

Case study: contextualizing LNG impacts

Climate Imperative Foundation Interview #2

Task: compare projected GHG emissions from C.P.2 to Willow

DAILY COMMENT

THE BIDEN ADMINISTRATION'S NEXT BIG CLIMATE DECISION

The liquefied-natural-gas buildout—and fossil-fuel exports—challenge progress on global warming.



By Bill McKibben

September 22, 2023

- “The [global] greenhouse-gas emissions associated with it would be twenty times larger than those from the oil drilling at Willow.” – Bill McKibben, *New Yorker*
 - Is this statement true? Why/why not?
- Implications: Biden administration is likely to approve or reject the proposal this fall

Calcasieu Pass 2 (C.P.2)

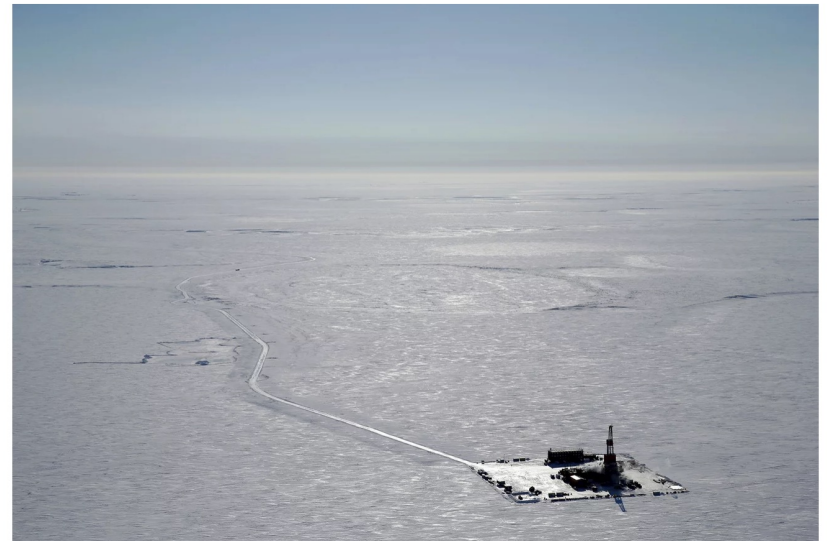
- Liquefied Natural Gas (LNG) export terminal on Louisiana Coastline
- All gas shipped through terminal will come from US basins
- Gas shipments distributed equally between Europe and Asia
- Capacity = 4 billion cubic feet per day



A Venture Global liquefied natural gas facility on the Calcasieu Ship Channel in Cameron, La. The company wants to build a new export terminal at the site. Brandon Thibodeaux for The New York Times

