Emerging New Energy Technologies

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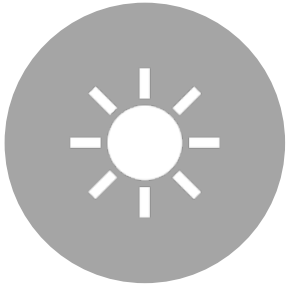
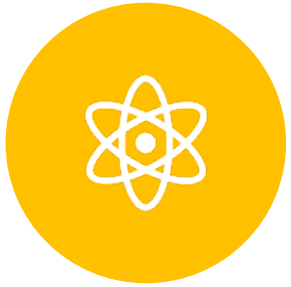
Maryland Energy Administration

Four Key Technologies

Carbon Capture Utilization and Storage (CCUS)



Energy Storage



Small Modular Reactors

Hydrogen

Carbon Capture and Sequestration

The CCS category can further be broken down into three key areas:

- Carbon Capture Utilization and Sequestration (CCUS)
- Bioenergy with Carbon Capture and Storage (BECCS)
- Direct Air Carbon Capture and Sequestration (DACCS)

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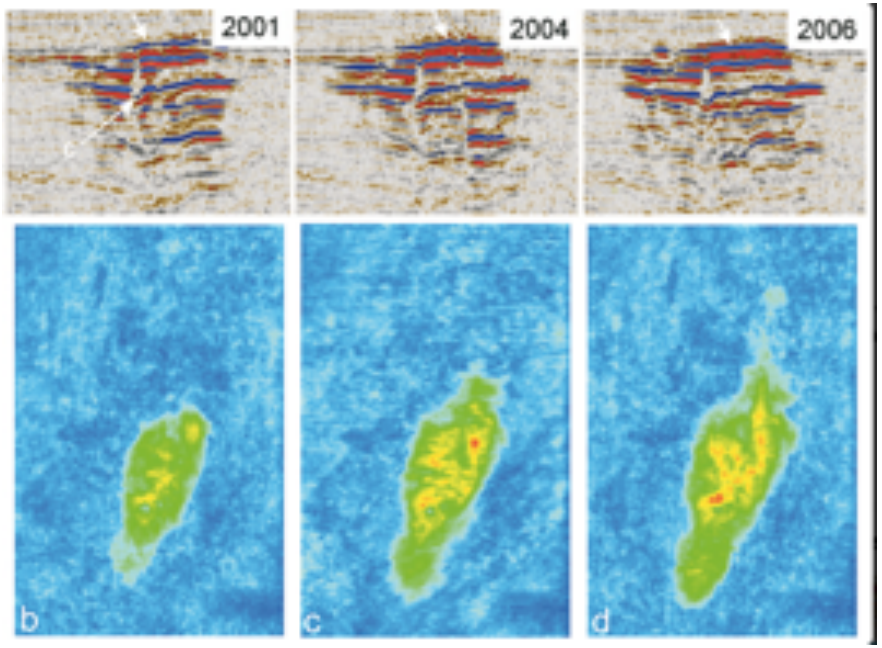
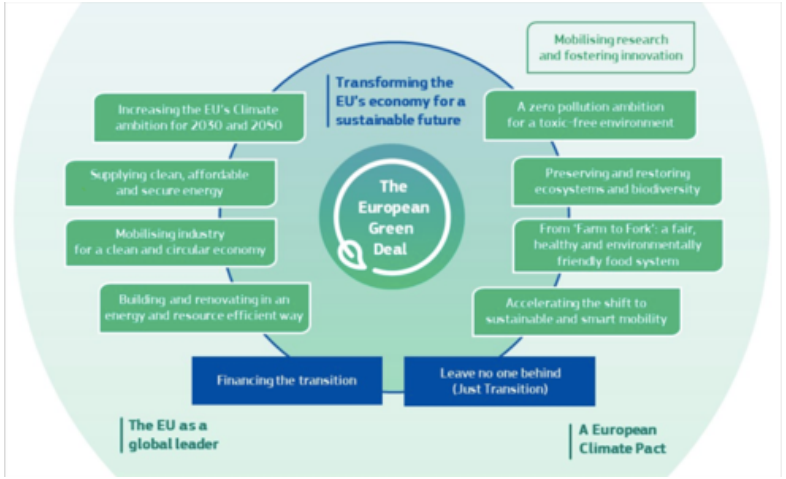


