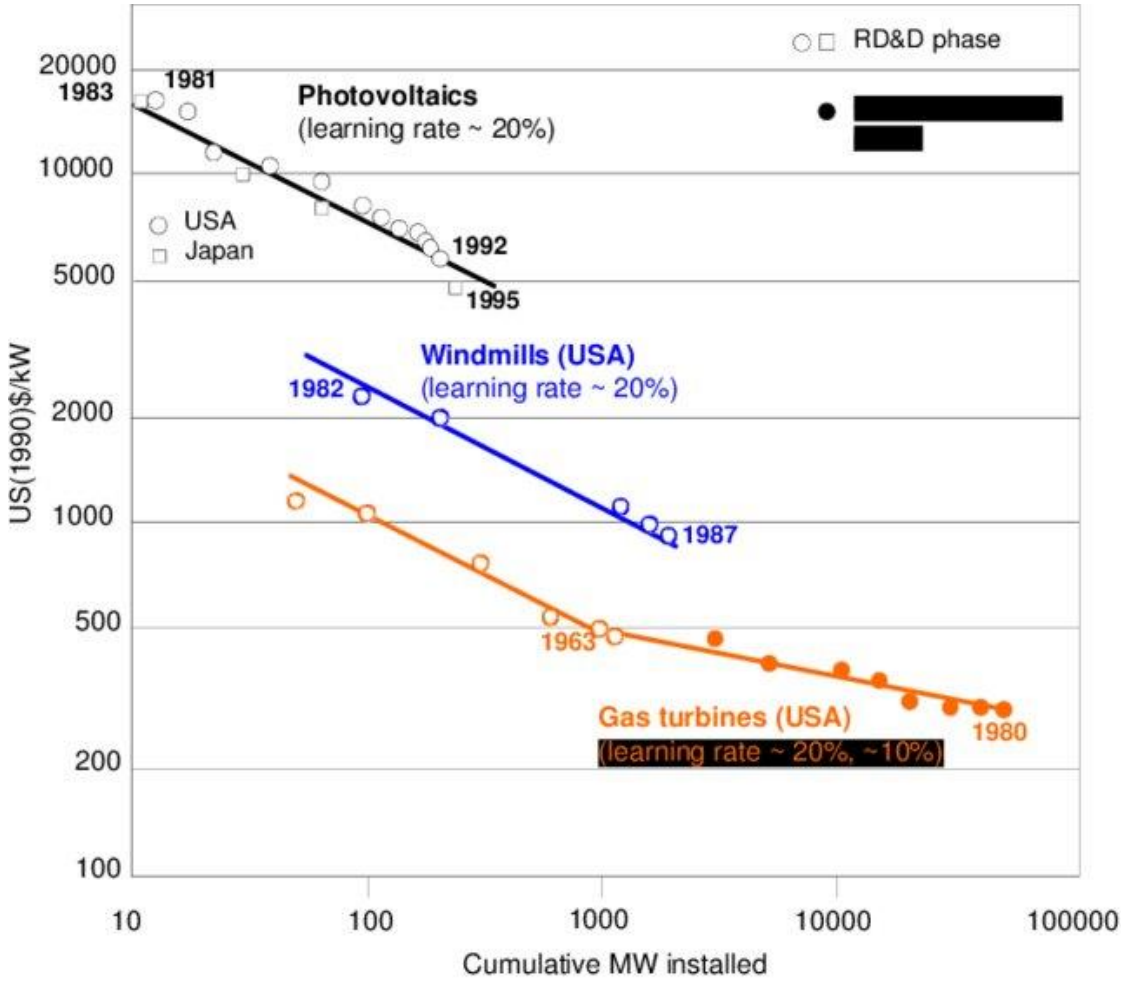
– A methodological approach to closing the cost gap