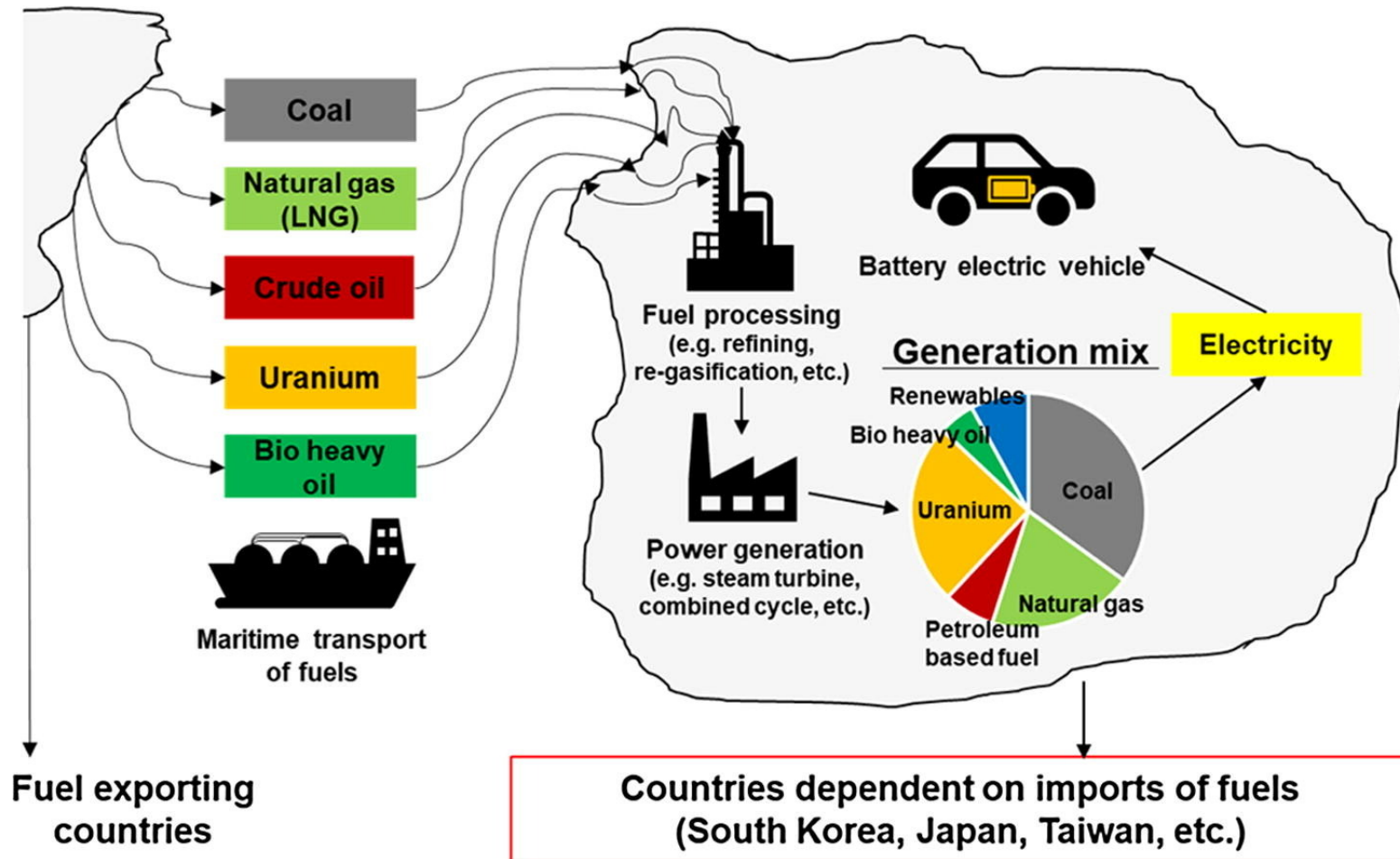
Willow

- Oil drilling project by ConocoPhillips in North Slope of Alaska
- Total production = 586 million barrels over 30-year lifespan

