

Alaska Wind Workshop



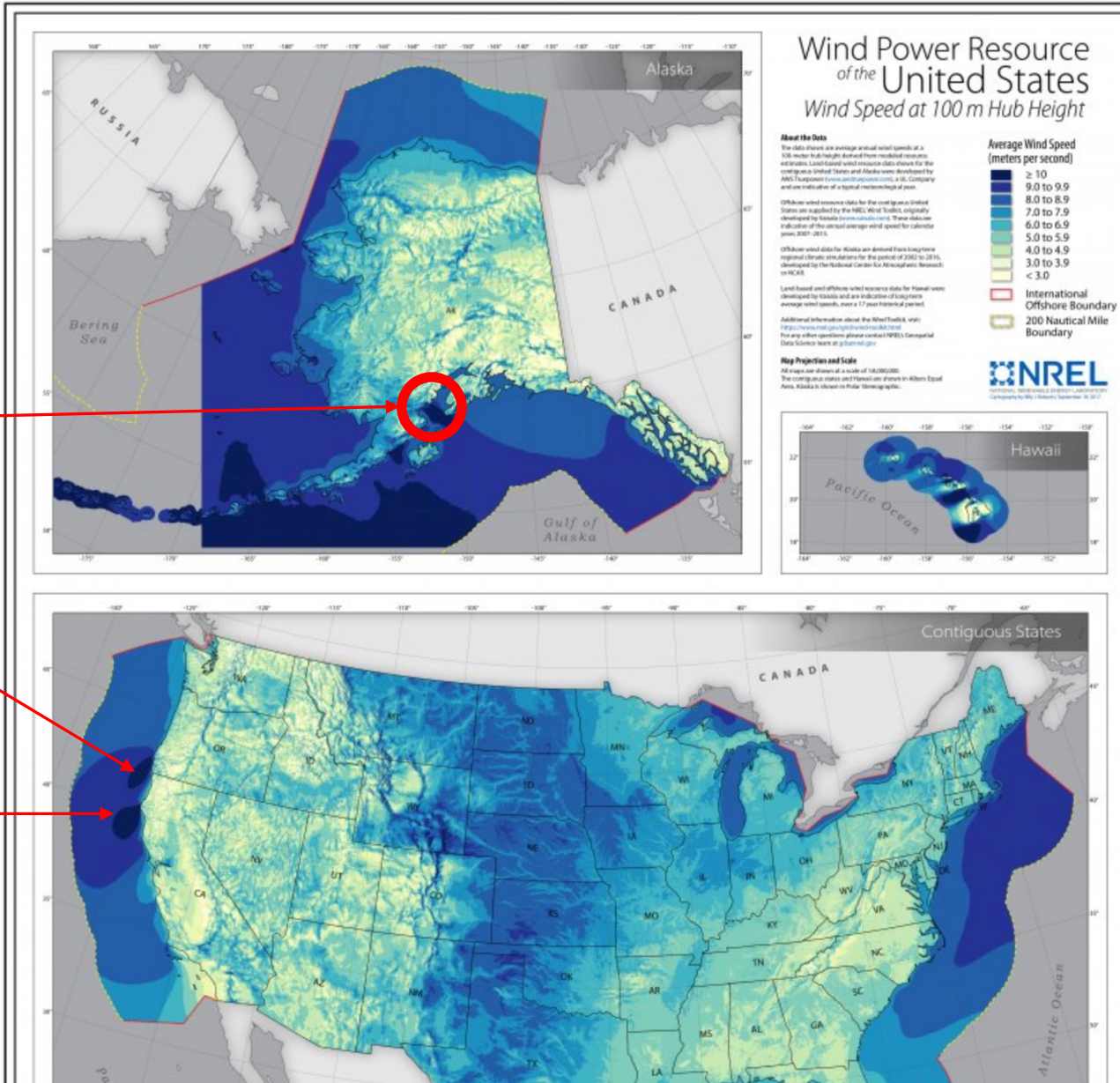
Panel #5: The Crystal Ball

September 8th, 2023

