



Unlocking carbon finance for low carbon hydrogen projects

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Introduction to

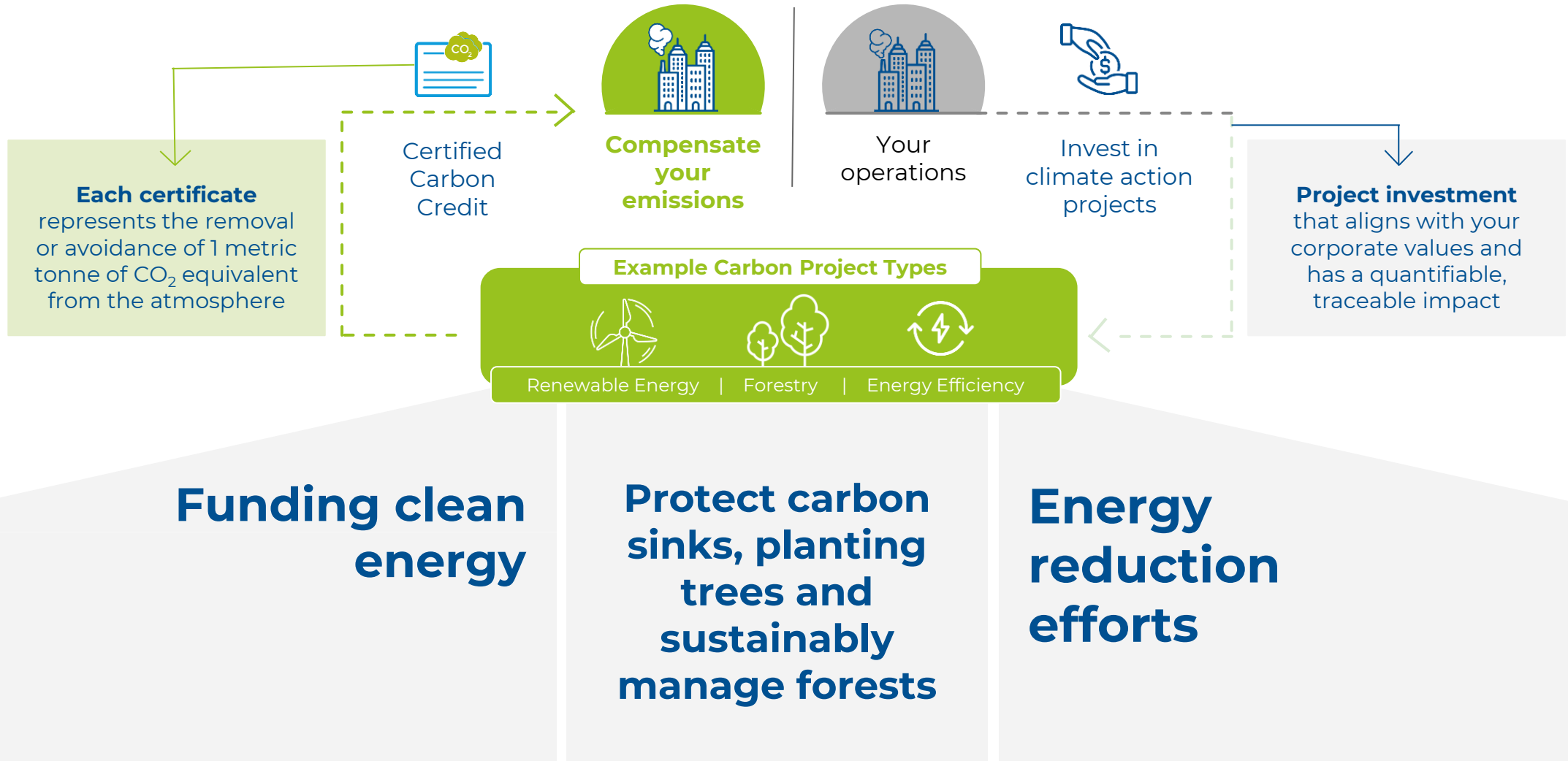
Carbon credits

What are carbon credits?

One carbon credit is equal to 1 tonne of CO₂ being reduced or removed from the atmosphere.



