

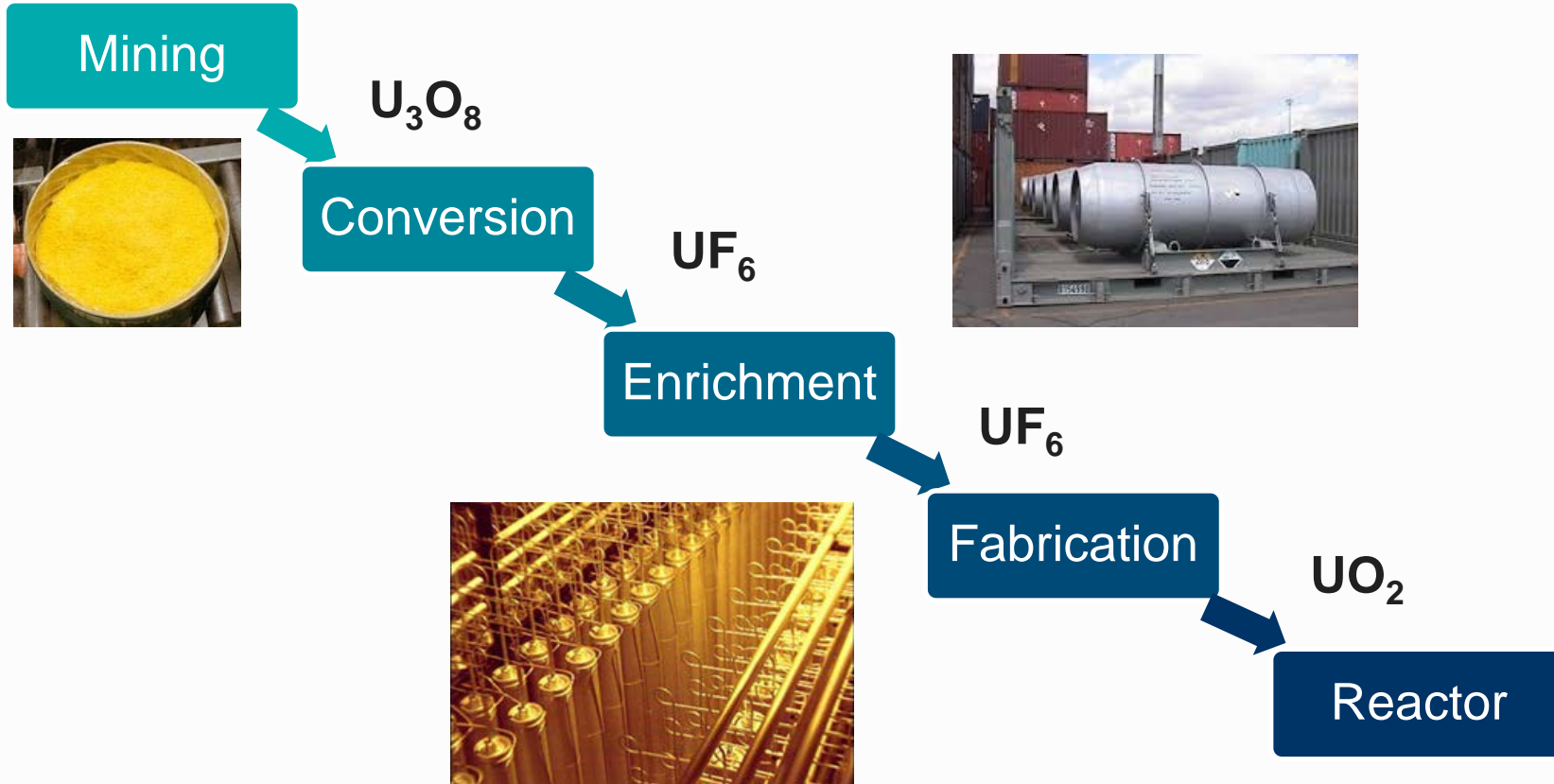
# HALEU Needs For Commercial Reactors

Everett Redmond II, Ph.D.