David Clarke, Engineering Director



US wind resources



Lower Cook Inlet

Del Norte
Humboldt
Cape Mendocino

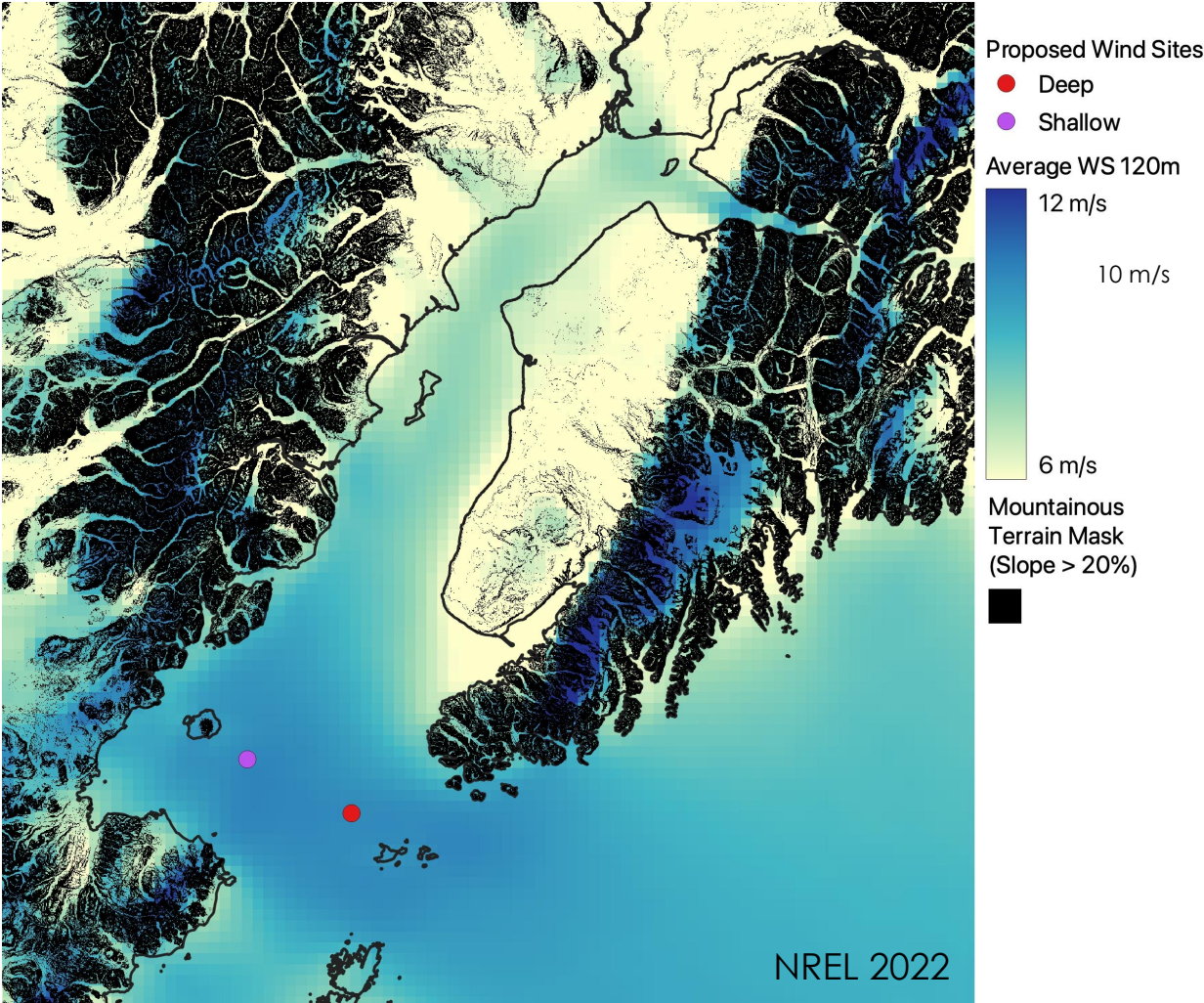
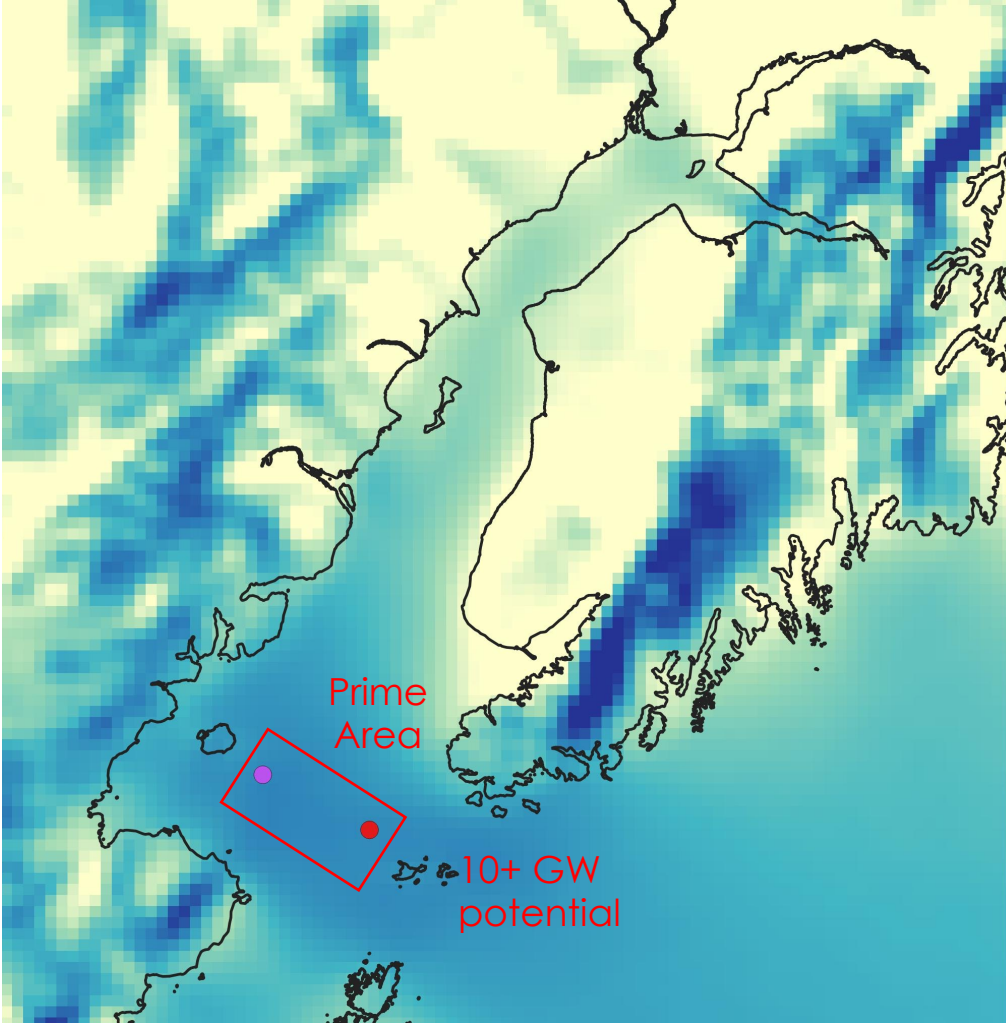
Morro Bay
Diablo Canyon