– Concluding remarks

From Emerging Technology to True Market
The Theory & Literature

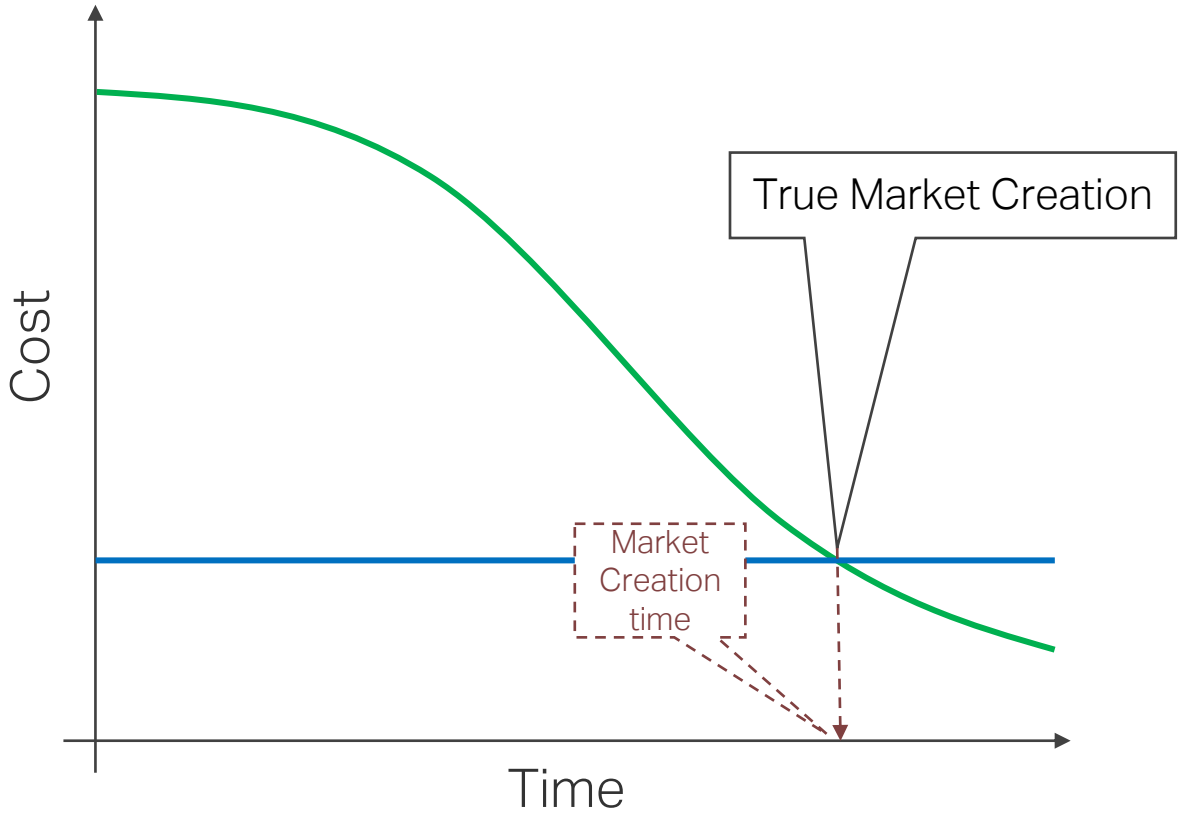


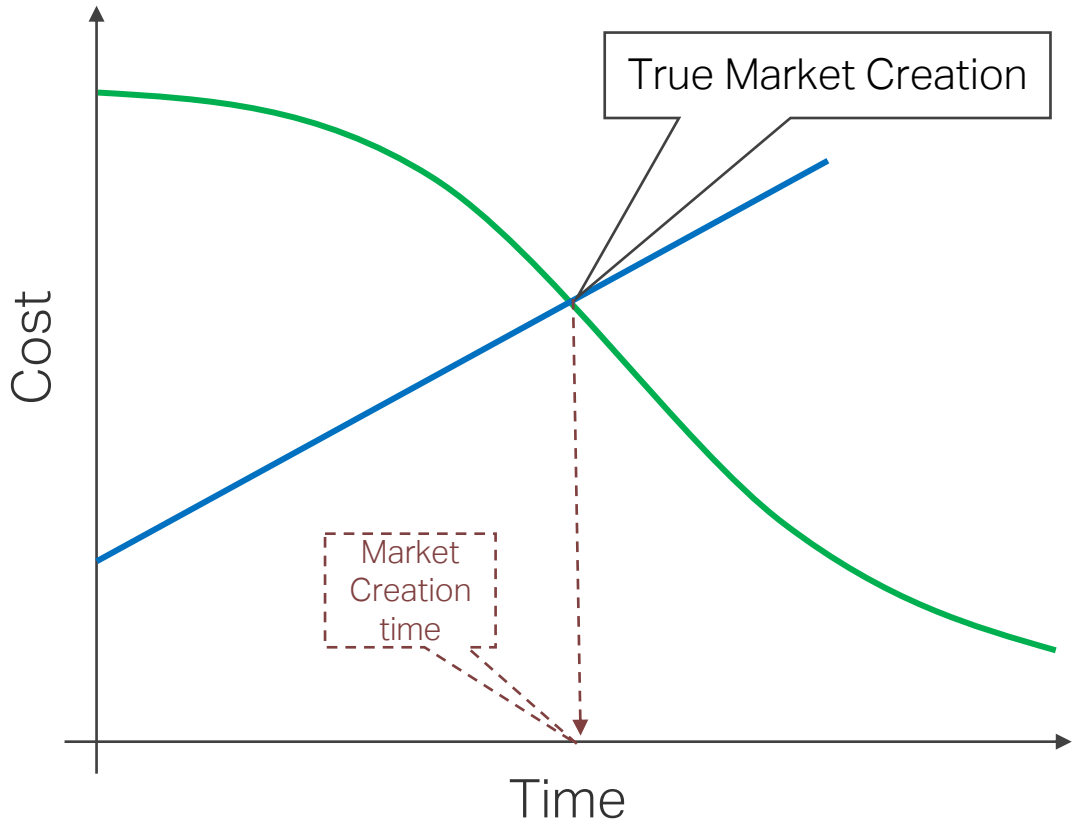
[Experience Curves for Energy Technologies]
Christine Woerlen, in [Encyclopedia of Energy], 2004