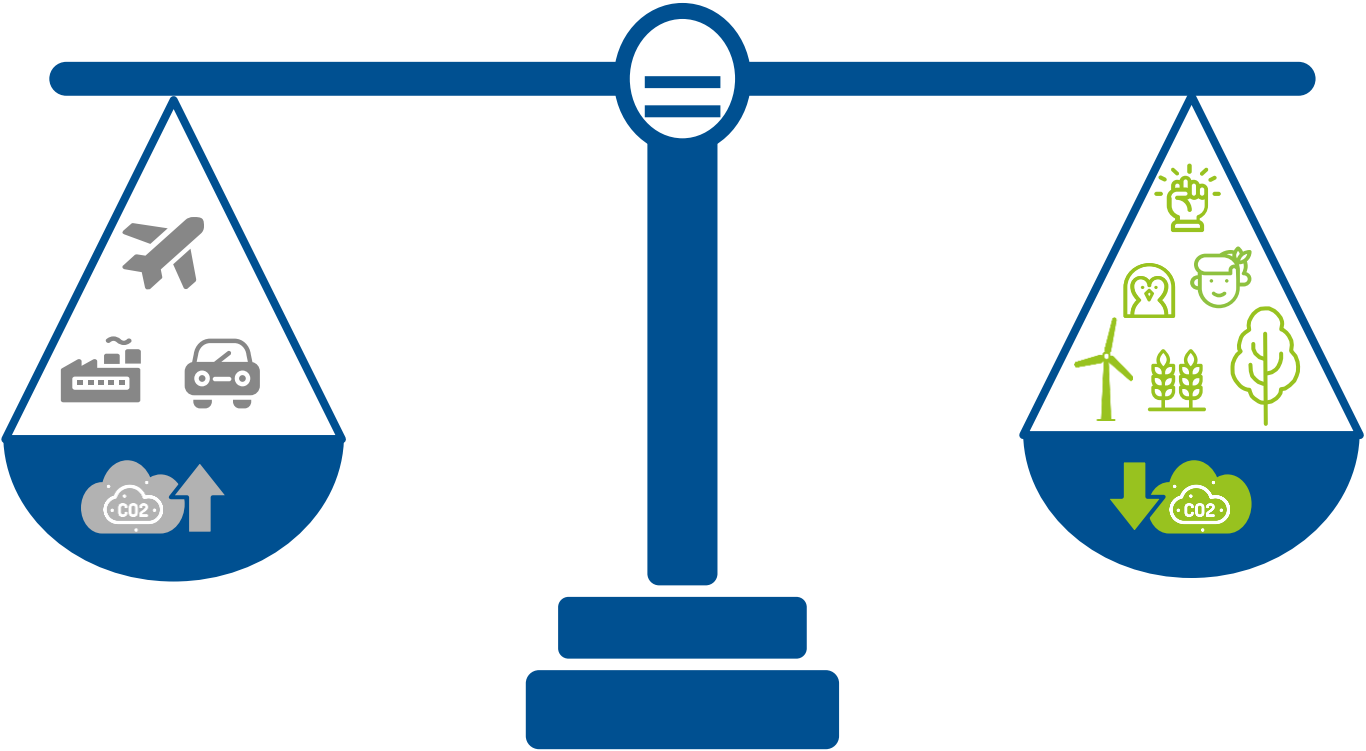
How do carbon credits work?



Carbon credits finance sustainable development

After you reduce your GHG emissions to a minimum, carbon credits allow you to balance your emissions through supporting certified climate action projects outside your value chain

Tonne of CO₂e emitted through activities in your value chain



Balance your emissions and help:

- Drive the renewable energy transition
- Protect biodiversity and ecosystems
- Vital carbon sinks
- Conserve Build long-term prosperity with sustainable growth
- Improve global resilience with better access to healthcare

South Pole's quality assurance

High-quality carbon credits

International best practice



ICROA-recognised carbon standards

Gold Standard



Third-party auditing



Thorough due-diligence carried out by South Pole

How do projects qualify for carbon credits?

Real



Additional



Measurable



Verifiable



Permanent



Unique



Who certifies carbon credits?

Internationally-recognised standards certify carbon credits

Gold Standard

Established by WWF, [The Gold Standard](#) is endorsed by more than 80 NGOs and has 1400+ certified projects in over 80 countries.. Gold Standard certified projects need to fulfill 3 Sustainable Development Goals to assure social co-benefits.



The [Verified Carbon Standard](#) (VCS) is the world's most widely used voluntary emissions reduction standard. It was developed and is managed by Verra, a registered not-for-profit organization founded in 2005.



[The Social Carbon Standard](#) (SC) was developed to strengthen social co-benefits and enhance the active participation of stakeholders. SC can be applied to any type of project that demonstrates an improvement in livelihood. It is usually adopted in combination with a carbon accounting standard, such as the VCS, ISO 14.064-2 or the CDM.