Cook Inlet

- one of only four offshore US locations with average wind speeds > 10 m/s
- only such area
 - with water depth < 60 m
 - in an energy community
- > 60% gross capacity factor *
 - cold/dense wind
 - high power prices (US #2)

* NREL 2023

Cook Inlet wind resources



shallower water
(fixed-bottom)



assemble it here ...



deeper water
(floating)



... or tow it from there

Kincardine 5 x 9.5 MW wind farm,
offshore Aberdeen

Federal government incentives to make the promote renewables



Wind Energy Technologies Office

1. Grand Challenges To Close the Gaps in Offshore Wind Energy Research

- Target deploying 30 gigawatts of wind energy from off the nation's coasts by 2030 (15 gigawatts of floating by 2035)

US offshore wind project pipeline, currently 52.7 GW (globally 427 GW). 2022 lease auctions raised \$5.44 Bn



Hydrogen

The first Energy Earthshot, launched June 7, 2021—Hydrogen Shot—seeks to reduce the cost of clean hydrogen by 80% to **\$1 per 1 kilogram in 1 decade** ("111").

3. Sustainable Aviation Fuel Grand Challenge

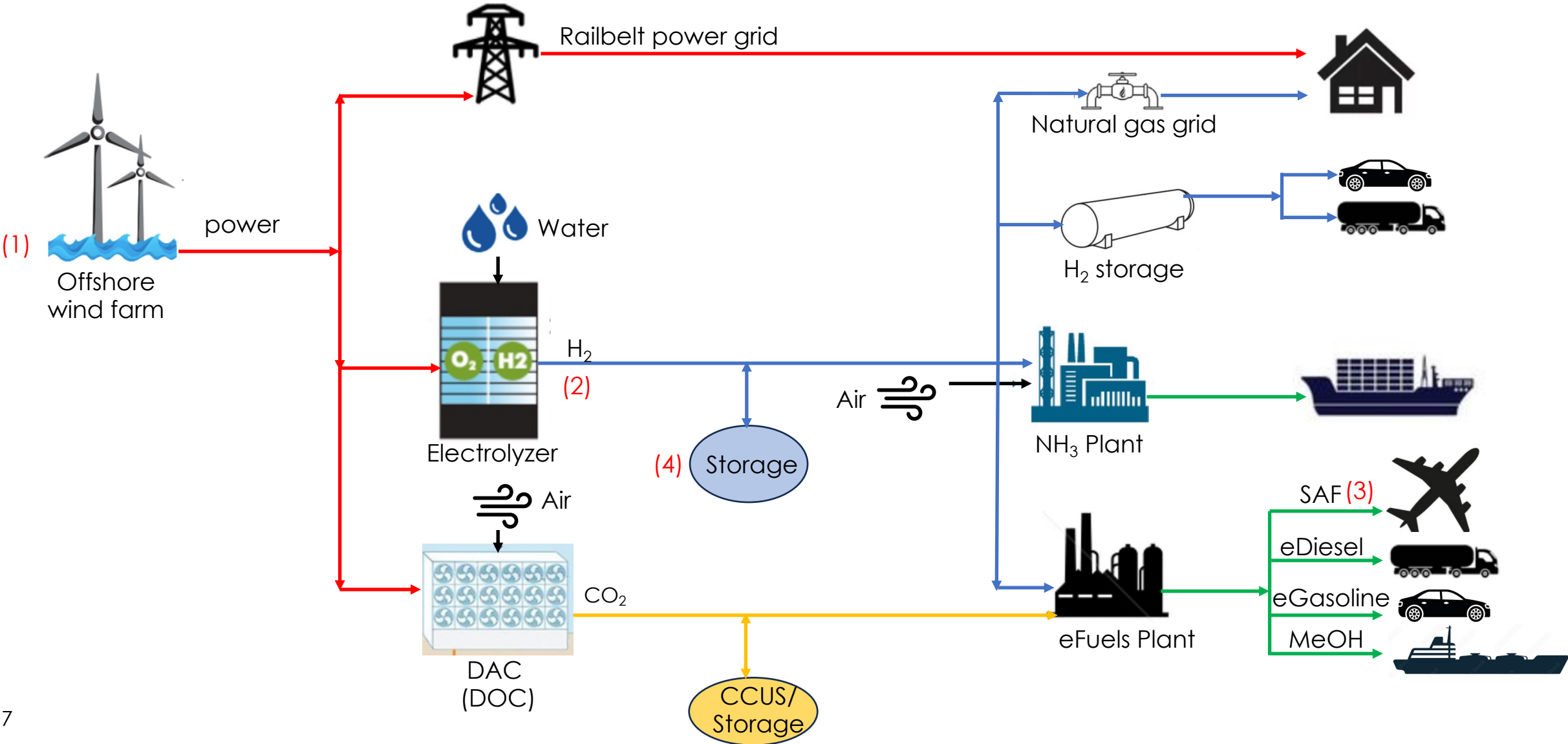


- 3 billion gallons/yr of domestic SAF production, >50% reduction in GHG emissions compared to conventional fuel by 2030.
- Supply 100% of projected domestic aviation jet fuel use, or 35 billion gallons/yr by 2050.