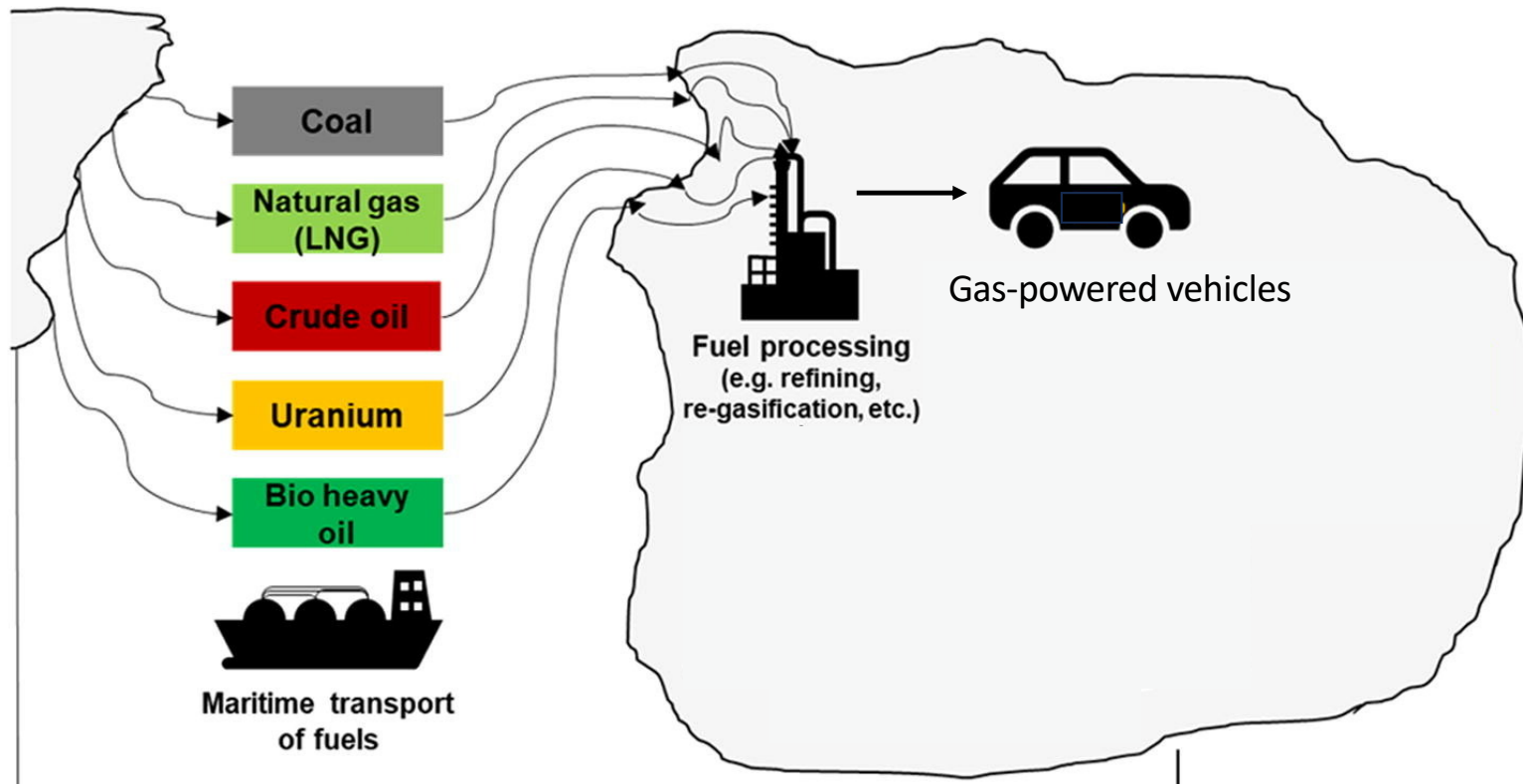


This 2019 aerial photo provided by ConocoPhillips shows an exploratory drilling camp at the proposed site of the Willow oil project on Alaska's North Slope.

ConocoPhillips via AP



Choi and Song (2018)



Modified from Choi and Song (2018)

Lifecycle stages of gas exported overseas and used for electricity production



UPSTREAM

Extraction of gas at the well, processing, and domestic pipeline transport; occurs in exporting country; greenhouse gas emitted: predominantly methane.



LIQUEFACTION

Gas is cooled to -162 degrees Celsius to reduce its volume and convert it to liquid form; occurs in exporting country; greenhouse gas emitted: almost all carbon dioxide.



TANKER TRANSPORT

Liquefied natural gas is loaded onto an LNG tanker and transported to its destination port; occurs on the high seas; greenhouse gas emitted: mostly carbon dioxide.



REGASIFICATION

Liquefied natural gas is re-warmed to convert it to a gas; occurs in importing country; greenhouse gas emitted: mostly methane.



POWER PLANT OPERATIONS

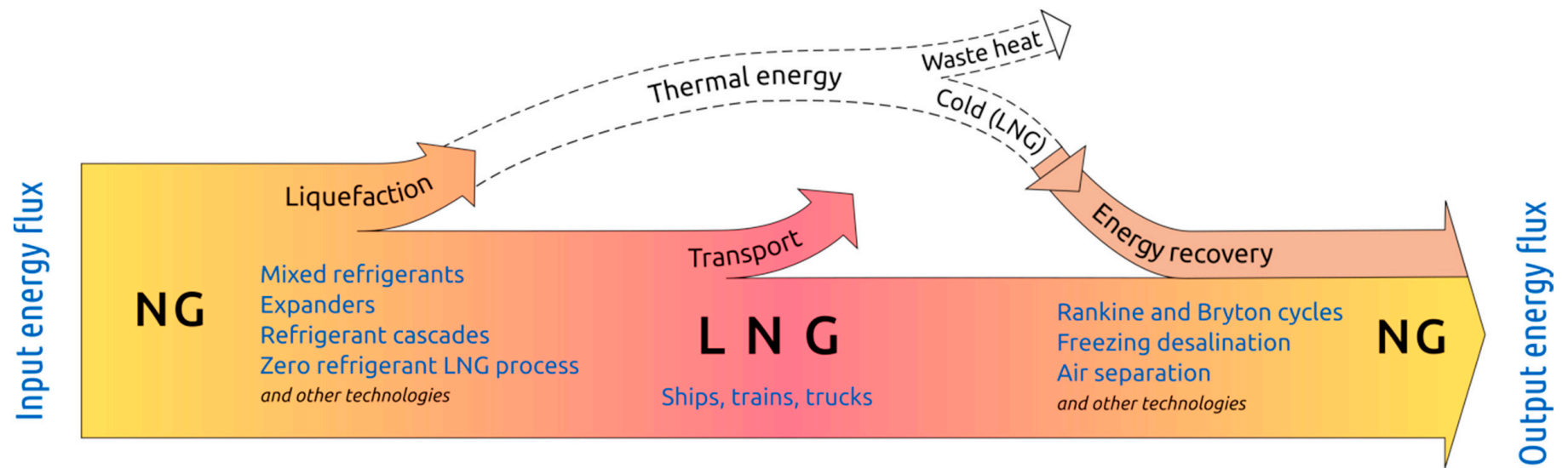
Gas is burned in a power plant to generate electricity; occurs in importing country; greenhouse gas emitted: almost all carbon dioxide.