Ogden, Williams and Larson, May 2001
Toward a Hydrogen-Based Transportation System
Toward a Hydrogen-Based Transportation System

From Emerging Technology to True Market
The Models

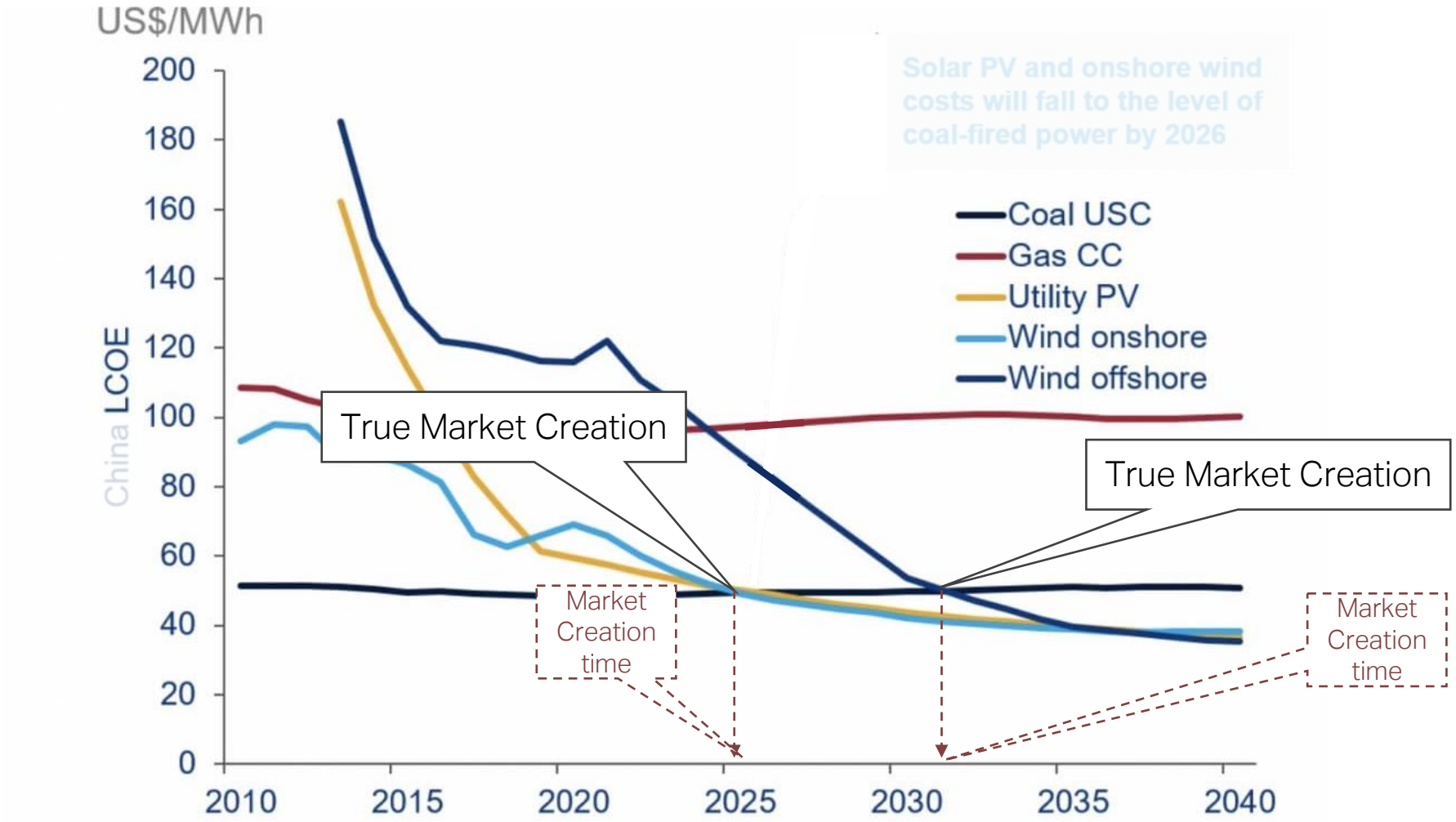