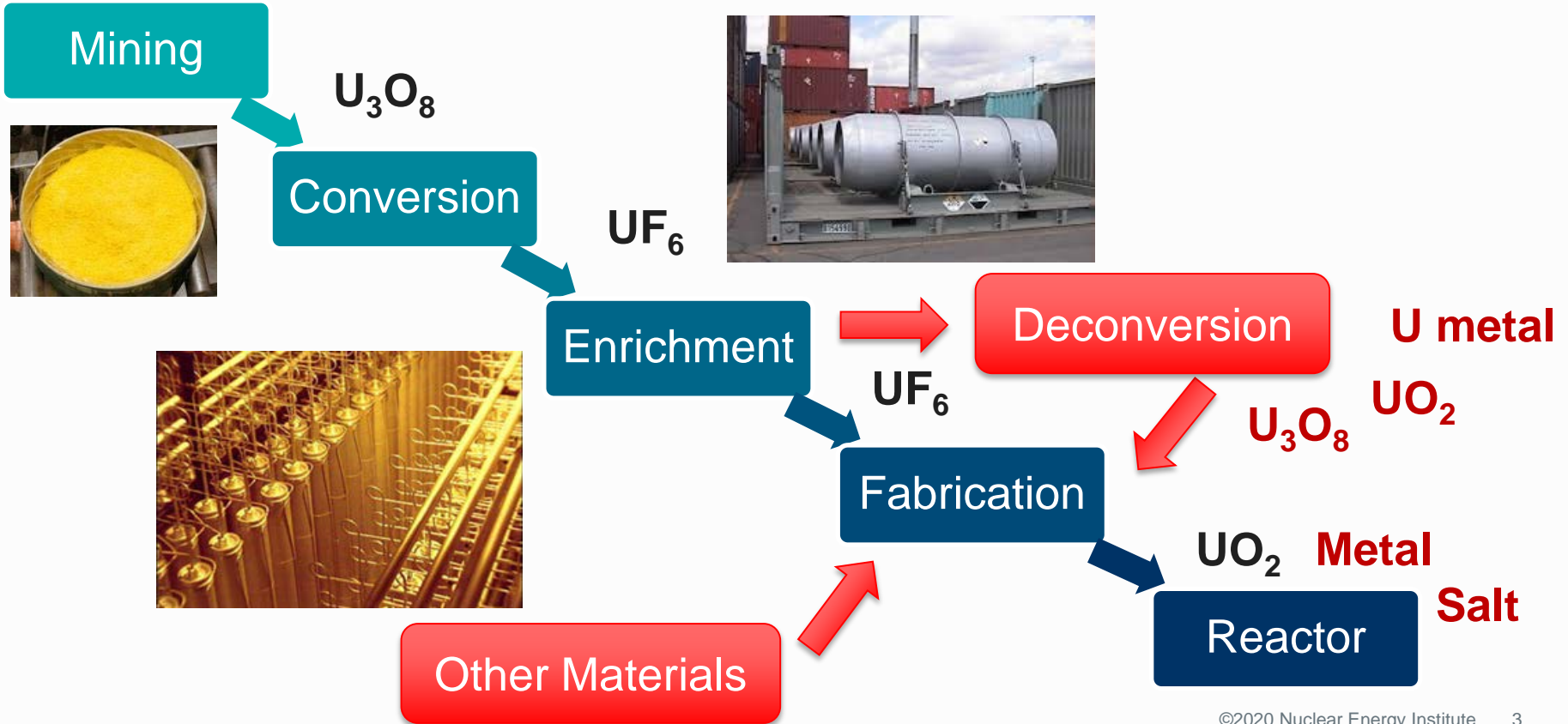
April 28, 2020



# Front End of the Fuel Cycle

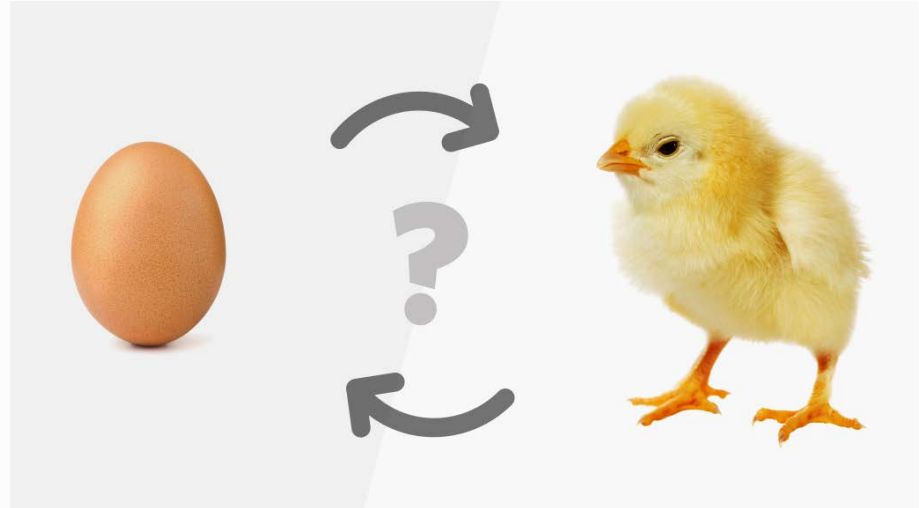


# Future Front End of the Fuel Cycle?



# Challenges to Establishing Future Front End Fuel Cycle

- Technology is typically not the problem
- Market development and infrastructure investment (enrichment and transportation) is the challenge



# HALEU for Industry – Two Uses

- Existing fleet
  - Between 5% and 10% (closer to 5%) for use with accident tolerant fuels
  - Extending burnup and time between outages
  - Confident in pathway for enrichment and transportation
- Advanced reactors
  - Between 10% and 20%
  - Needed by most but not all advanced non-LWR reactors and some advanced fuels for existing fleet
  - Enrichment and transportation challenges

# INDUSTRY NEEDS IN 2018

- Letter to Secretary Perry July 5, 2018
- Values in MTU
- Current fleet uses about 2000 MTU/year
- Data from eight companies
- Does not include enrichments below 10% for LWR fleet
- Not all ARs or advanced fuels need HALEU

Year	Annual	Cumulative
2018	0.026	0.026
2019	1.506	1.532
2020	2.21	3.7
2021	4.2	7.9
2022	3.7	11.6
2023	18.8	30.4
2024	10.3	40.7
2025	12.4	53.1
2026	57.4	110.5
2027	73.6	184.1
2028	108.1	292.2
2029	111.8	404.0
2030	185.5	589.5

