



A Guide to the Circular Carbon Economy

IEEJ

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A holistic approach to carbon management.

 Watch the animation

 circular carbon economy

The Guide

Guide to the Circular Carbon Economy

CCE Guide – Background

- ❑ Experts largely agree that the challenge of achieving the Paris Agreement climate goals requires the pursuit of all options that can manage greenhouse gas (GHG) emissions. Carbon dioxide is one of those GHGs.
- ❑ The global energy mix needed for a carbon balance, or net-zero, or carbon neutrality includes all sources of energy (including hydrocarbons). The resulting carbon emissions from this energy mix must be managed.
- ❑ The Circular Carbon Economy is an extension of the idea of the Circular Economy. CCE is a useful framework for understanding how carbon can be managed and for visualizing how carbon mitigation options are interrelated.

CCE Guide – Background

	Circular Economy Reduce, Reuse, Recycle	Circular Carbon Economy Reduce, Reuse, Recycle, Remove
What	Framework for sustainable production and consumption	Framework for climate mitigation valuing all options
Scope	Resource and material flows	Energy and carbon flows
Goal	Minimize resource consumption / waste disposal	Manage GHG emissions (including CO ₂) toward balance

Circular carbon economy



Reduce



Reuse



Recycle

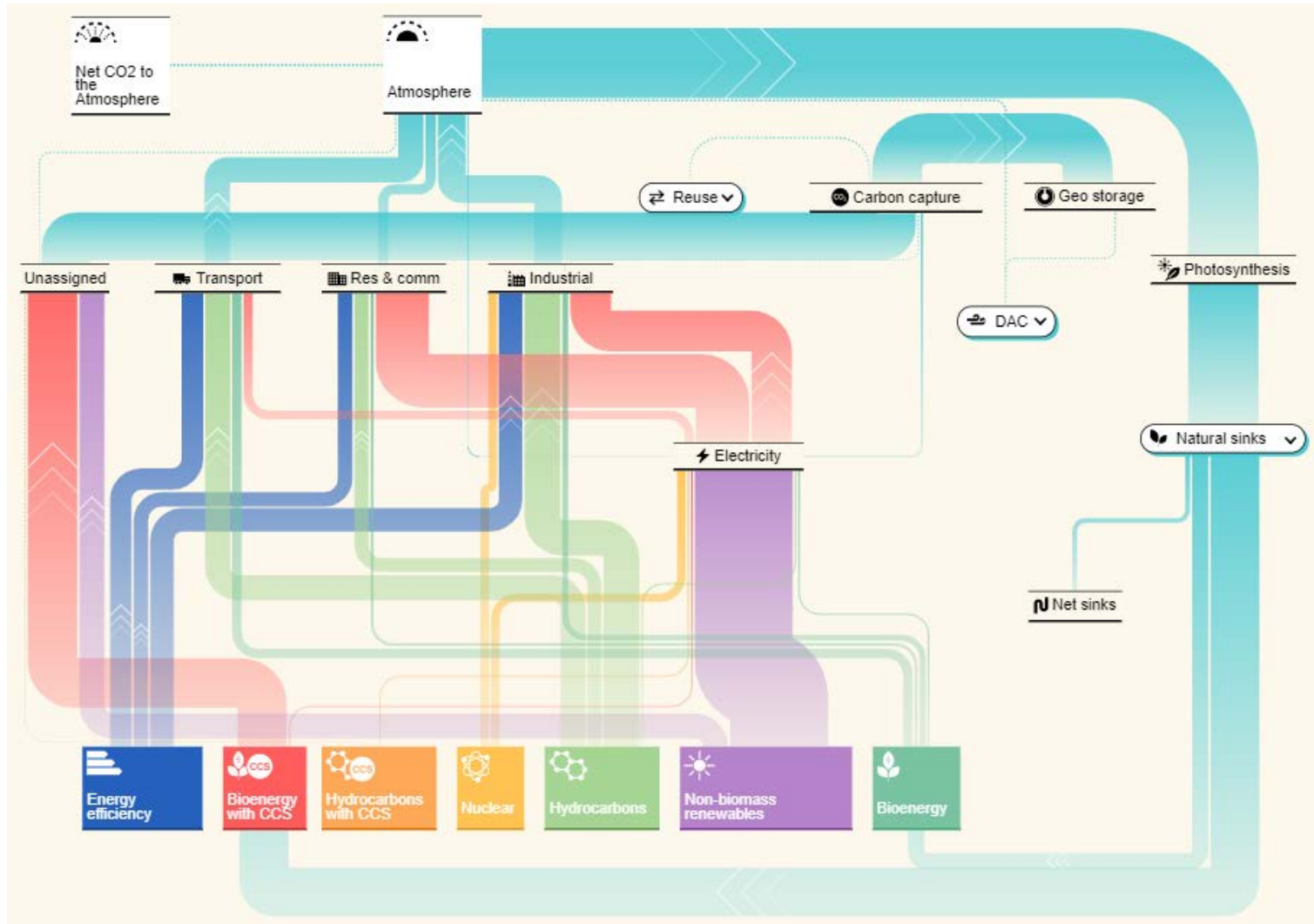


Remove



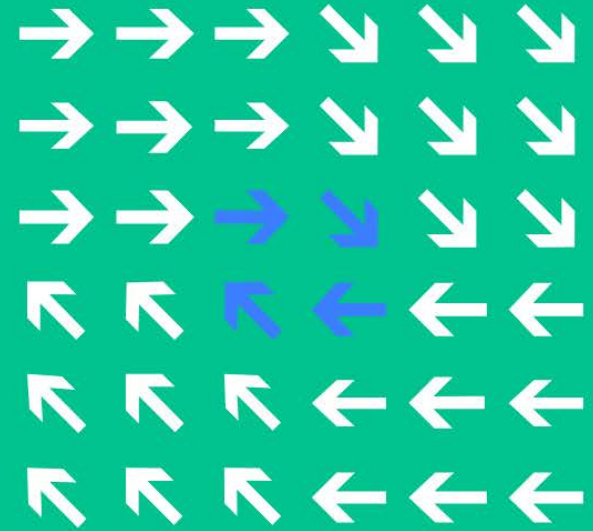
CCE Visualizer

www.cceguide.org

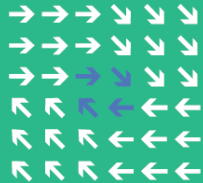


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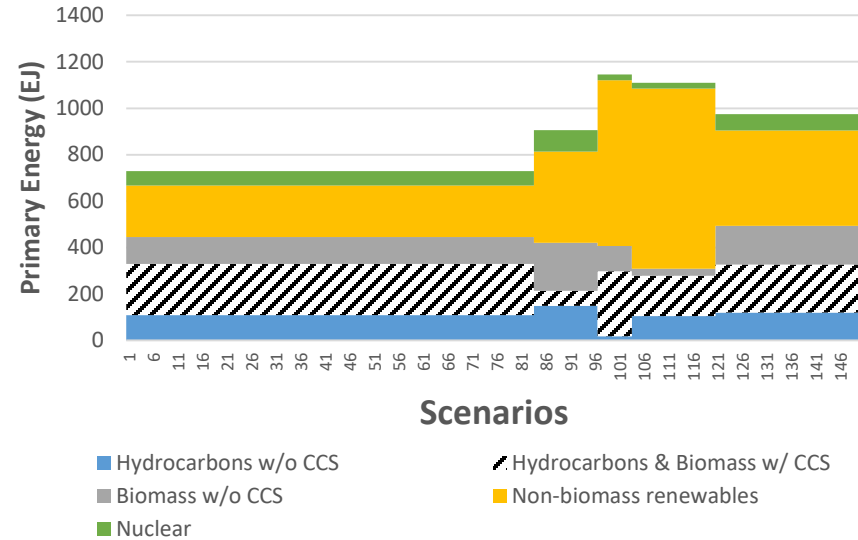


The CCE Guide report series provides practical information for policymakers to understand the challenges and opportunities presented by each element within the CCE. The Guide illustrates the degree to which each CCE element may be able to contribute to climate goals while also pursuing an improved quality of life.



The **Circular Carbon Economy (CCE)** is an integrated and inclusive approach to transitioning toward more comprehensive, resilient, sustainable, and climate-friendly energy systems that support and enable sustainable development.

- A pathway to the Paris Agreement’s climate goals includes all options
- The energy mix for scenarios underpinning the IPCC 1.5 degree report that result in a less than 2 degree C increase:
 - All renewables including bioenergy: 34% to 98% share (64% average)
 - Energy efficiency / demand reduction: 21% to 35% share
 - Nuclear: 7% average share
 - CCS: 24% average share



01

Reduce:
Energy efficiency.

Reduce.
Reuse.
Recycle.