Existing/ conventional Technology

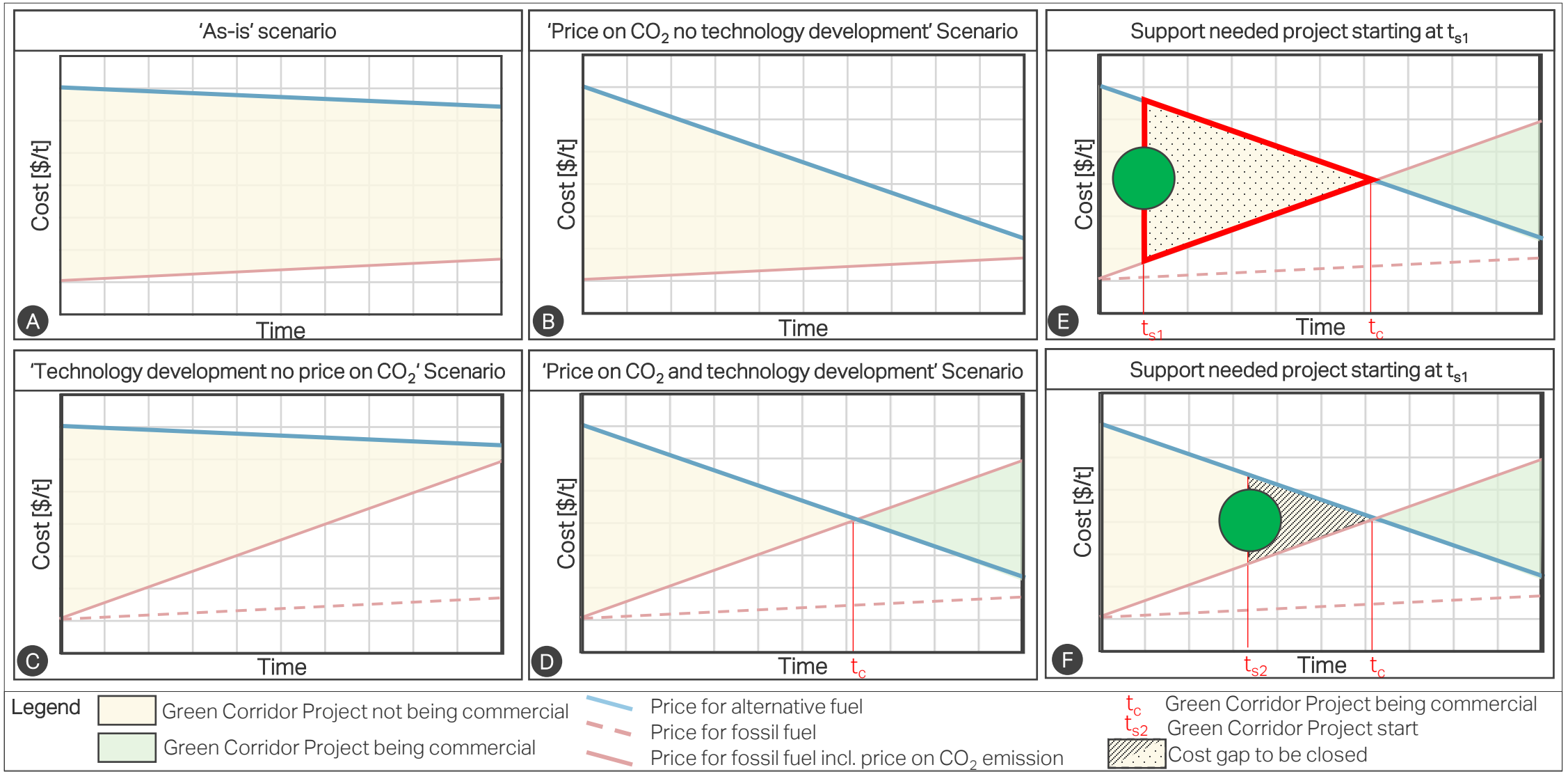
Emerging/ advanced Technology

From Emerging Technology to True Market Creation
Case study

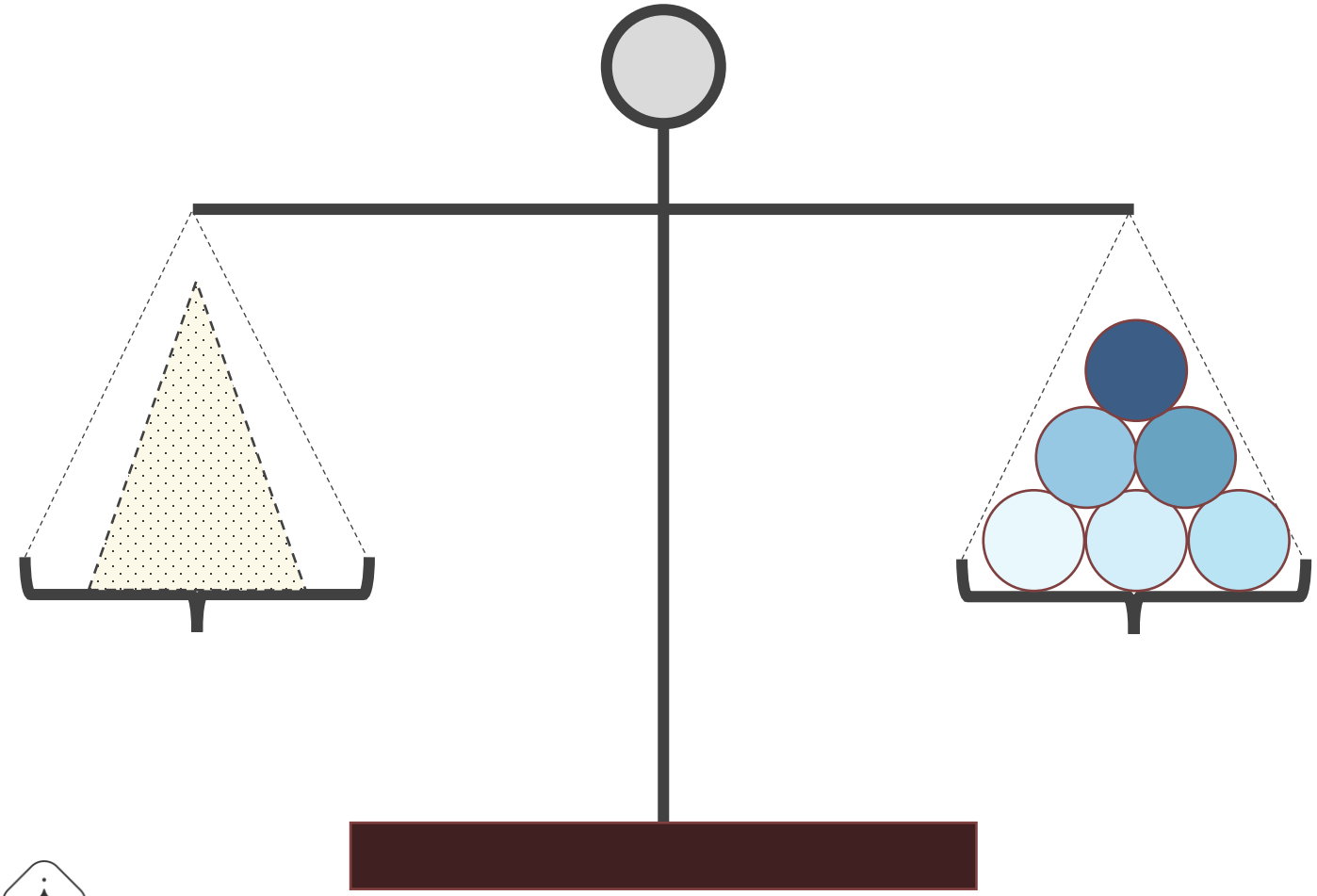


Sprint or marathon: China provincial renewable power competitiveness report 2019
August 2019

From Emerging Technology to True Market Creation
How do we get there in the maritime decarbonization?