[The Climate Community & Biodiversity Standard](#) (CCBS) is used for projects related to land-management projects (including reforestation, avoided deforestation and improved forest management practices) that promote sustainable development and have proven additional community and biodiversity benefits. CCBS is managed by Verra since 2014.

All impacts are verified by approved auditors, including:





Understanding hydrogen's role in decarbonisation

Hydrogen: the missing link to climate neutrality

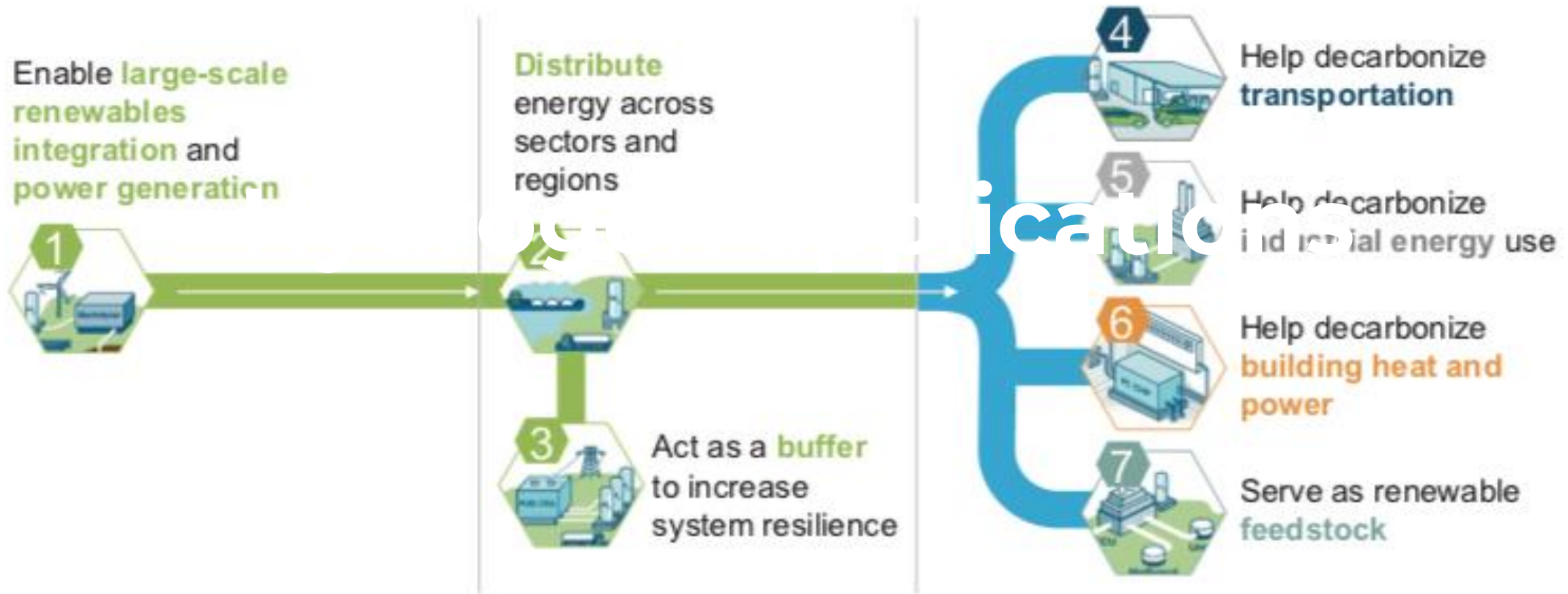
- Hydrogen is increasingly expected to play a significant role in the transition towards a low carbon economy by enhancing flexibility of energy systems through storage and replacing fossil fuels in industry and transport.
- Green hydrogen can play a role in the decarbonisation of aviation and heavy-duty transport and can also be used as a feedstock in refineries and other industrial processes, such as steel-making, replacing coke as a fuel for high-temperature heat and the use of fossil-fuel based hydrogen.



