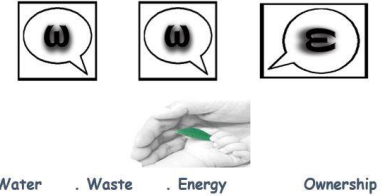


Sustainability Landscape: Transformative Pathways towards Low Carbon Development in the Energy Sector



Mekong Forum 2023

Landscape of Energy Transition and Climate Finance

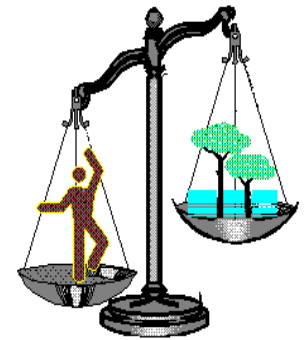
Dr Salil
Sustainability "Living Labs" Practice
At W W E_Own = "We Own" compliant habitats

27 July 2023

Transformative Pathways:

RESILIENCE

PROACTION



SEAMLESSNESS

Transformation:

from: Energy:

to: Water ~ Waste ~ Energy {W W E}

from: W W E

to: W W E_Own = "We" Own

Transform 1: Low Carbon habitats

RESILIENCE

Transform 2: Methane harness fin-tech

SEAMLESSNESS

**Transform 3: Leveraged Finance with
Environment Social Governance**

PROACTION

**Transform 4: Value added perspective:
*Societal cost of Capital, Environmental cost
of capital, Economic cost of capital***

Low-carbon Energy Development



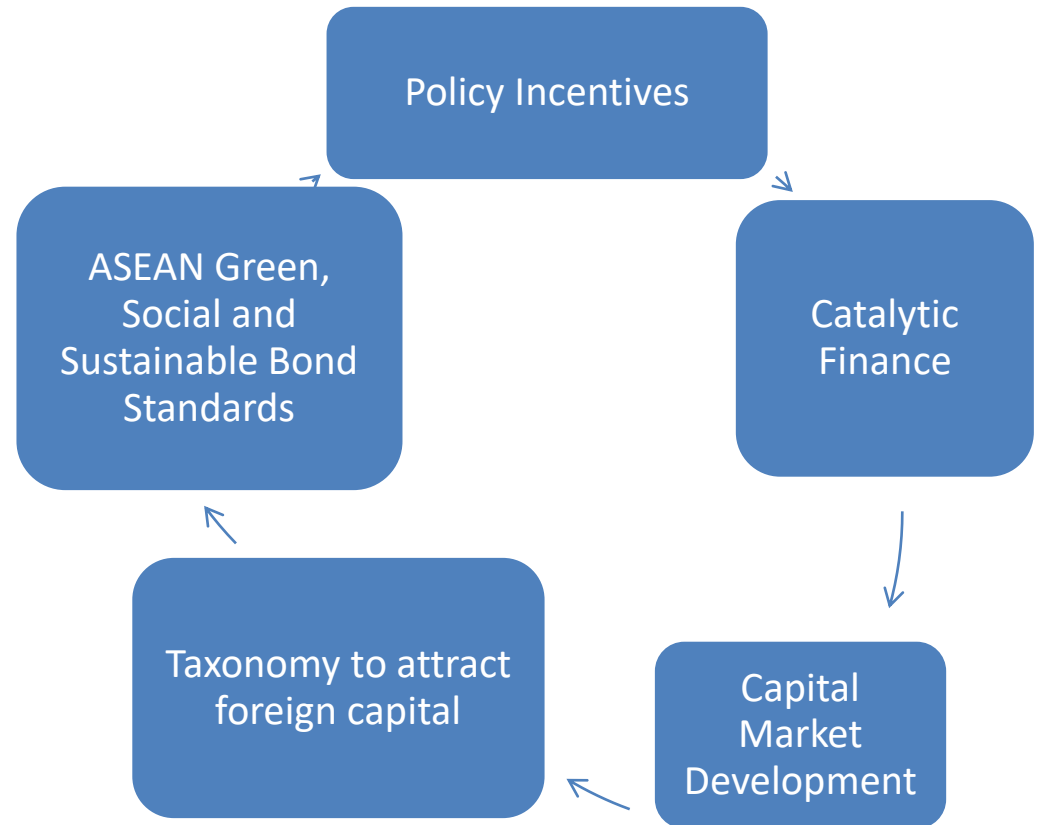
Energy has value embedded in
W W E {Water Waste Energy}

- the **user**,
- the **manufacturer**,
- the **service provider**,
- the **society** or
- the **policy makers**

The Energy mix:

- **Low Carbon**
- **Methane harness**
- **Hydrogen**

Climate Finance Risks map < > Opportunity map



TRANSFORMS



PATHWAYS

Policy-makers

Processors

Community

Three value propositions:

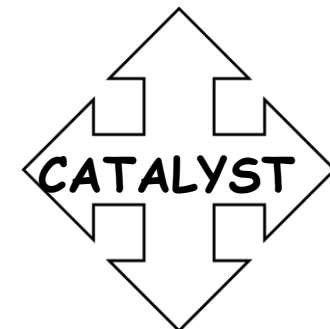
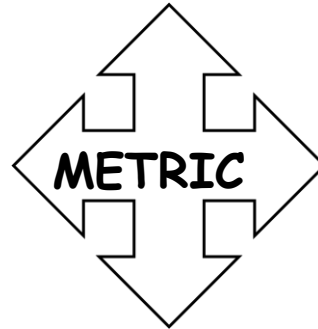
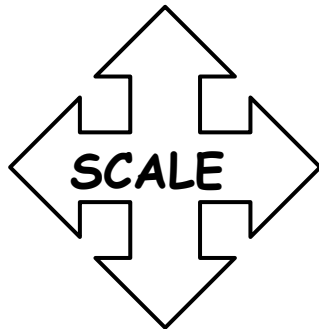
Water



Waste



Energy

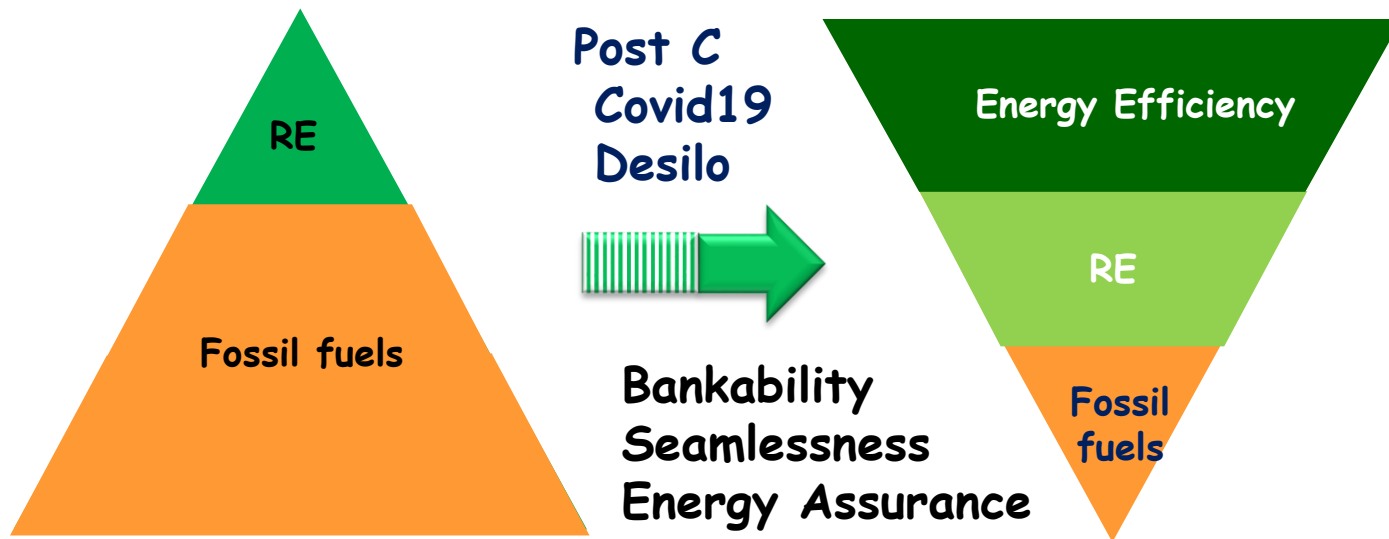


THAILAND+

MEKONG+

**ASIA
PACIFIC+**

Transformation: Low Carbon Pathway Risk <> Opportunity



SCALE; Clean-energy-tech; Energy Security; Partnerships

Innov-engage (i) Methane < > Carbon dioxide

Carbon pricing (Stiglitz/Stern, 2017)

Role of Carbon Pricing,

Emissions Trading Scheme (Zotzo, 2021);

China ETS; Germany ETS; UK ETS...

