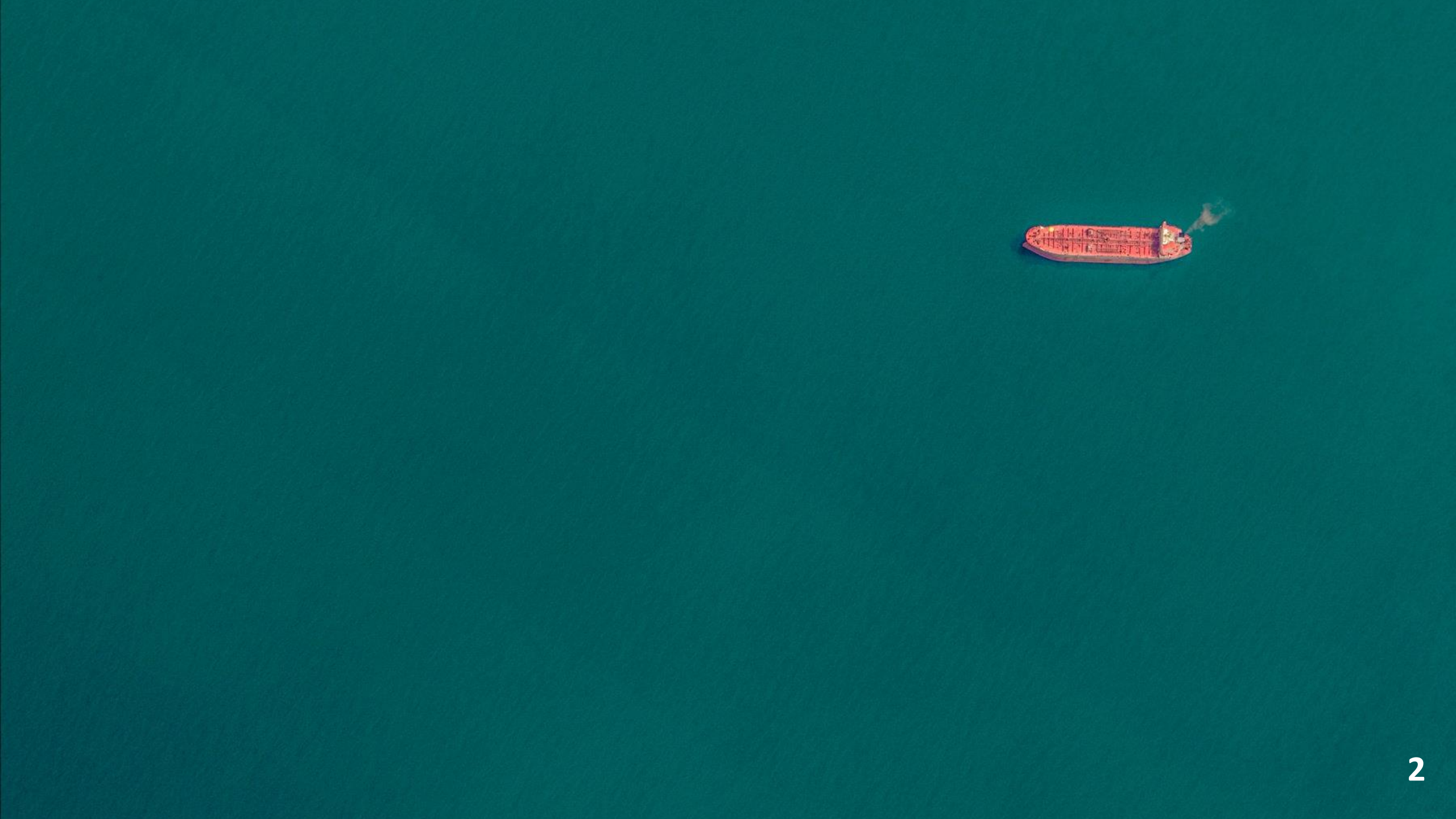




NAMEPA Houston Marine Operations Seminar, March 3rd 2020
Reducing Shipping's Environmental Impact