Exhibit 3: Hydrogen can play 7 roles in the energy transition

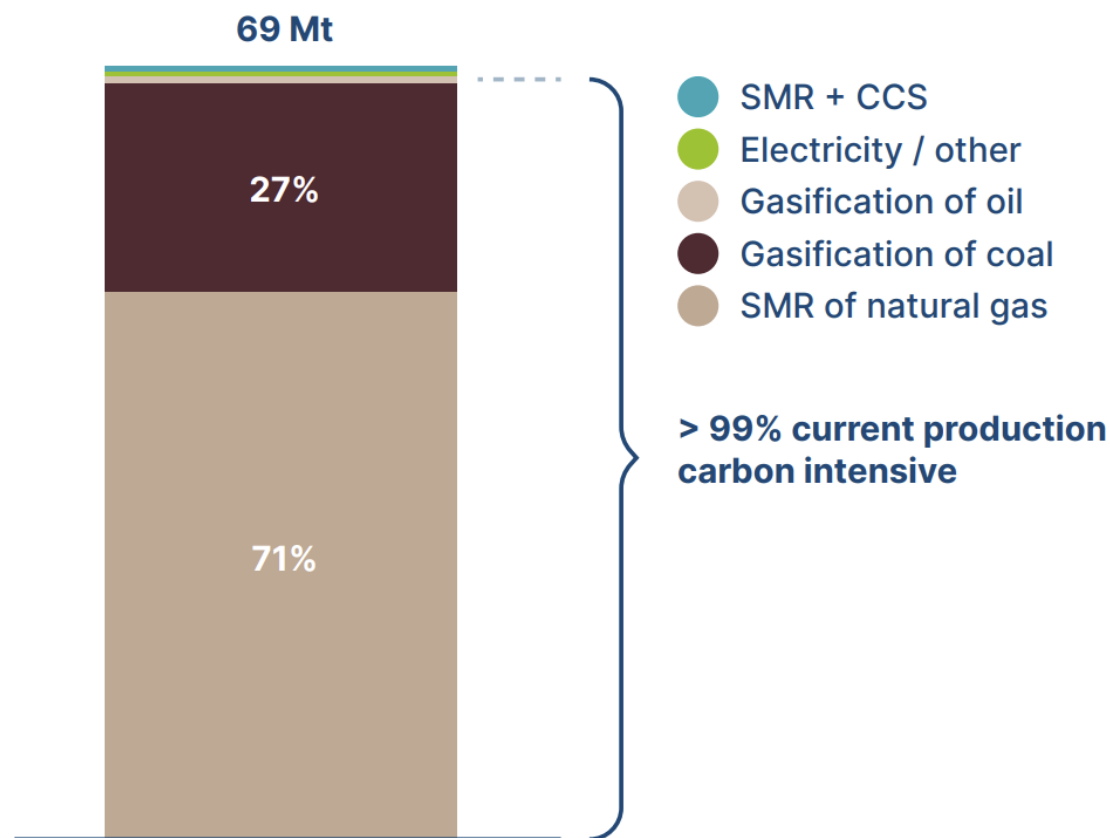
Enable the renewable energy system

Decarbonize end uses

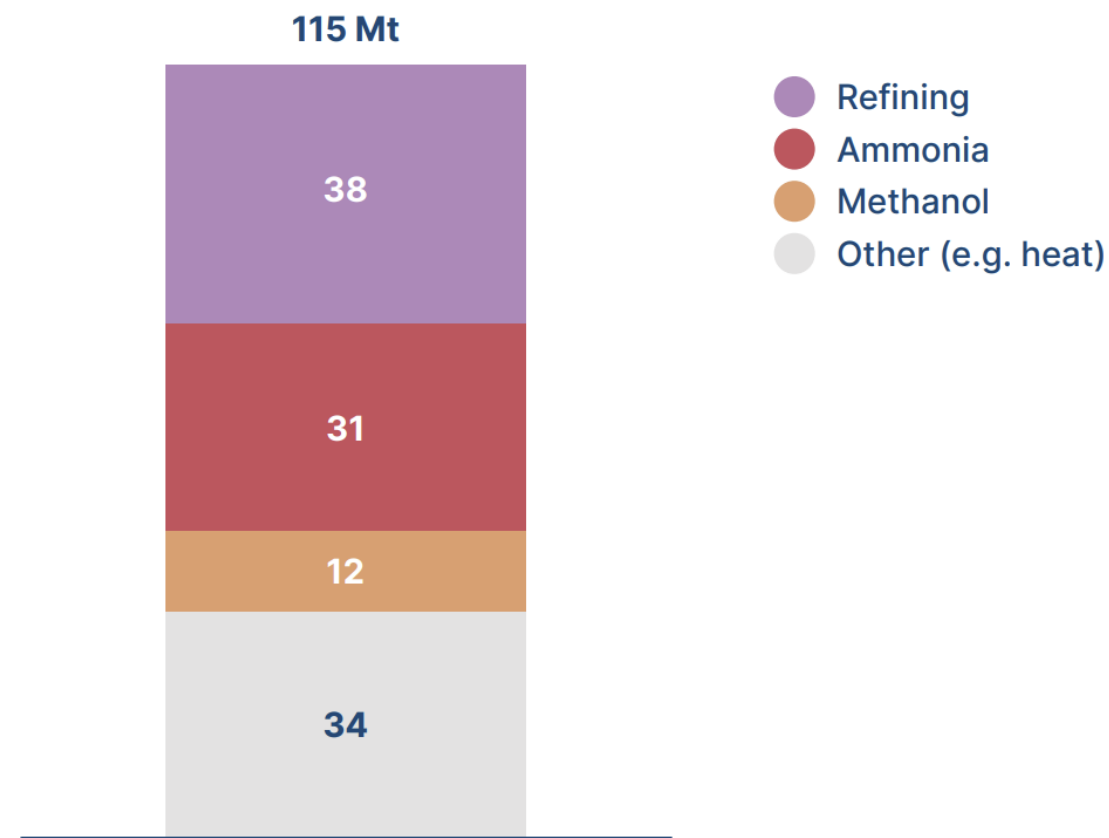


Today's production of hydrogen is via carbon-intensive processes, with use of hydrogen concentrated in the refining, ammonia, and methanol sectors

Dedicated hydrogen production pathways used (2018)
% of dedicated production

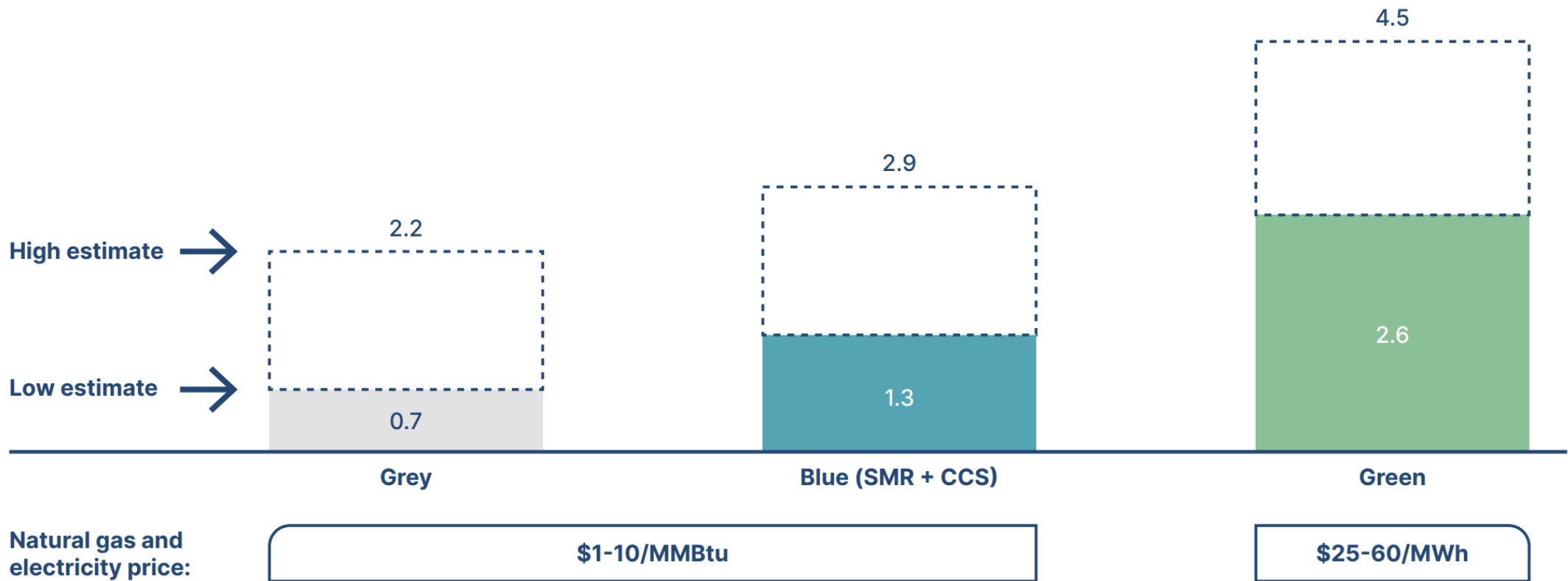


Hydrogen use sectors (2018)
Mt H₂



Today's production prices range based on local costs: clean production routes more expensive with green hydrogen ca. 2-4x more expensive than grey

Hydrogen production cost (2020)
\$/kg H₂



NOTES: No carbon tax applied. Costs for SMR+CCS (90% capture rate) shown as there are no dedicated ATR (or POX) + CCS facilities for blue hydrogen production today. Green: assumed 50% capacity utilisation factor, \$850/kW CAPEX for large scale alkaline electrolyser, energy consumption: 53 kWh/kg. Green hydrogen costs can even be higher for smaller scale applications.

