

Ghostbusters for Batteries

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OnTo
Technology
LLC

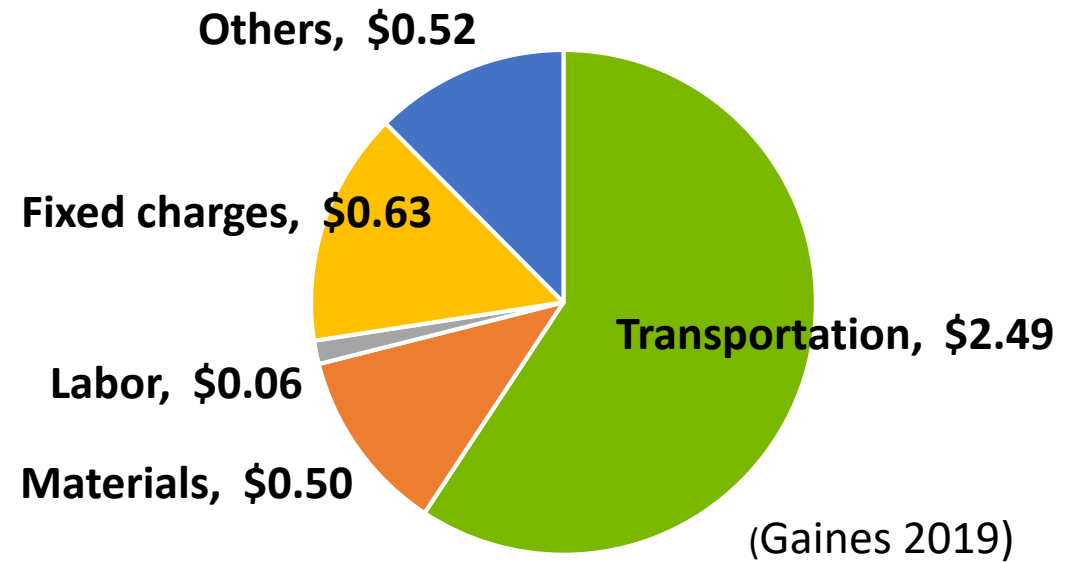
Why is Class 9 shipping expensive?

Transporting end-of-life lithium-ion batteries is costly and dangerous.



**Shipment + disposal + environmental..
\$3800**

Transportation and Recycle Cost Breakdown



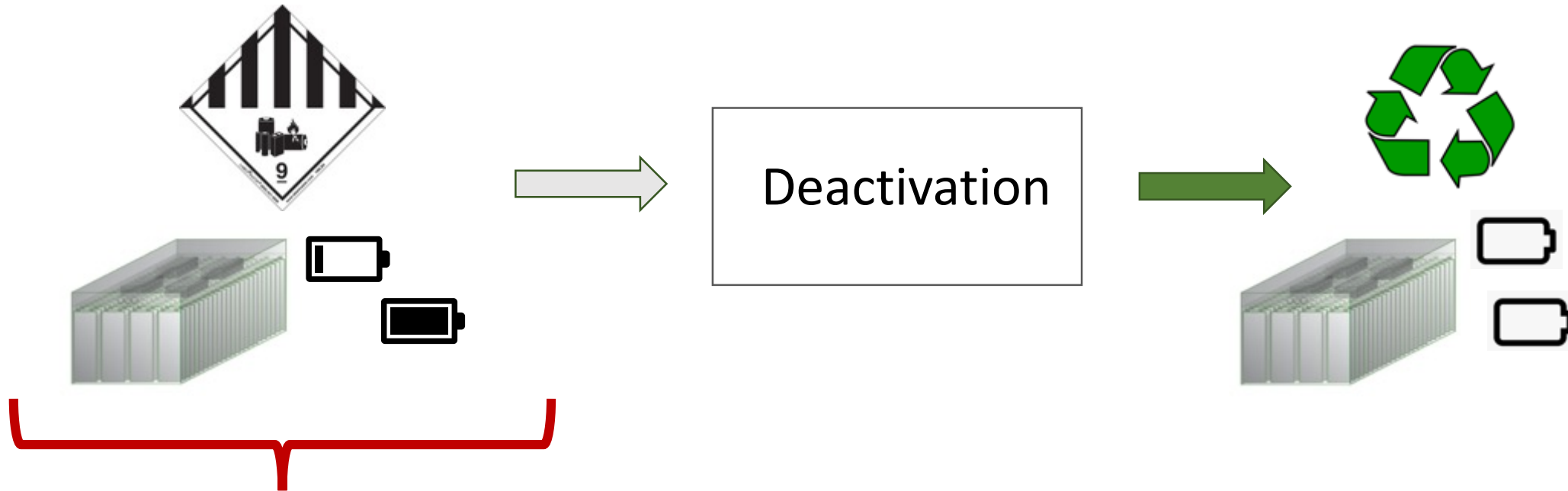
Transportation is >50% the overall cost of recycling