Gap between mitigation targets and Carbon taxes and Emission Trading

Pricing Carbon motivates (i) decarbonization (ii) investments

Carbon tax revenues: France, Canada, Japan...Asia catching up

SCALE UP:

Global investments in energy transition technologies, Energy Efficiency triple 2023 (USD 1.3 tri IRENA)

Methane <> CO2 sync curb:

Innov-engage low emission tech

Technology plus AI enabled dashboards

Some consensus on Methane curb (ref: COP 27)

renewable energy, energy efficiency, electrified transport and heat, energy storage, hydrogen and carbon capture and storage (CCS)

Off-grid Solar:

Concentrated in specific countries

Solar Photovoltaic:

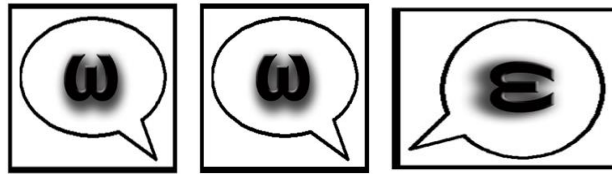
Ability to attract private funding

Flow of Finance:

Recognize endowments, starting conditions

Infrastructure development:

energy transition in line with the 1.5°C Scenario requires the redirection of USD 1 trillion per year from fossil fuels to energy-transition-related technologies



W.W.E_Own =
We_Own

Waste-to-energy:
methane emissions
critical to harness climate change

Methane
84-87 times the warming potential
Carbon dioxide
100-year time horizon

Global warming potential (GWP) (ref IPCC 2020)
methane: 16% of our total emissions
84-87 times the warming potential
methane tracker: 12% from landfills
(ref: International Energy Agency (IEA))

Grey hydrogen: extracted from natural gas
or coal, costing around EUR1.50/kg (ref EU
green deal)

METRIC



Water . Waste . Energy Ownership

Methane < > CO2 sync curb

Innov - Engage

Grey Hydrogen: Grey hydrogen: extracted from natural gas or coal, costing around EUR1.50/kg (ref EU green deal)

>> electricity from renewable sources such as wind and solar

Blue Hydrogen
produced from natural gas costs around EUR2.00/kg to produce

>> carbon that is emitted is captured and stored in underground reservoirs
>> carbon capture is often not 100 %

Green Hydrogen
produced using water electrolysis splits water into oxygen and hydrogen EUR2.50-5.50/kg, likely to come down as Renewables pick up and CO2 emissions curb (less natural gas, oil)

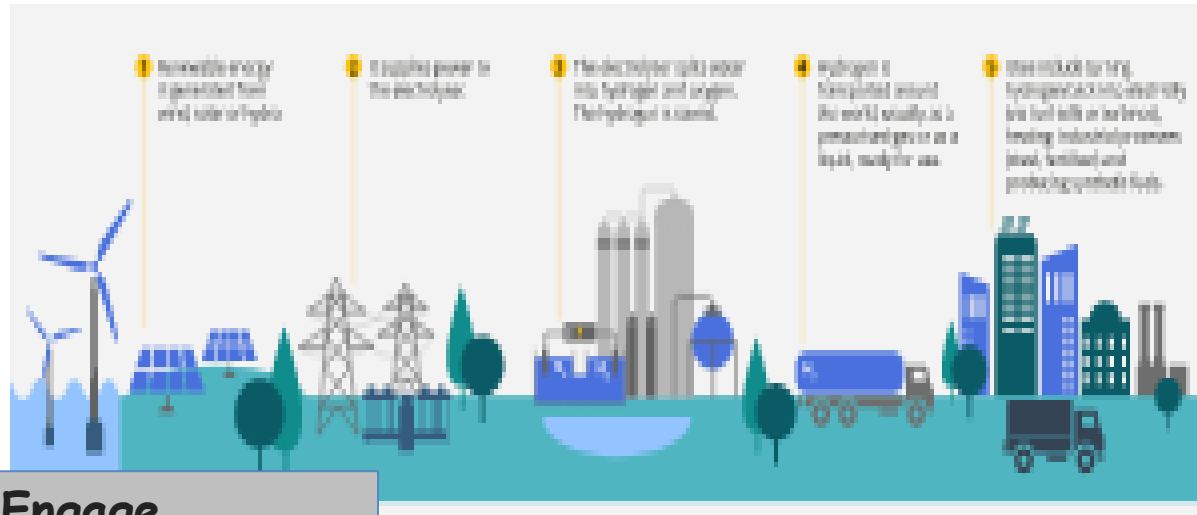
>> hydrogen for methane < > carbon-neutrality in sectors presently difficult to decarbonize;
>> solar photovoltaic, onshore/offshore wind and hydropower

S E A M L E S S N E S S

Two-pronged "Innov-engage": hydrogen plus renewables minus oil 'n gas

hydrogen produced by solar and wind power
can be converted back into electricity

PATHWAYS



Innov - Engage

CO₂ from the air and combining it with hydrogen to produce renewable aviation fuel (ref: Norsk e-Fuel consortium, Europe)

steel-making minus energy from fossil fuels (ref: SSAB Sweden)