Utilization or Sequestration

CCUS outside the US



EUROPEAN COMMISSION

Brussels, 11.12.2019
COM(2019) 640 final

COMMUNICATION FROM THE COMMISSION

The European Green Deal

1. INTRODUCTION - TURNING AN URGENT CHALLENGE INTO A UNIQUE OPPORTUNITY

This Communication sets out a European Green Deal for the European Union (EU) and its citizens. It resets the Commission's commitment to tackling climate and environmental-related challenges that is this generation's defining task. The atmosphere is warming and the climate is changing with each passing year. One million of the eight million species on the planet are at risk of being lost. Forests and oceans are being polluted and destroyed [1].

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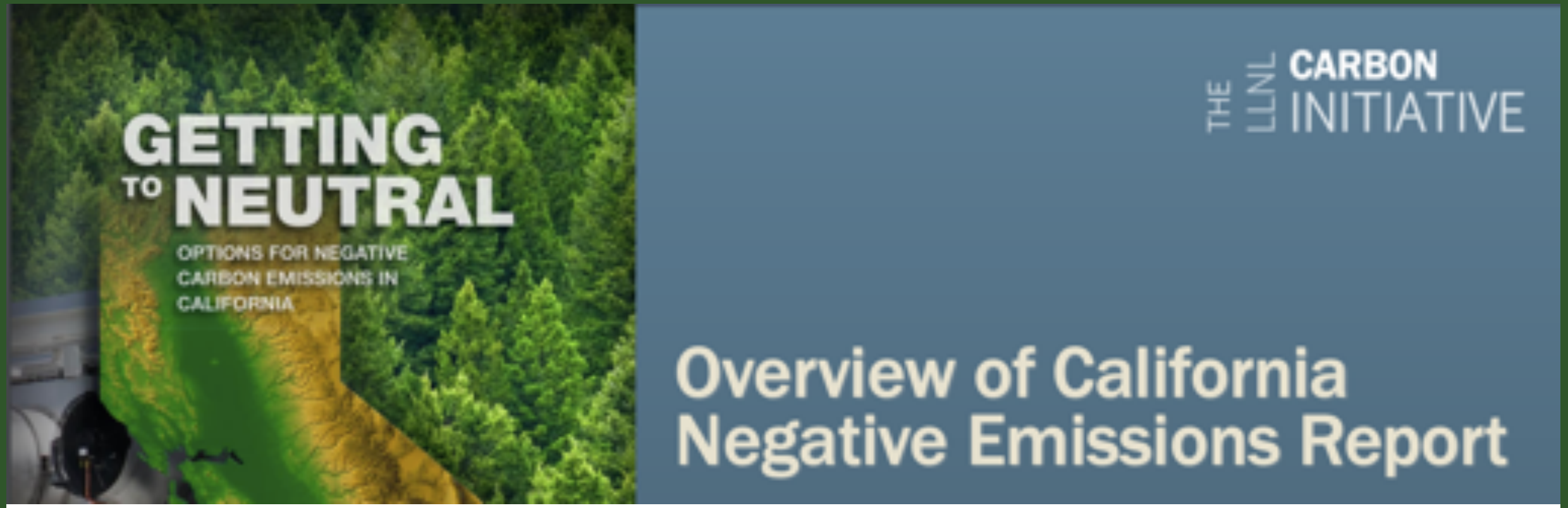

BECCS and DACCS

45Q Tax Credits

Main policy mechanism accelerating carbon capture deployment in the United States