# Changing Landscape Since 2018

- NuScale NRC Design Certification in late 2020
- Oklo Aurora application to NRC
- DOD SCO mobile micro-reactor project
- DOE demonstration program
- Significant activity in Canada
- Numerous reactors to be operational by 2030 and many more after 2030

# Comparing Needs in 2018 vs 2020

- Values in MTU
- 2020 draft data
- Data from eight companies in 2018 and eleven in 2020
- Does not include enrichments below 10% for LWR fleet
- Not all ARs or advanced fuels need HALEU

Year	2018 Annual	2020 Annual
2020	2.21	5.0
2021	4.2	6.9
2022	3.7	5.0
2023	18.8	19.0
2024	10.3	22.3
2025	12.4	36.9
2026	57.4	69.3
2027	73.6	55.2
2028	108.1	95.5
2029	111.8	130.4
2030	185.5	190.2



# INDUSTRY NEEDS IN 2020

- Values in MTU
- Draft data
- Current fleet uses about 2000 MTU/year
- Data from eleven companies
- Does not include enrichments below 10% for LWR fleet
- Not all ARs or advanced fuels need HALEU

Year	Annual	Cumulative
<b>2020</b>	5.0	5.0
<b>2021</b>	6.9	11.9
<b>2022</b>	5.0	16.9
<b>2023</b>	19.0	35.9
<b>2024</b>	22.3	58.2
<b>2025</b>	36.9	95.1
<b>2026</b>	69.3	164.4
<b>2027</b>	55.2	219.6
<b>2028</b>	95.5	315.1
<b>2029</b>	130.4	445.5
<b>2030</b>	190.2	635.7
<b>2031</b>	222.6	858.3
<b>2032</b>	266.6	1124.9

# THE FUTURE OF CLEAN ENERGY WILL BRING NEW REACTOR DESIGNS AND NEW APPLICATIONS