Making the Green Corridor Economical Feasible



Residual Cost Gap outside project consortium

Public

- Public/Philanthropic funding, support, financial instruments

Private

- Customers' interest to pay for green transportation
- Cargo owners' interest to reduce Scope 1/2/3 emission
- Synergies with other Projects
- Project team's interest via Business Development
- Project team's pre-investment into relevant technologies and infrastructure

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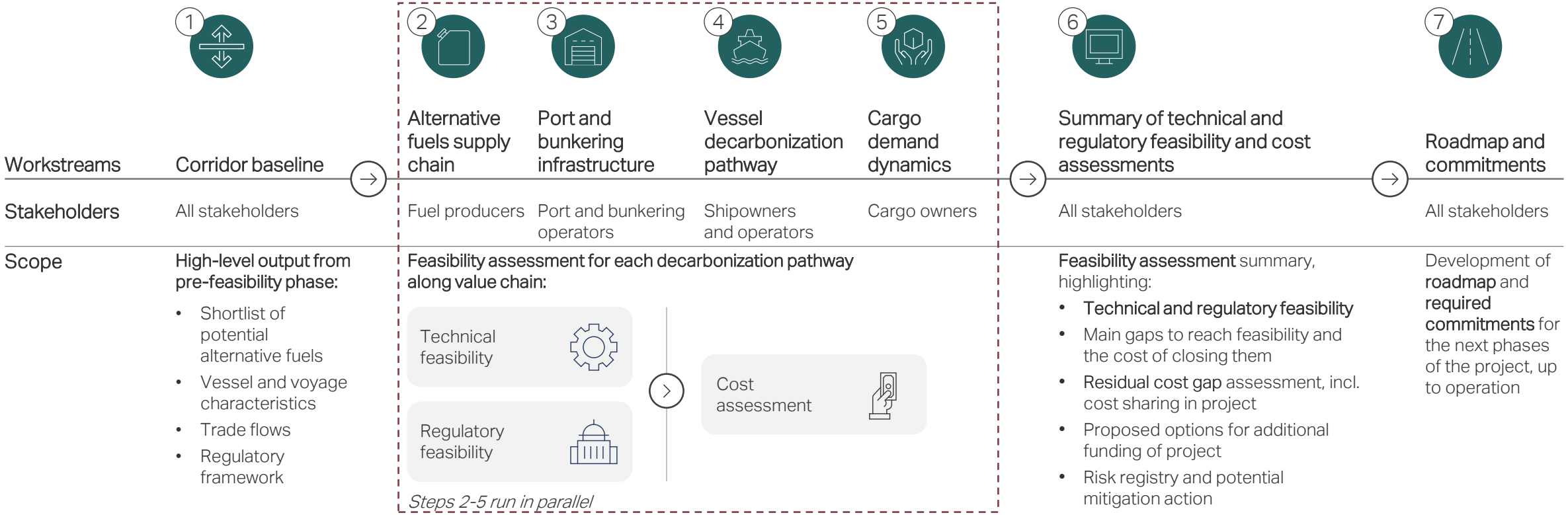
The MMMCZCS Green Corridors: Feasibility Phase Blueprint is structured around seven workstreams



Assessing the Residual cost gap is an iterative process

Estimate the incremental cost of green

A1. **Estimate costs** fuel, port and bunkering infrastructure, vessel for
   - I. Fossil fuel-based corridor
   - II. Alternative fuel-based corridor

A2. **Calculate the incremental cost of green** for each of the 3 dimensions

A3. **Estimate the high-level cost pass through on cargo** and the CO_2 **price**, to cover the incremental cost of green

Data source: Green Corridor Scenario Modeling tool

Overview of pre-investments done by consortium members

B. **Quantify pre-investments** done by first movers in the industry with interest to join the consortium

C. **New Baseline**

Reduce the incremental cost of green through the consortium

D. **Refine Cost Estimate** throughout Feasibility Study of workstream 2-5

E. **Reduce costs among consortium members** through business development opportunities and synergies

F. **Assess the willingness-to-pay** through the cargo & customer chain

G. **Identify the remaining cost gap** to be covered by other stakeholders

Assess funding options to close the remaining cost gap

H. **Identify sources of funding** to close the remaining cost gap
   - Subsidies
   - Attractive loans
   - Re-payment of ETS
   - Philanthropic organizations
   - Guaranteed minimum auctions
   - Other financial instruments