SOURCE: SYSTEMIQ analysis for the Energy Transitions Commission (2021); BloombergNEF (2020), *Hydrogen Economy Outlook*

HYDROGEN FOR NET-ZERO INITIATIVE

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Unlocking the potential of renewable & low-carbon hydrogen by bringing together stakeholders such as industry leaders, technology innovators, investors, NGOs and policy makers to enable them utilizing carbon markets for making their hydrogen investments economically feasible.





Unlocking carbon finance for H2-activities

- Development of Methodological Frameworks for Voluntary Carbon Markets & Art. 6 of the Paris Agreement
- Standardisation of meth framework amongst key standard setters
- Covering whole H₂ value chain and variety of applications

Stakeholder engagement and information platform

- Updates and briefs on H2 policies, standards and support schemes
- Strategy papers on relevant topics such as integration of hydrogen into corporate NetZero-Strategies
- Stakeholder Exchange Platform incl. roundtables, working groups, exploring joint business opportunities
- External communication & strategy documents

Overview of work streams



Development of Methodological Frameworks

Stakeholder engagement & information platform

Membership services & administration

Core Team



Co-initiators



Dr Gokce Mete
Co-Lead
H2& policy expert

South Pole helps clients achieve their sustainability targets and build back better. This includes setting Climate Neutrality & Net Zero targets and catalyzing the necessary financing for related actions. Renewable energy and nature-based solutions offer a (cost-) effective and efficient means to reaching climate neutrality & Net Zero milestones – and, in the process, hedge against global climate risks, build competitive advantage and brand, and create measurable value within and beyond a company’s own operations.



Philipp Veh
Co-Lead
H2 & meth expert

Perspectives is an independent group of highly qualified consultants and researchers providing the private sector, governments and non-governmental organisations (NGO) with practical solutions for domestic and international climate policies, climate finance, and international greenhouse gas markets. Their comprehensive expertise benefits from over two decades of research and practical experience with carbon market mechanisms and international climate policies.

Independent Standard Setters



Ian Kuwahara
Director Energy and Industrial Innovation
Verra

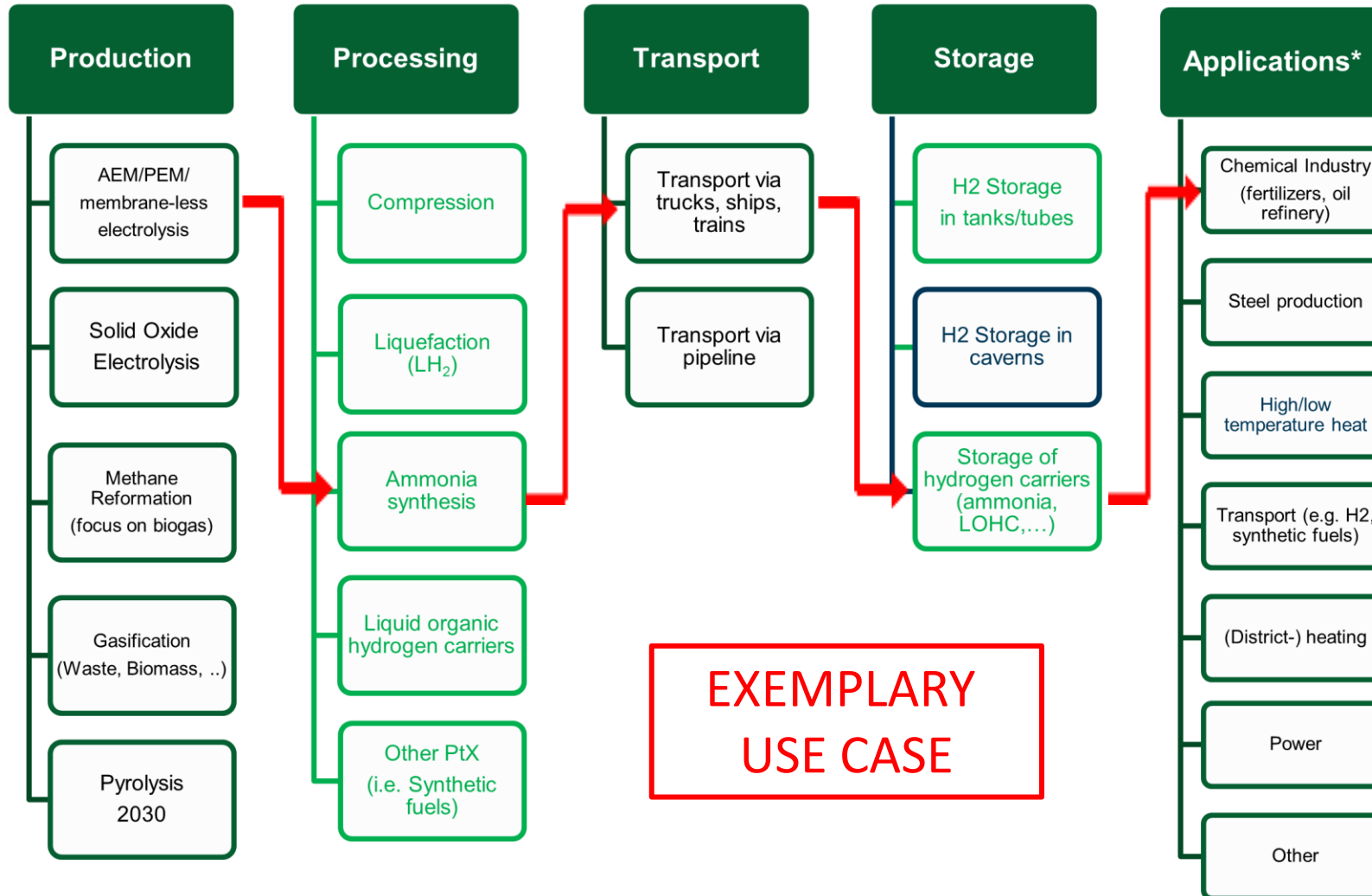
Verra works to provide “Standards for a sustainable future”. Through robust standards, they help accurately quantify benefits and drive investment in responsible, high-performing projects and programs. Verra’s flagship standard, the Verified Carbon Standard Program, is the longstanding leading standard in the voluntary carbon market.