TRANSFORMS

synthetic fuels for aviation; fuel cells for small airplanes (ref: Orkney Scotland)

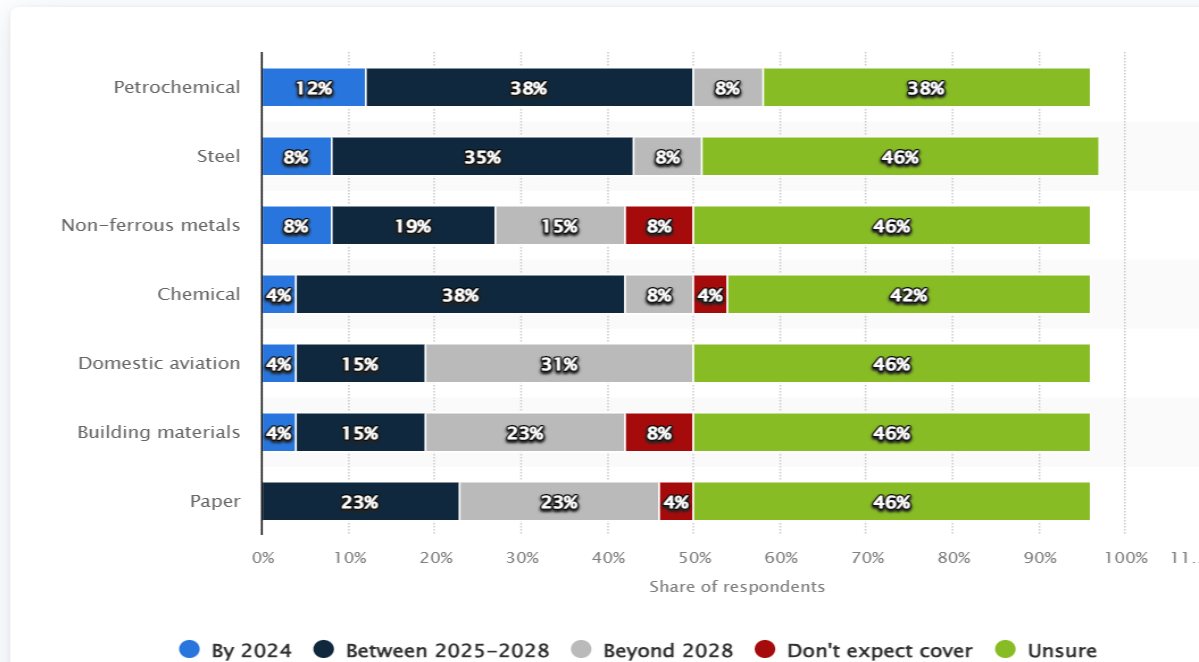
hydrogen to make ammonia for the creation of a carbon-free fertilizer (ref: Agricultural services Yara, Australia)

METRIC: ASSESS, REVIEW, INNOV-FINANCE

China's Energy Trading Scheme (ETS) to include more sectors post 2023

- >> Cement >> Petrochemical >> Steel >> Non-ferrous metals >> Paper
- >> Aluminum >> Chemical >> Domestic Aviation >> Building materials
- >> PRC Ministry of Ecology and Environment (MEE) call for proposals
- >> CCER Chinese Certified Emissions Reduction Scheme

from 2024 to 2028



- >> **Systemic & Structural Reforms (Ref: International Carbon Action Partnerships, 2023)**
- >> **USA & Canada: ETS linkage between California and Quebec**
- >> **EU Green Deal: energy policies**
 - carbon pricing mechanisms to accelerate the transition**
 - >> **EU phase-in of the maritime sector from 2024**
- >> **India: Bureau of Energy Efficiency two mechanisms: (i) voluntary market domestic project based offset scheme (ii) compliance market with mandatory participation for regulated Entities**
- >> **Thailand: Voluntary ETS Eastern Economic Corridor, Carboc Credit Trading Platform**
- >> **Vietnam: e pilot ETS is expected to start in 2026 and become fully operational by 2028**

ETS Innovation Fund finances the commercial demonstration and deployment of innovative low-carbon technologies and industrial solutions

ETS Modernisation Fund is one of its solidarity mechanisms to help lower-income Member States
decarbonize and develop their energy systems

Social Climate Fund and auction proceeds:
vulnerable citizens and microenterprises undertake green investments in energy efficiency,
decarbonization, and sustainable transport, such as home insulation, heat pumps, solar panels, and electric mobility.