Consortium matured — Project Commitment Letter — Feasibility Documented

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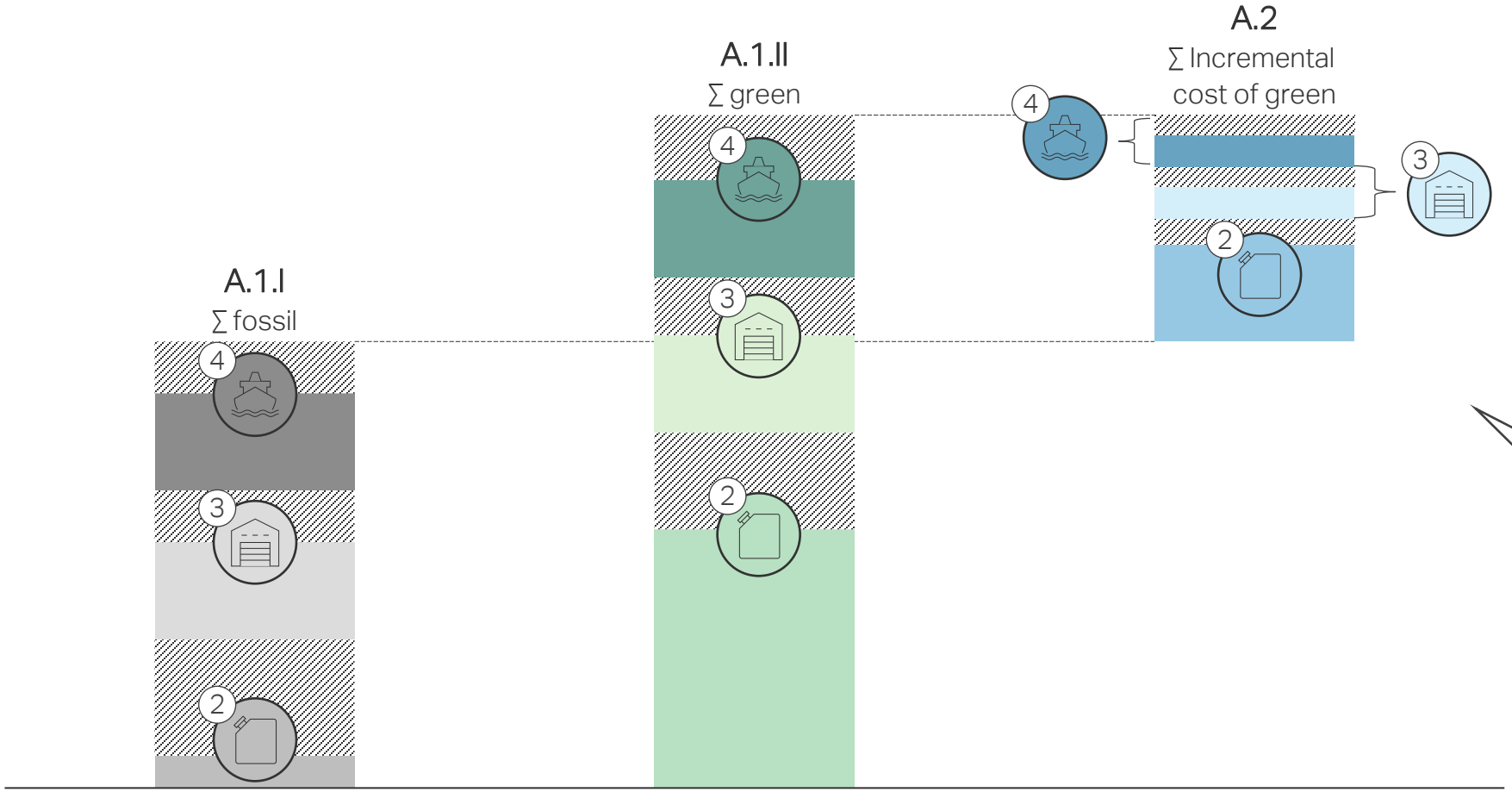
A. Green Corridor Scenario Modeling tool provides initial estimates on the incremental cost of green for a green corridor