Energy Storage

- Environmental benefits as an enabling technology for renewables
- Maryland
  - AES Warrior Run 10 MW Storage System (frequency reg)
  - Cold Spring Substation Battery Energy Sorge System (BESS)
- Benefits:
  - Rapid response
  - Black start capability
  - Backup power
  - Peak shaving
  - Demand response
  - Load shifting
  - Wholesale market (energy, capacity, ancillary services)
  - Reliability, rapid changes in electricity
  - Arbitrage
  - Defer infrastructure expenses

Energy Storage

Maryland the first in the nation to have a program incentivizing behind-the-meter energy storage

Maryland Energy Administration Storage Program

- 30 percent of the total installed costs of the energy storage system; or,
- $5,000 for an energy storage system installed on a residential property; or,
- $75,000 for an energy storage system installed on a commercial property.

Maryland Energy Storage Pilot Program

- 5-10 MW aggregate storage

HB 650 accelerated this program in 2019

- Program solicitation of project partners
  - Utility ownership
  - Utility-owned, third party operated
  - Third party owned
  - Virtual power plant (model promoted in DPL service territory)

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Figure 1: Energy Storage Technology Types

Different Storage Types


HORNSDALE
POWER RESERVE
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OVERVIEW
At 100MW/129MWh, the Hornsdale Power Reserve is the largest lithium-ion battery in the world, and is providing essential grid-support services.
The 50MW/ 64.5MWh expansion, currently under construction, will further showcase the complete benefits that grid-scale batteries can provide to the National Electricity Market (NEM) and Australian consumers.
In its first two years of operation, the project saved South Australia consumers over $150 million.
BATTERY
Battery storage allows us to store the energy and provide it to the grid whenever it's needed.


AES
03
04
AES
AES
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Energy Storage
04

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NuScale's SMR Design Clears Phase 4 of Nuclear Regulatory Commission's Review Process

NRC on track to approve NuScale's SMR design certification application by September 2020

December 12, 2019 03:37 PM Eastern Standard Time

PORTLAND, Ore.--(BUSINESS WIRE)--NuScale Power today announced that the U.S. Nuclear Regulatory Commission (NRC) has completed the fourth phase of review of the design certification application (DCA) for the company's revolutionary small modular reactor (SMR). NuScale reached this milestone on schedule, marking yet another significant achievement along its path to commercialization. The entire review of NuScale's SMR design is now in Phases 5 and 6.

"We appreciate the NRC's efforts to streamline Phase 5, and we expect that Phase 5 will be completed on or ahead of the original schedule in June 2020"

Tweet this

NuScale's technology is the world's first and only SMR to undergo design certification review by the NRC, and today's major announcement, along with ongoing work by NuScale's manufacturing partners, demonstrates how close NuScale is to bringing the country's first SMR into production and operation, putting the U.S. on the path to beat foreign competitors in the global SMR race. NuScale's achievement is a result of the successful private-public partnership with the U.S. Department of Energy and support from Congress.

Phase 4 of the NRC's DCA review represents completion of the advanced safety evaluation report (SER) with no open items. Completion of Phase 4 is significant as it signifies near-completion of the technical review. All requests for additional information have been closed, and all open items have been closed. This is the last version of the SER before the NRC issues its Final SER in September 2020, and the NRC remains on track to complete its final review of NuScale's design by this date. The Final SER represents approval by the NRC staff of our design.

"The completion of Phase 4 of the NRC's design review certification process is an unprecedented step forward for our company and for the advanced nuclear industry overall," said NuScale Chairman and Chief Executive Officer John Hopkins. "We appreciate the tremendous effort the U.S. Nuclear Regulatory Commission has dedicated to its thorough and rigorous review of

NUSCALE

NUSCALE POWER

Release Summary

NuScale announced that the U.S. Nucl
Regulatory Commission has completed
fourth phase of review of the design
certification application.