River Bennett, Nuclear Policy Analyst
Nuclear Innovation Alliance

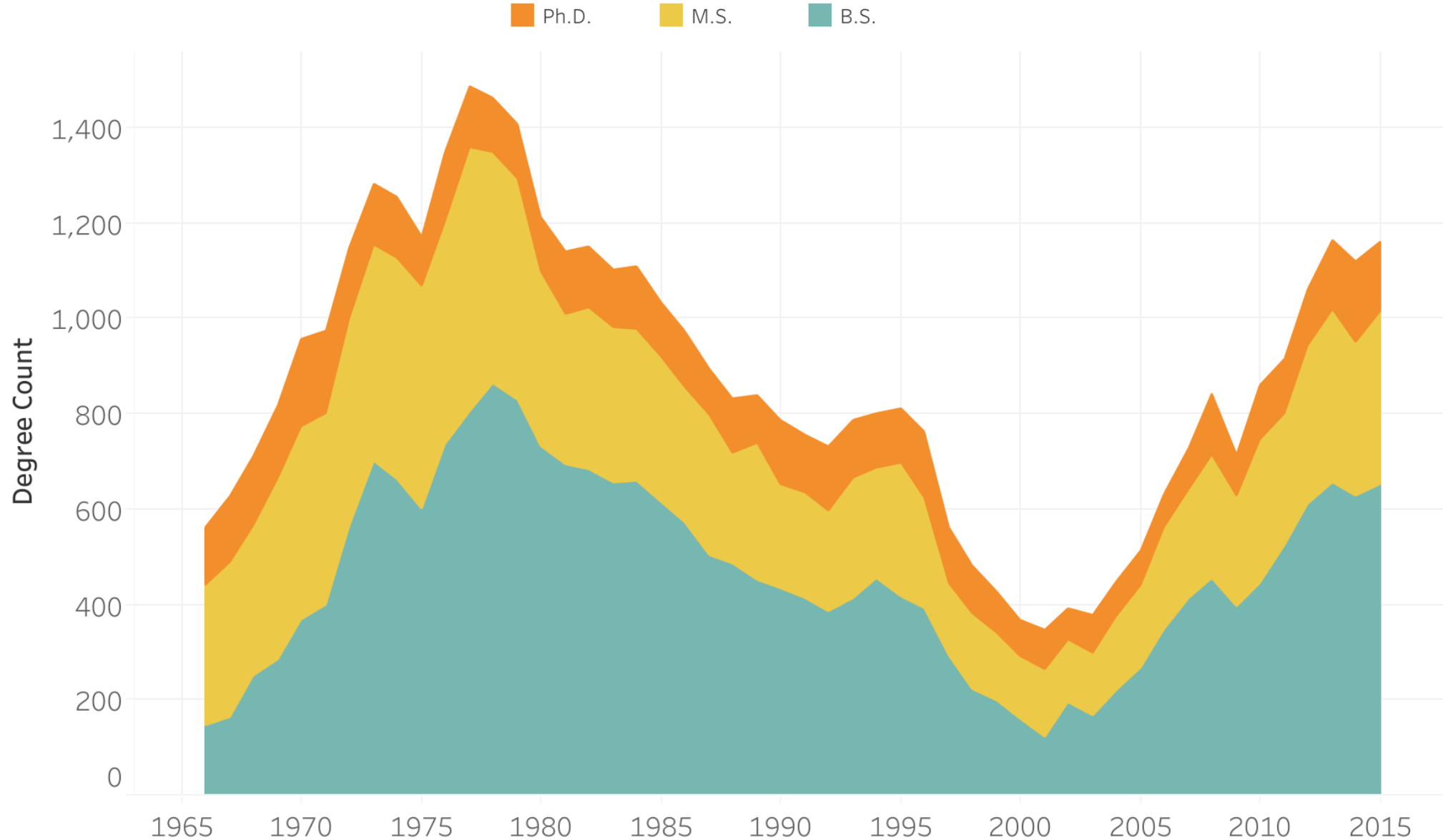






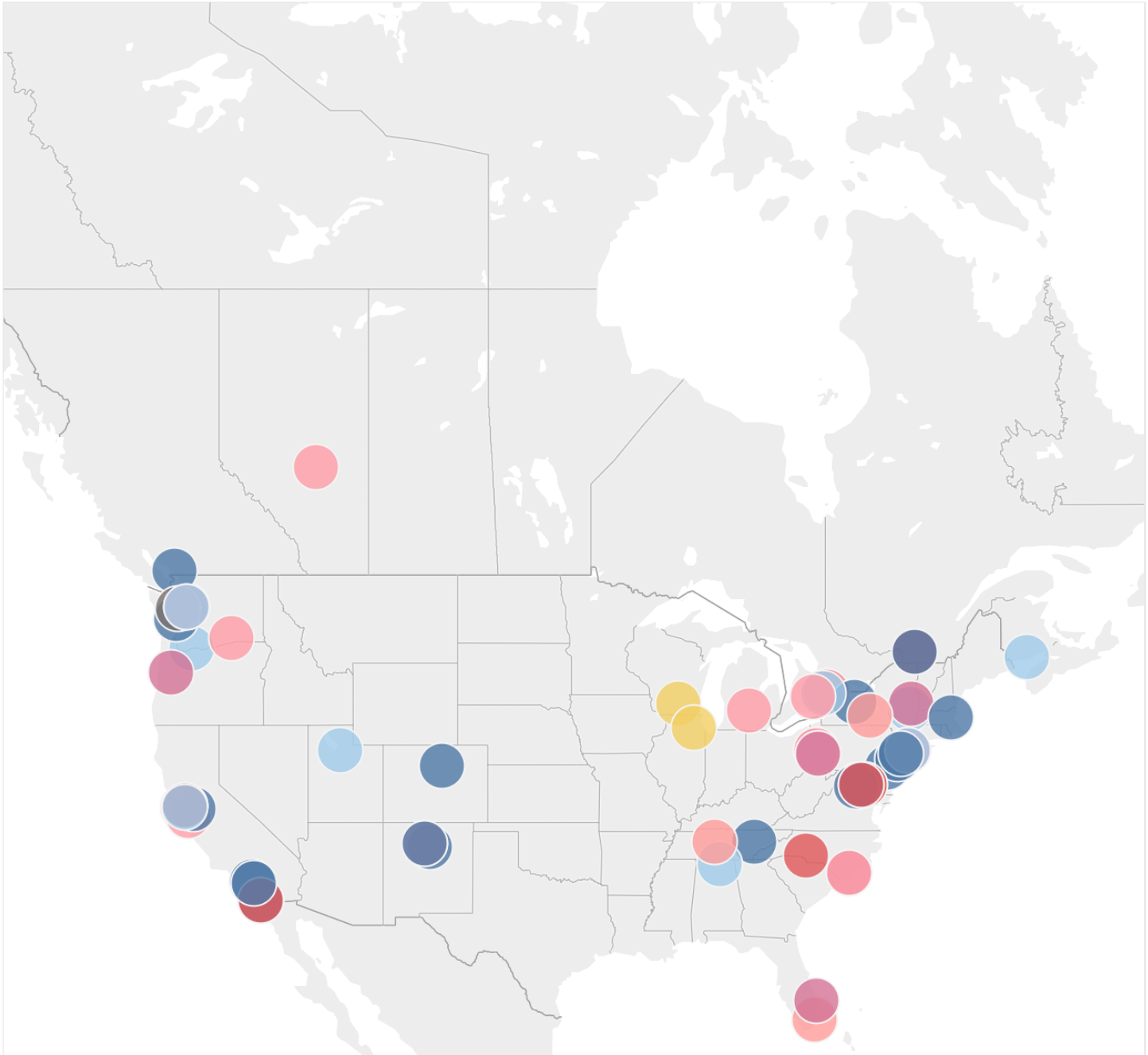
The Advanced Nuclear Sector





Awarded nuclear engineering degrees: 1966 - 2015

Advanced Nuclear Industry: The Next Generation



- Design Type
- Molten Salt Reactor
 - High Temperature Gas Reactor
 - Nuclear Battery
 - Designs Advanced Nuclear Fuels
 - Fusion
 - Super-Critical CO2 Reactor
 - Accelerator Driven System Project
 - Liquid Metal-cooled Fast Reactor
 - Microreactor
 - Small Modular Reactor
 - Super-Critical Water-cooled React..