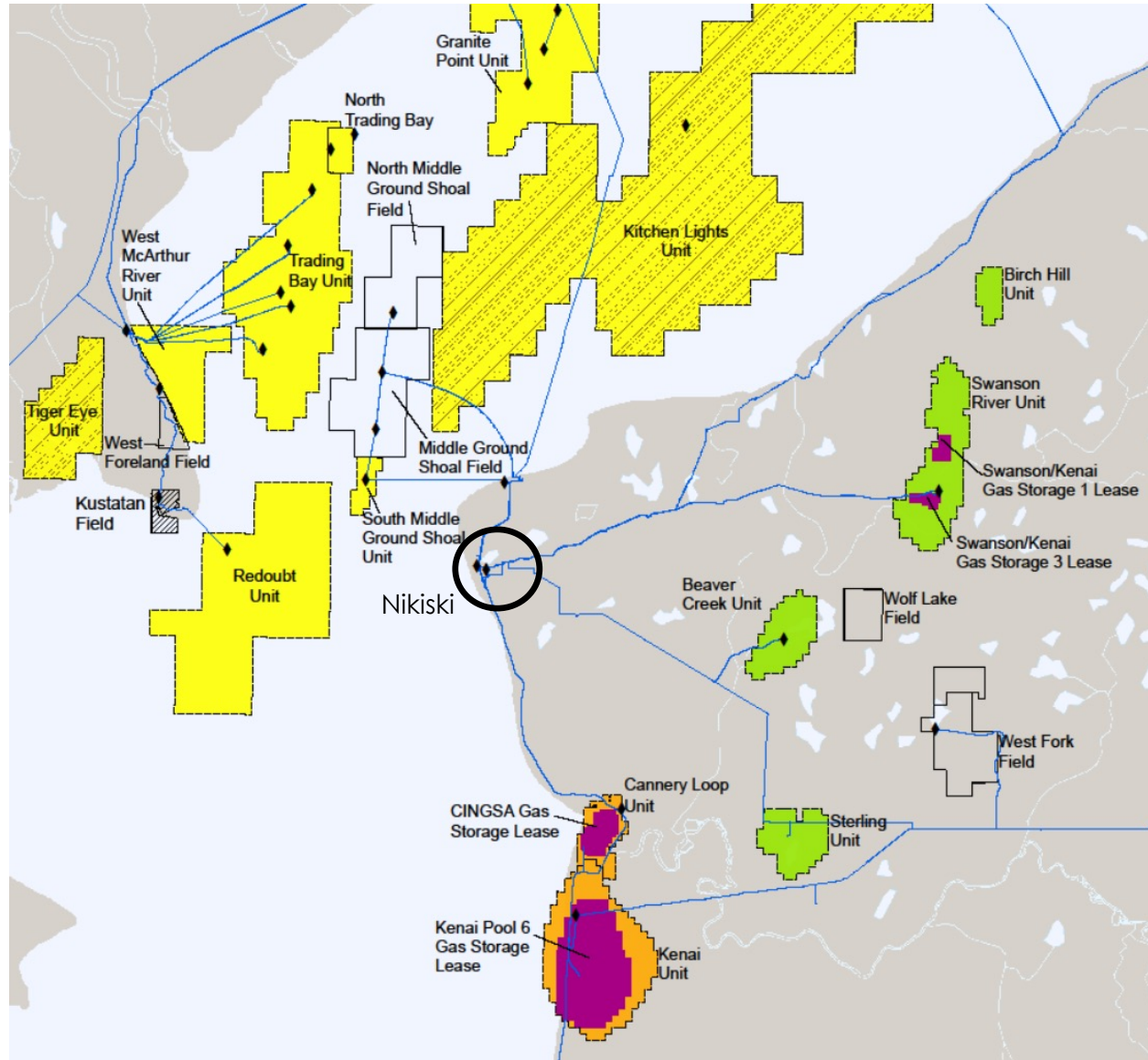
4. US DOE releases national clean hydrogen strategy and roadmap

- 50% reduction in U.S. GHG emissions from 2005 levels by 2030
 - 100% carbon pollution-free electricity by 2035
 - Net zero GHG emissions no later than 2050
- 40% of the benefits of Federal climate investments delivered to disadvantaged communities.

potential markets for offshore wind power



hydrogen storage options



Above ground

- hp storage (@350 or 700 barg)
- cryogenic storage (@-253 °C)

Subsurface

- salt caverns
- depleted Oil & Gas reservoirs

Alaska solution

- Cook Inlet has a wide range of reservoir storage capacities, properties & geometries
- SHASTA using Cook Inlet as a case study for optimum reservoir selection
- DOE funding similar initiatives in Oklahoma, North Dakota and Virginia

Early 2030s

- 3 GW fixed-bottom offshore wind supplying:
 - power to the Railbelt
 - H₂ to ammonia plant

Late 2030s

- Cook Inlet is major CCUS hub
- Nikiski is major H₂ hub
- 3 GW floating offshore wind supplying:
 - H₂ to SAF plant
 - 20% H₂ to the natural gas grid

Early 2040s

- extensive buildout of Railbelt Pumped Storage Hydro
- renewables supply 80% of Railbelt power
- 4 GW floating offshore wind supplying:
 - DAC/DOC facility
 - additional eFuels plants

By 2050

- Alaska achieves net zero
- Anchorage airport runs on 100% SAF

“It’s tough to make predictions, especially about the future” - Yogi Berra