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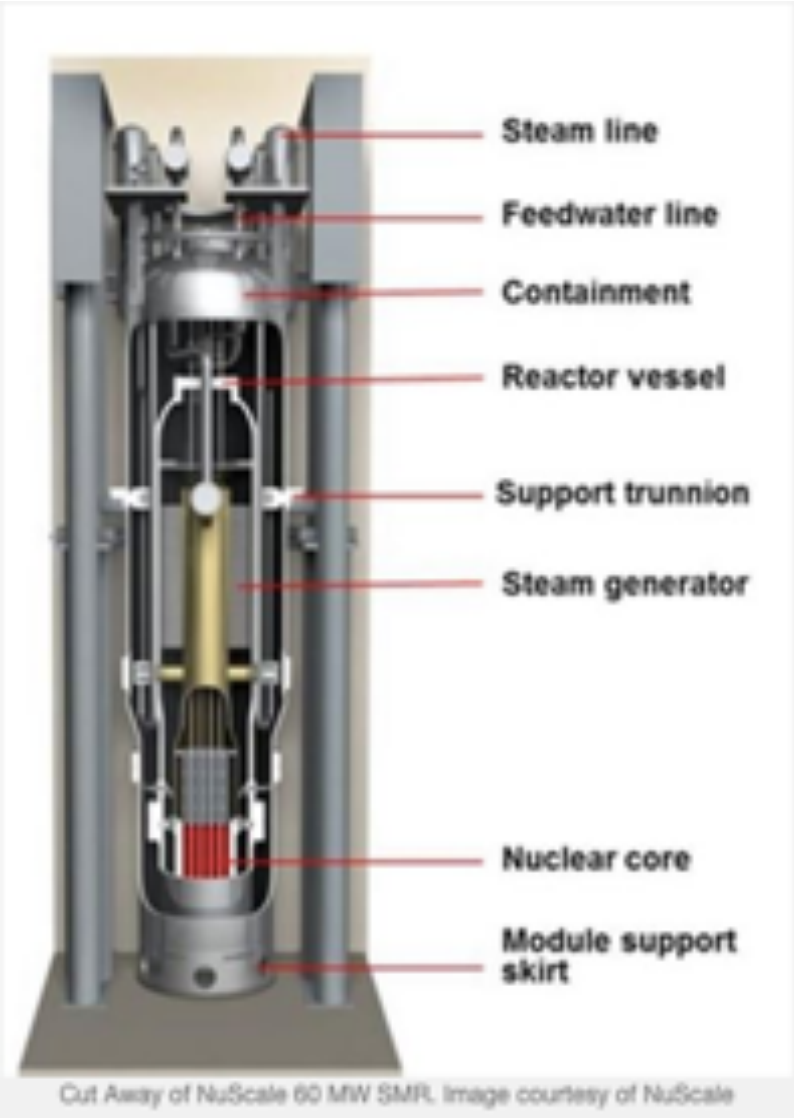
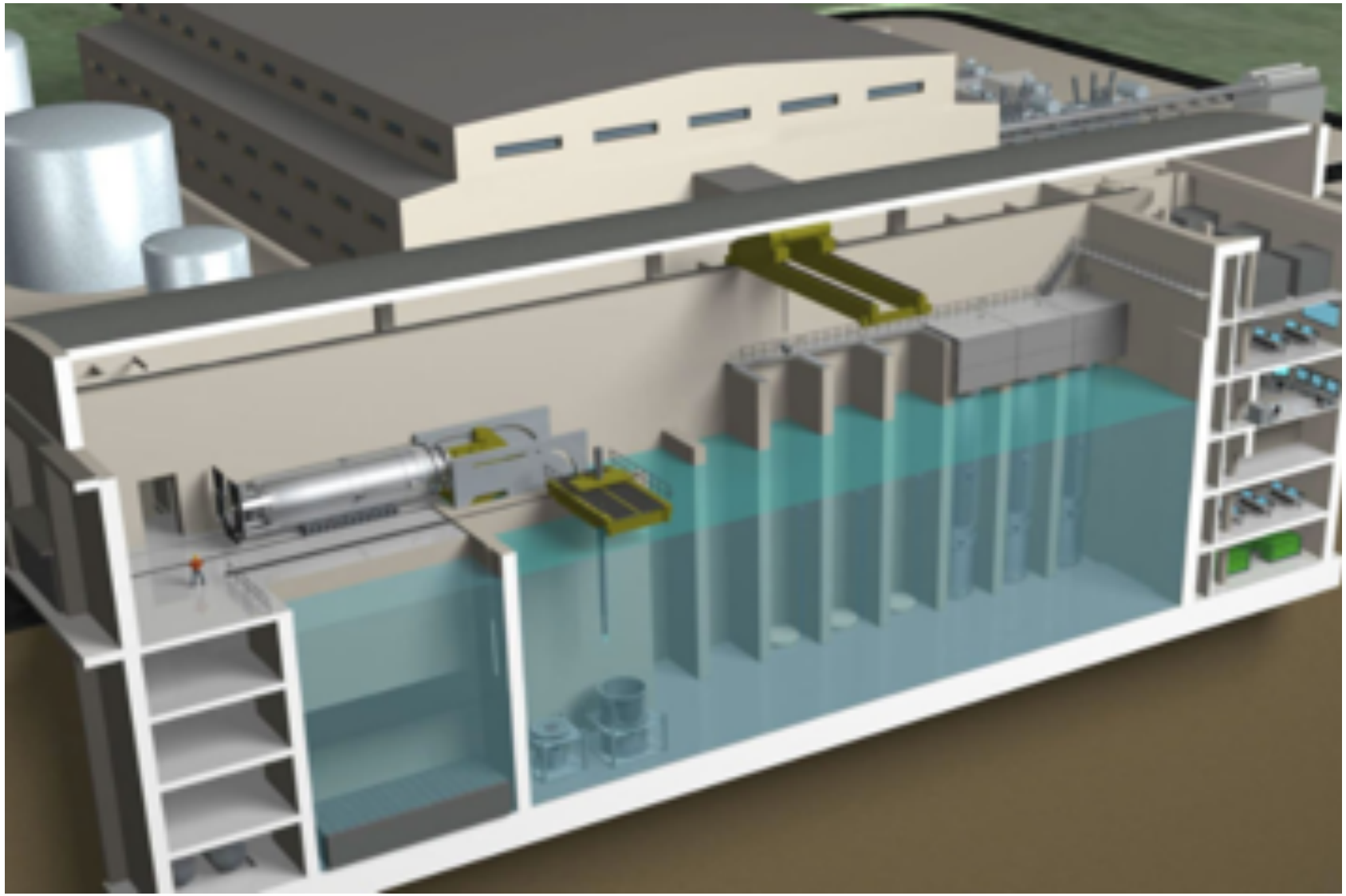