Early stage incidents; What about with 100x volume?



OnTo Patented Deactivation Service

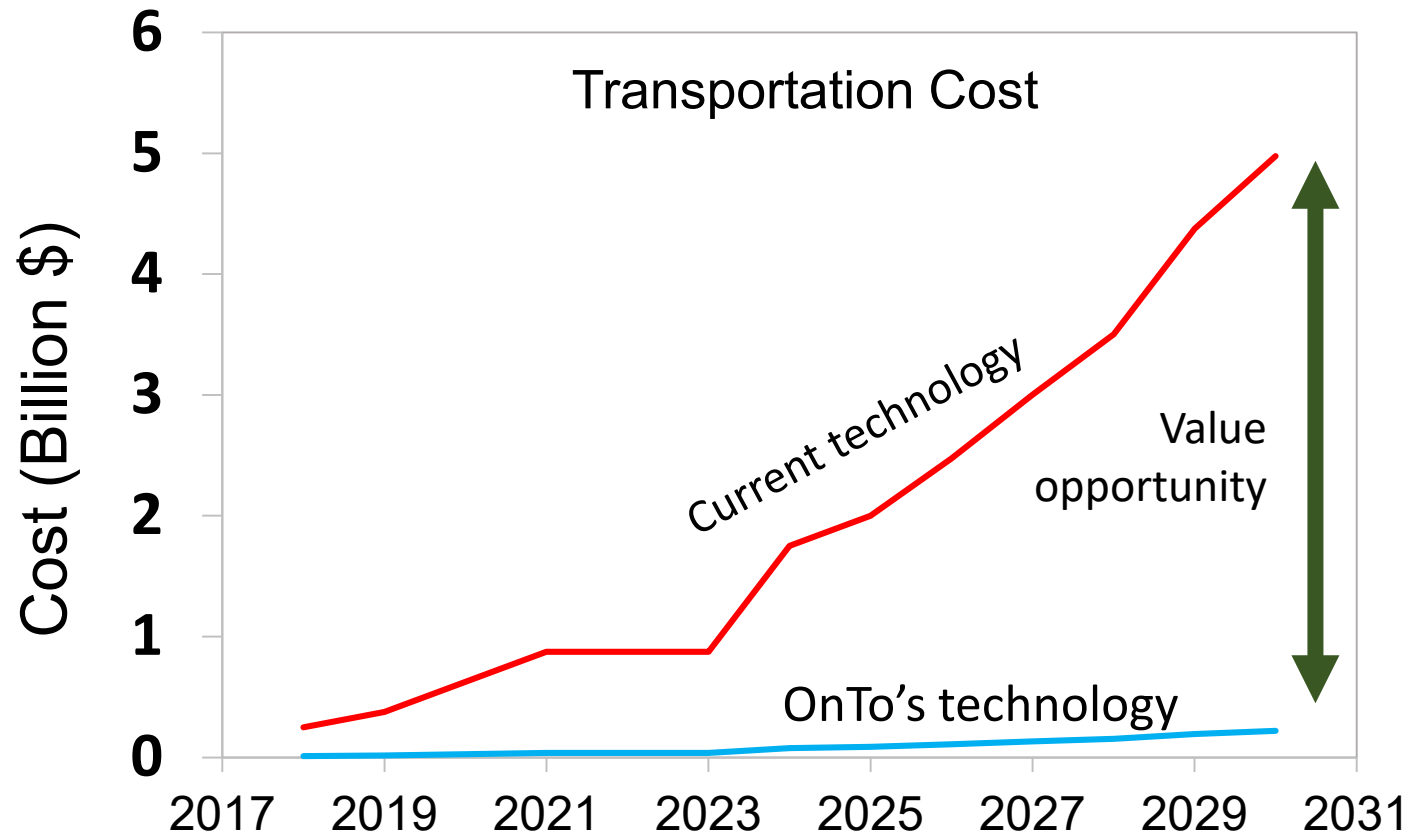
Remove hazards from EOL Li-ion



Any: State of charge
State of health
Chemistry
Format

- Resolves reactivity and flammability.
- Can be practiced prior to transport.