Hugh Salway
Head of Markets
Gold Standard

Gold Standard is a standard and certification body that aims to catalyse more ambitious climate action to achieve the Global Goals through robust standards and verified impacts. They design and oversee rigorous processes that amplify the impact of efforts to deliver clean energy and water, responsibly manage land and forests, and transform lives of the world’s poor.

Workstream 1: Use cases & meth framework



- Framework considers the complete hydrogen value chain
- Founding members and core partners bring in their use cases, for which the first meths & modules will be developed
- Additional modules can be added throughout the lifetime of the H₂NZ Initiative.
- Meth experts of Perspectives & South Pole lead meth development
- Aim to maximize standardization between Verra & GS

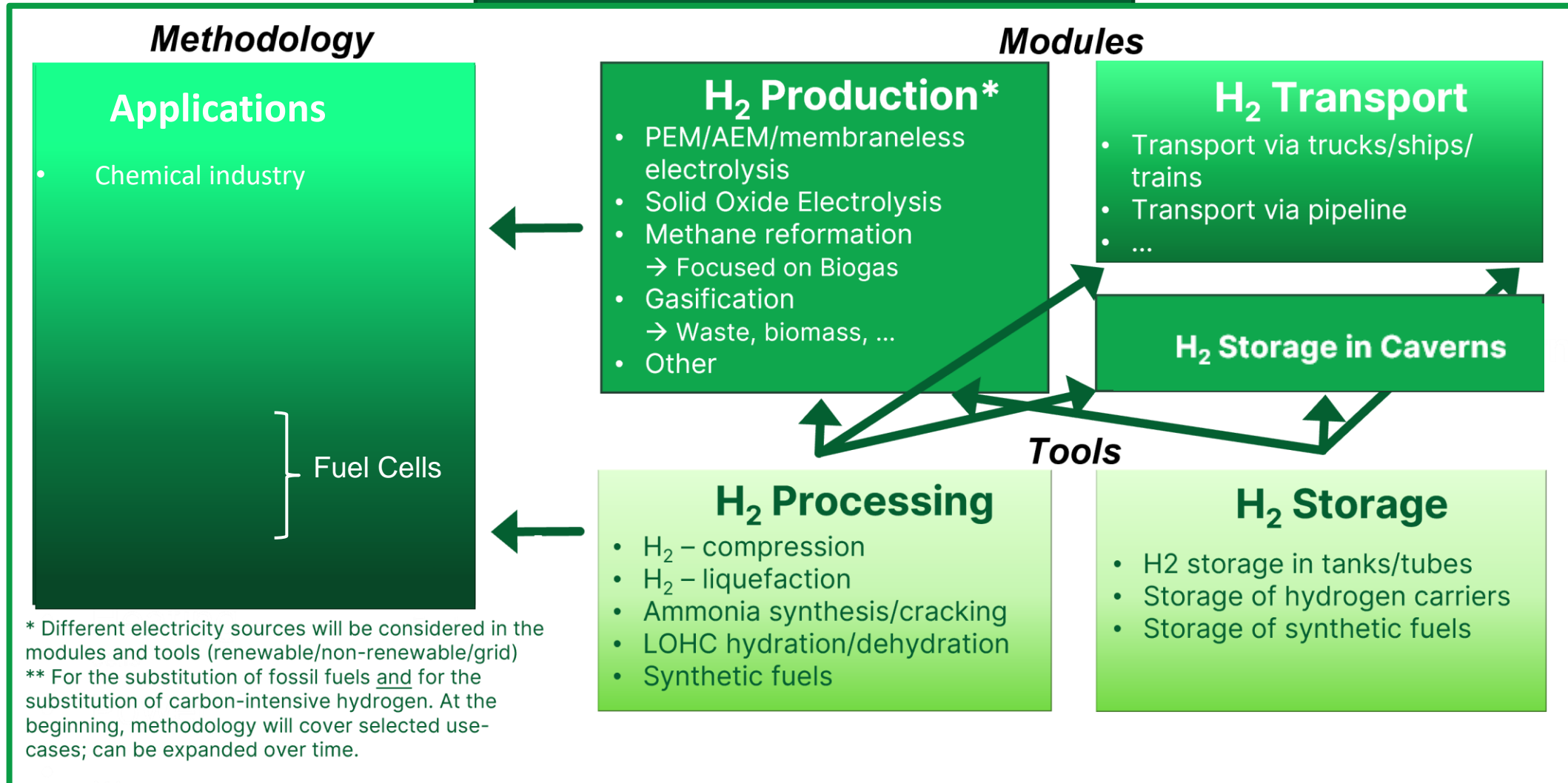
* Different electricity sources will be considered in the modules and tools (renewable/non-renewable/grid)