Remove.



Existing technologies can deliver an annual energy intensity improvement rate of 3.6%, if fully deployed, providing 40% of the GHG emissions abatement required by 2040.

02

Reduce:
Non-bio renewables.

Reduce.
Reuse.
Recycle.
Remove.



IRENA concludes that renewables plus energy efficiency can achieve over 90% of the energy-related carbon emission reductions needed to meet the Paris Agreement's climate goals.

03

Reduce:
Nuclear

Reduce.
Reuse.
Recycle.
Remove.



NEA states that by 2040, nuclear capacity is expected to increase by 35% from today's levels. This translates to a doubling of the current annual rate of capacity additions.

04

Reuse:
Carbon reuse.

Reduce.
Reuse.
Recycle.
Remove.



New technologies that convert CO₂ into fuels, chemicals and building materials are needed to expand CO₂ use from today's 230 MT/year.

05

Recycle:
Bioenergy.

Reduce.
Reuse.
Recycle.
Remove.



Modern bioenergy could supply 23% of primary energy and avoid 2.6 GtCO₂ per year in 2050 under the climate-friendly transforming energy scenario.

06

Remove:
Carbon capture
and storage.

Reduce.
Reuse.
Recycle.
Remove.



The lowest-cost opportunities for CCS can deliver multi-million tonne CO₂ abatement at a single facility, at a cost of less than US\$ 20 per tonne.

07

Cross-cutting:
Hydrogen.



Hydrogen is versatile. It can be used to produce a variety of synthetic fuels, many of which are compatible with existing energy infrastructure. It can also be used in many end-use applications: transportation, hard-to-abate industrial applications, heat, and power generation.

08

Enabling policies.



OECD points out the need for more specific policies for reuse and remove that provide for a 'robust revenue stream' along the value chain of capture, transport and use/storage of carbon.

CCE Guide – Conclusion

- ❑ The Circular Carbon Economy is a holistic approach to carbon management that can guide domestic and international efforts toward a more inclusive, resilient, sustainable and carbon-neutral / net-zero energy system.
- ❑ The CCE provides a useful way to understand a broad range of climate change mitigation options and how they interconnect. It reveals how choke points in any one of the Rs – reduce, reuse, recycle and remove – can make the carbon flows in the system unmanageable if a key technology is under-represented or unavailable.
- ❑ Circular carbon economy shows that hydrocarbons can continue to play an important role even with a transition toward net zero as long as CCUS technologies are deployed.

Thank you

www.cceguide.org (from 24 September)

www.kapsarc.org