Legend

Costs

- Opex
- Capex

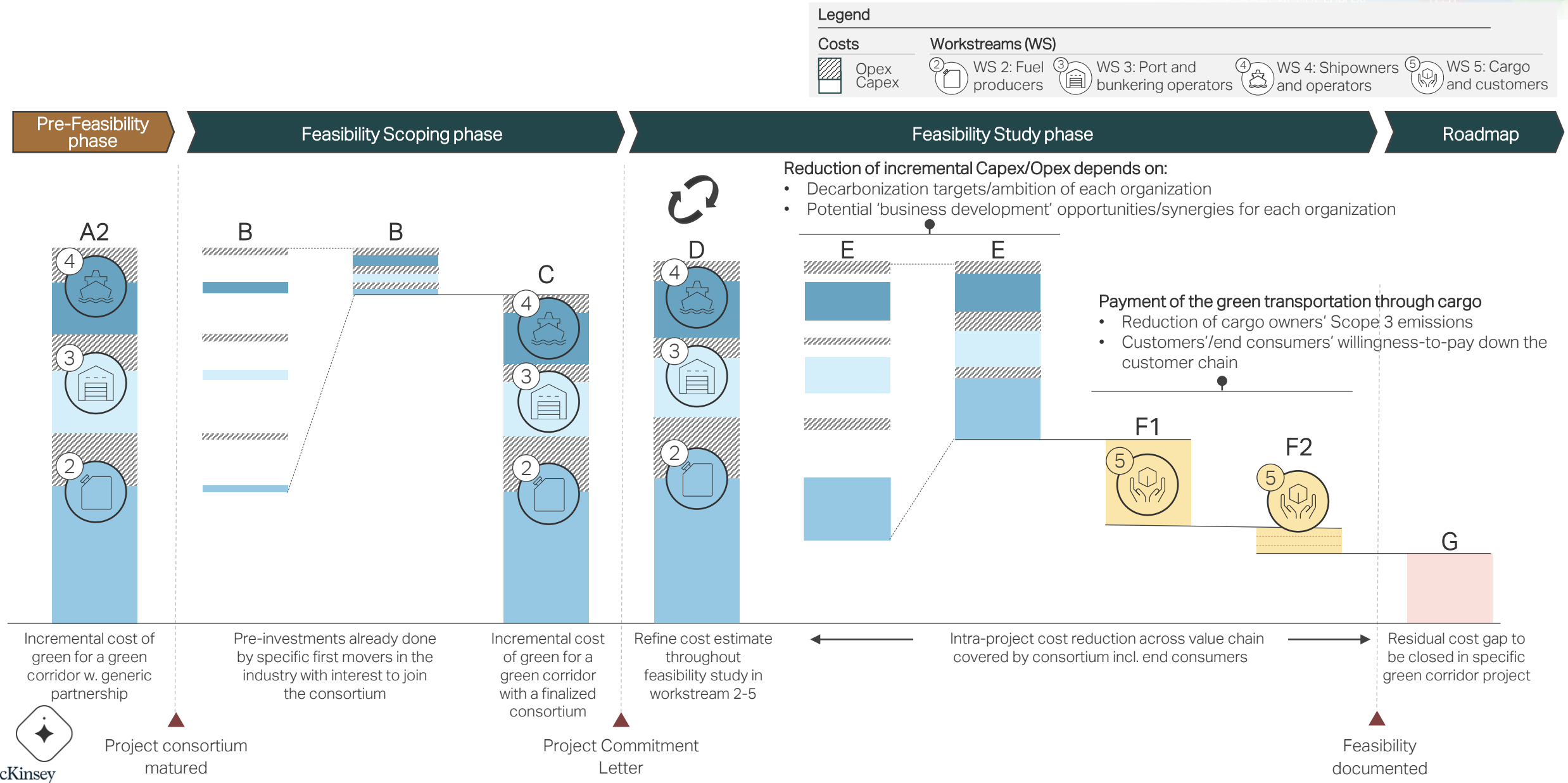
Workstreams (WS)

- WS 2: Fuel producers
- WS 3: Port and bunkering operators
- WS 4: Shipowners and operators

Cost pass through for green transportation = Σ Incremental cost of green / Cargo volume moved in the period

1. Estimate to be further refined with cost inputs received from consortium members after the Project Commitment Letter has been signed

The incremental cost of green can be reduced in various ways



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Concluding remarks

– The deployment of alternative (low/zero emission) fuels is mandatory for the full decarbonization of the shipping industry

– The pace required does not allow for a standard 'waiting game' and 'business-as-usual approach'

– A collaborative approach where *normal* is put aside is needed

– Green Corridors offers such a collaborative framework, where first mover companies, countries and financial players can accelerate the green transition

– Maersk Mc-Kinney Møller Center for Zero Carbon Shipping has developed several methodologies for green corridors, allowing a consistent and transparent maturation. This includes a model for estimating the residual cost, which is cardinal for constructive Private Public Partnerships


Thank you