** For the substitution of fossil fuels and for the substitution of carbon-intensive hydrogen

Workstream 1: Methodological Framework



Methodological Framework



Case Study – Substitution of Grey Hydrogen



Methodological Framework

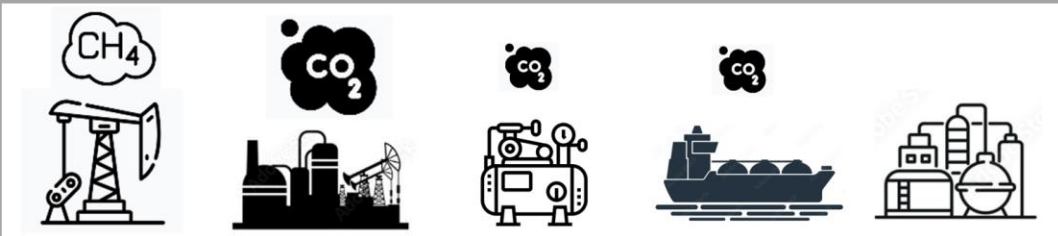
Green Hydrogen Supply Chain



Dedicated RE	Electrolysis	Liquefaction	Transport	Application in Industry
0 kg	0 kg	0 kg	2 kg	0 kg

= 2 kgCO₂-eq/kgH₂

Grey Hydrogen Supply Chain



NG Upstream Emission	SMR	Liquefaction	Transport	Application in Industry
~3,5 kg	9,1 kg	1 kg	1,5 kg	0 kg

= 15,1 kgCO₂-eq/kgH₂

Exemplary project data:

Electrolyser capacity:	100 MW
Full load hours:	90 %
Annual production:	17,000 t
Total emissions (green):	34.000 t
Total emissions (grey):	256,700 t
GHG-mitigation:	222,700 t

→ **Certificates/a:** **222,700**



Annual revenues from certificate sales:*
2,227,000 – 6,668,100 US\$

*With certificate prices projected to range between 10 and 30 US\$

Certification of Hydrogen

- In a purely renewable world – **NO!**
- But in the short, medium term – at least until 2050 – **YES!**
 - Produced hydrogen should contribute significantly to climate protection
 - produced H₂ must emit remarkable less greenhouse gases than conventionally produced H₂
 - considering the whole value chain
 - Certification gives clear criteria for industry and investors as to which H₂ technologies are suitable and sustainable for the future
 - Double or multiple sales CO₂ reduced hydrogen must be prevented.





**Connect.
Empower.
Change.**



Women in Green Hydrogen

Promoting diversity in Green Hydrogen