Cut Away of NuScale 60 MW SMR. Image courtesy of NuScale



Nuscale

Hydrogen

Uses:

Electricity

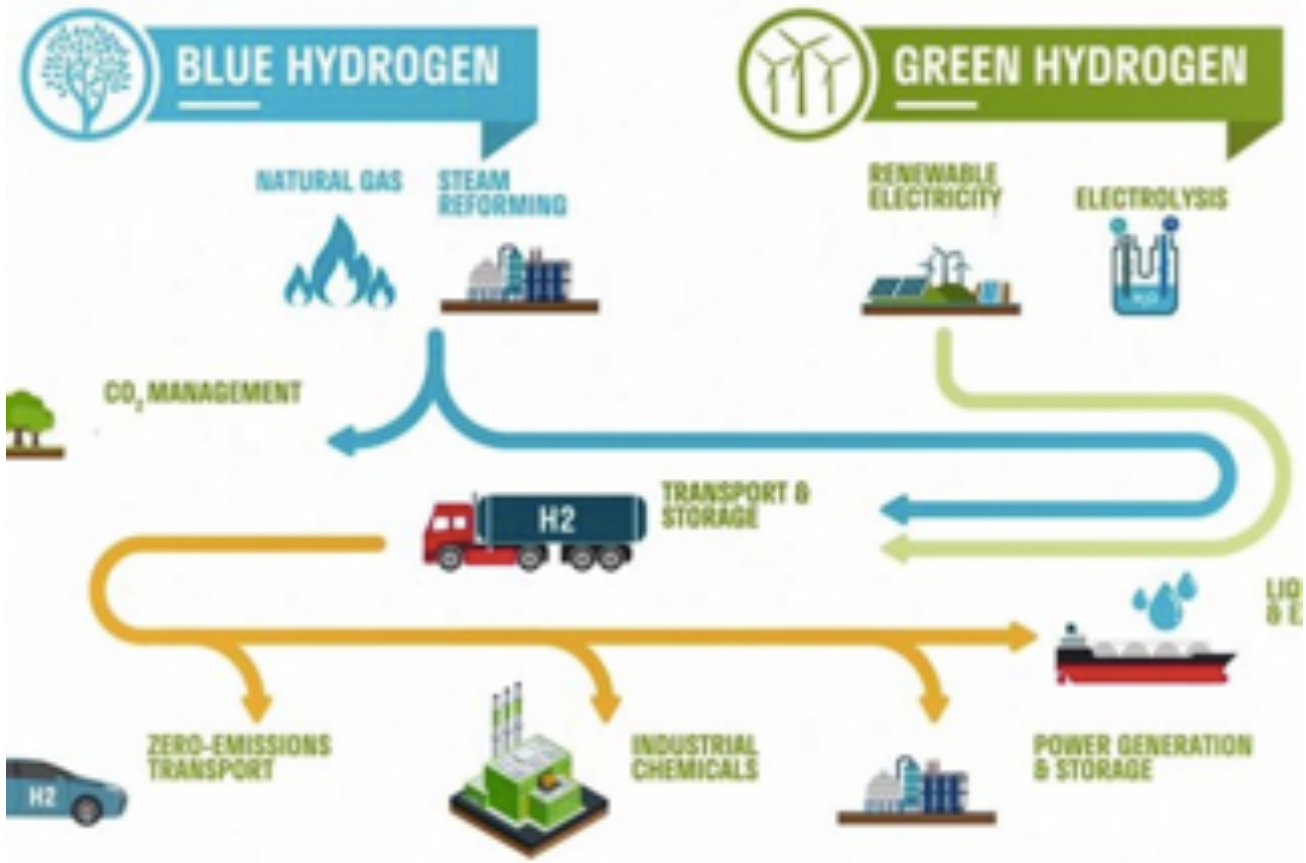
Energy Storage

Vehicle Fuel

Industrial Input

Ammonia/Fertilizer Production

Metal Processing



Woodside Energy

Hydrogen Growth

Port of Rotterdam

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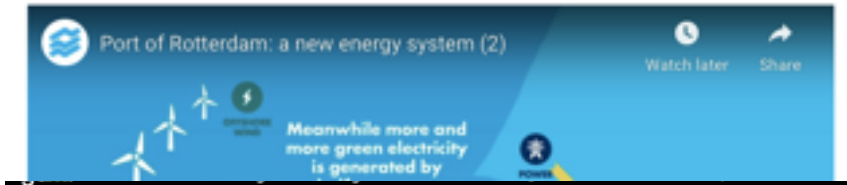
ENERGY TRANSITION SHOWCASE 14 September 2019

Largest 'green' hydrogen plant in Europe

Hydrogen is used as a sustainable fuel for industry. New technology even produces hydrogen without CO2 emissions. Rotterdam is committed to the largest 'green' hydrogen plant in Europe.



BUSINESS

Germany and hydrogen — €9 billion to spend as strategy is revealed

As part of its stimulus package, Germany intends to expand the role of green hydrogen to help end the country's reliance on coal. The government agreed on a plan on how to spend the €9 billion earmarked for the project.

EUROPEAN COMMISSION

Brussels, 8.7.2020
COM(2020) 301 final

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS

A hydrogen strategy for a climate-neutral Europe

ENERGY

European Union Sets Gigawatt-Scale Targets for Green Hydrogen

The EU wants 40 gigawatts of electrolyzers installed within its borders by 2030, up from the 250 megawatts in place globally today.

JOHN PARNELL | JULY 09, 2020

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