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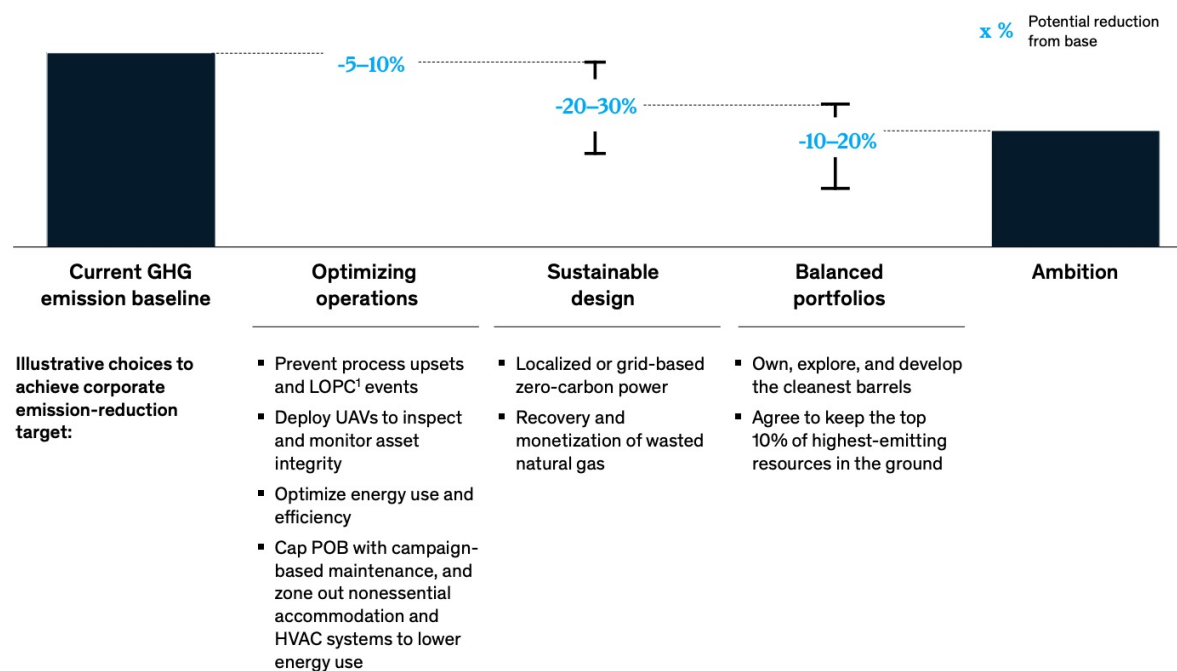
NRDC (2020)

Energy demand of liquefaction and regasification of natural gas



Pospisil et al. (2019)

Emissions reduction strategies



1. LOPC = loss of primary containment; UAV = unmanned autonomous vehicle; POB = personnel on board.

NRDC (2020)

Limitations – this analysis does not consider:



Chesapeake Climate Action Network (CCAN) via Flickr

- Upstream water use and water pollution
- Impacts to native ecosystems
 - For example, Willow result in loss of bird and polar bear habitat
- Climate impacts
 - For example, McKibbin discusses hurricane risk in the Lake Charles region of LA
- Upstream and downstream cost of fuel
- Availability of US natural gas reserves to keep C.P.2 at full capacity for 30 years

References

- <https://www.science.org/doi/10.1126/science.aar6859>
- <https://www.sciencedirect.com/topics/engineering/oil-equivalent#chapters-articles>
- <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>
- <https://www.conocophillips.com/operations/alaska/willow-project/>
- <https://www.sciencedirect.com/science/article/abs/pii/S0306261918312637>
- <https://www.energy.gov/sites/prod/files/2019/09/f66/Life%20Cycle%20Analysis%20of%20Natural%20Gas%20Extraction%20and%20Power%20Generation%2005%20-%2014%20NETL.pdf>
- <https://www.energy.gov/sites/prod/files/2019/09/f66/Life%20Cycle%20Analysis%20of%20Natural%20Gas%20Extraction%20and%20Power%20Generation%2005%20-%2014%20NETL.pdf>
- <https://www.sciencedirect.com/topics/earth-and-planetary-sciences/gas-purification>
- <https://ingaa.org/wp-content/uploads/2010/10/10929.pdf>
- <https://www.sciencedirect.com/science/article/pii/S1364032118306828>
- <https://www.sciencedirect.com/science/article/abs/pii/S0360544221014109>