GHG Emission Profiles for Power Production

Current & Advanced Technology





A Brief History of Maritime Nuclear Propulsion





USS Enterprise



NS Savannah



Sevmorput
(Се́вморпу́ть)



The Potential for Advanced Nuclear at Sea





Third Way: “Nuclear Reimagined”

12



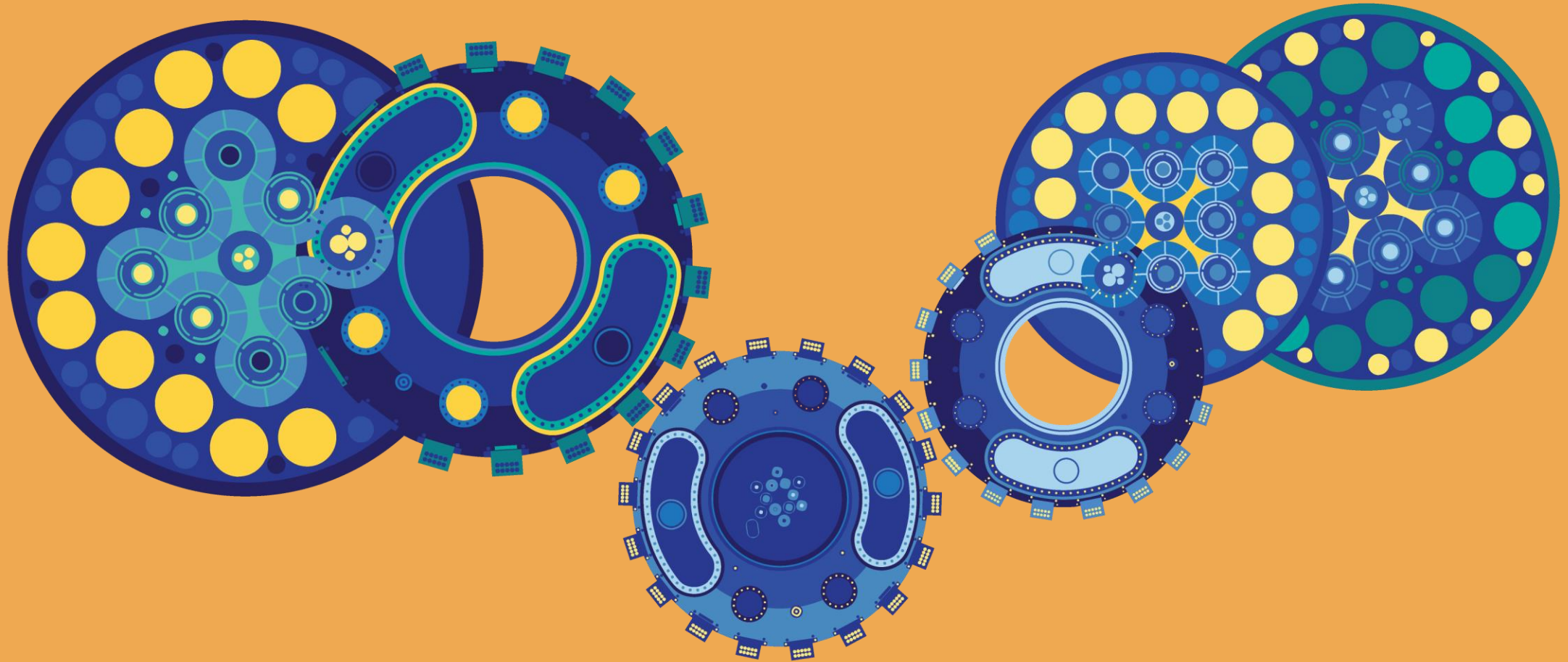
Oklo "Aurora" micro-reactor 13



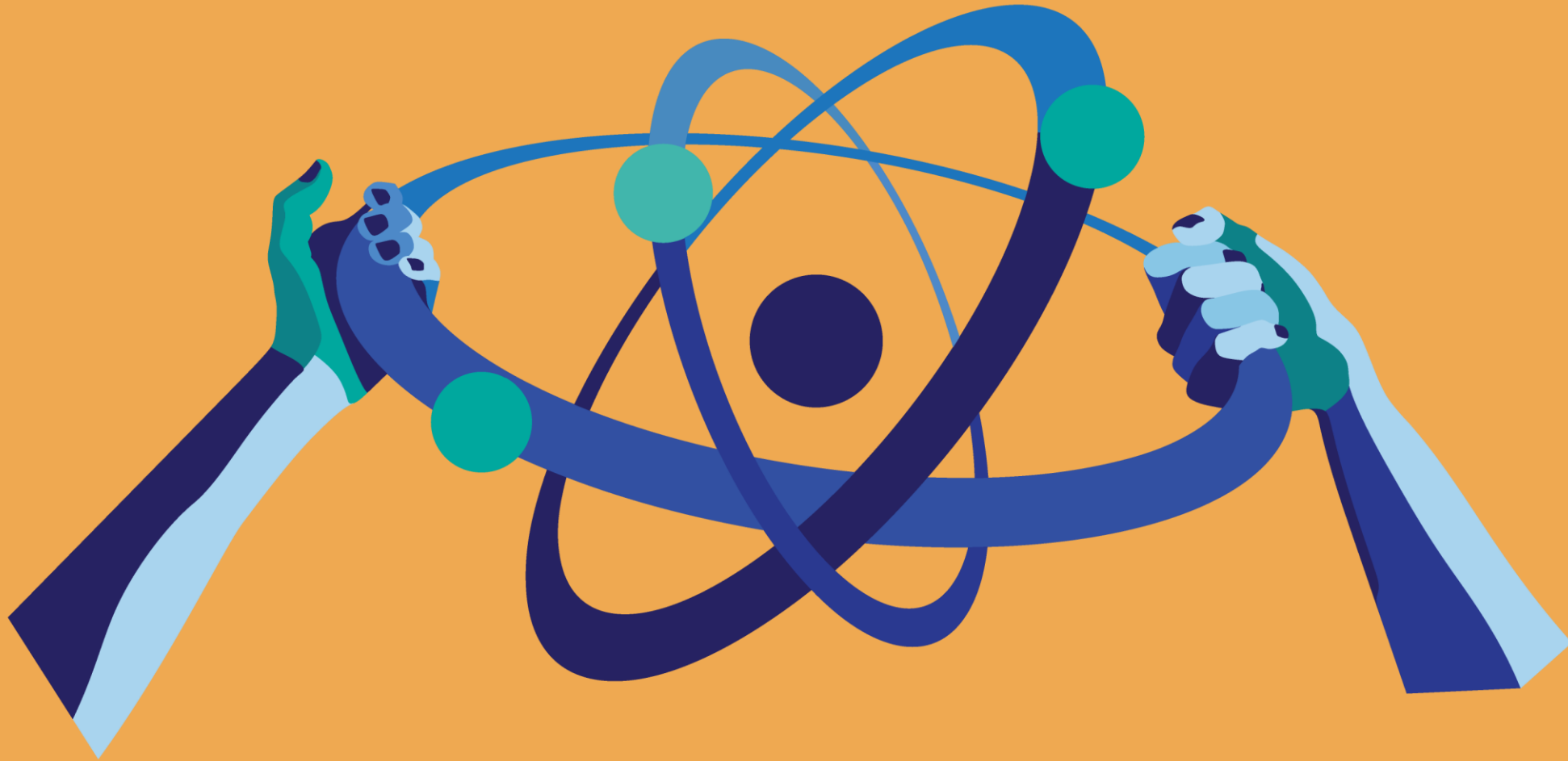
Challenges and Regulatory Framework



Regulatory



Liability





Economics

Potential for cost increase

Technology capital costs

Licensing + regulatory costs

Personnel training + security

Waste management

Potential for cost decrease

Zero-emission fuel

Lower fuel costs / higher sailing speeds

Years between refueling

No exhaust control regulations

Global Access: Largest U.S. Trading Partners

Rank	Country / District	Nuclear Navy?
1	China	Yes
2	Canada	
3	Mexico	
4	Japan	U.S. Navy allowed access to ports
5	Germany	
6	South Korea	Expected
7	United Kingdom	Yes
8	France	Yes
9	India	Yes
10	Italy	
11	Taiwan	
12	Brazil	Expected

“Because of the Program's demonstrated reliability, U.S. nuclear-powered warships are welcomed in more than 150 ports of call in over 50 foreign countries and dependencies.” – U.S. Naval Nuclear Propulsion Program

Security





Opening a Dialogue



- **Market and Regulatory research (NIA)**
- **Discussion: Industry to Industry to Government**

- **Individuals / groups / companies**
- **Partnerships**

- **NRIC at INL**
- **Enthusiastic Engineers and Policy People!**

Image Credits:

- **2, 21:** Google Earth
- **8:** wikipedia.org/wiki/Nuclear_powered_cruisers_of_the_United_States_Navy
- **9:** atomicinsights.com/cover-story-why-did-savannah-fail/
- **10:** twitter.com/Syndroma3
- **12:** thirdway.org/blog/nuclear-reimagined
- **13:** businesswire.com/news/home/20200219005485/en/Idaho-National-Laboratory-Selects-Oklo-Opportunity-Demonstrate
- **17:** twitter.com/Syndroma3