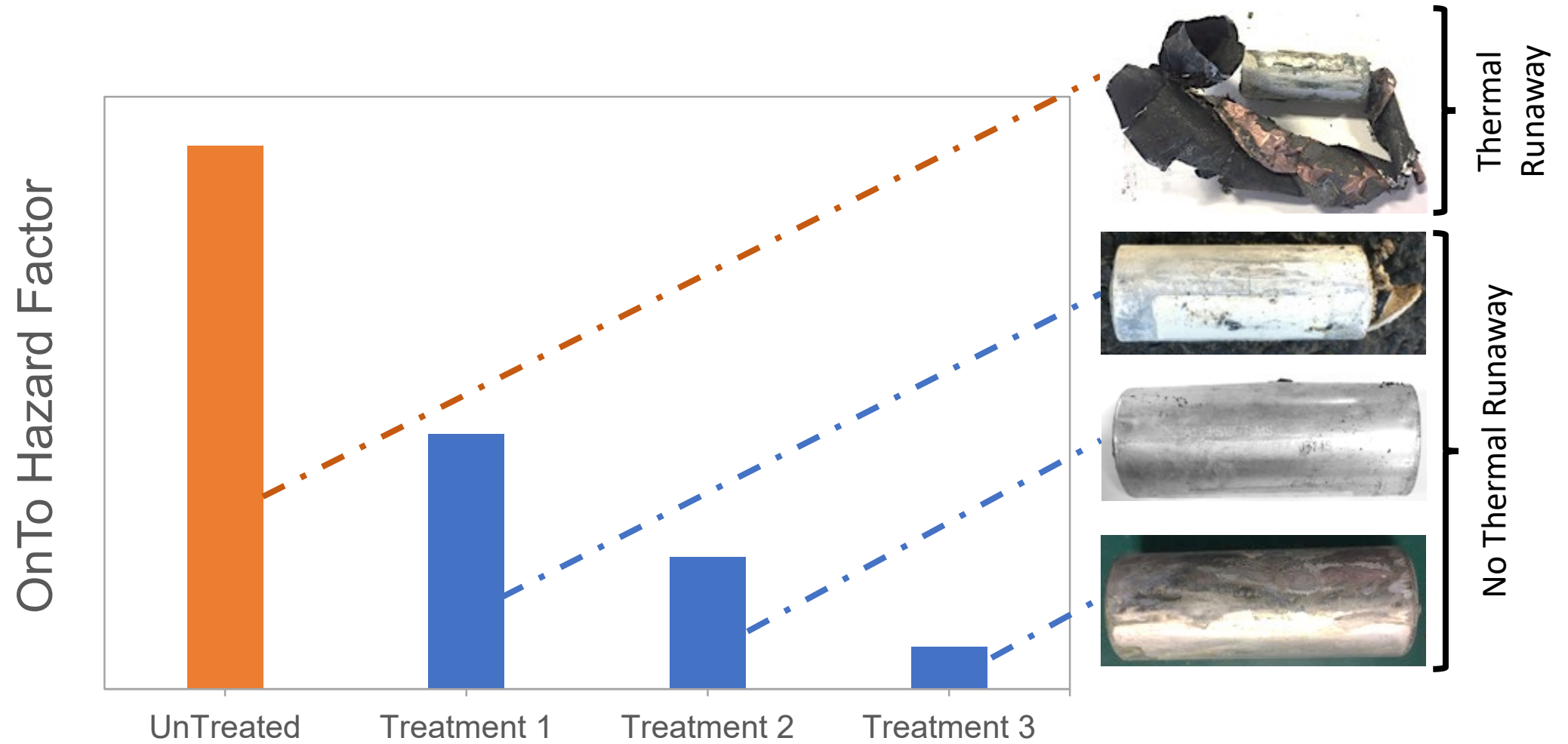
Battery Deactivation Opportunity



In 2030:

\$5B vs. **\$250M**

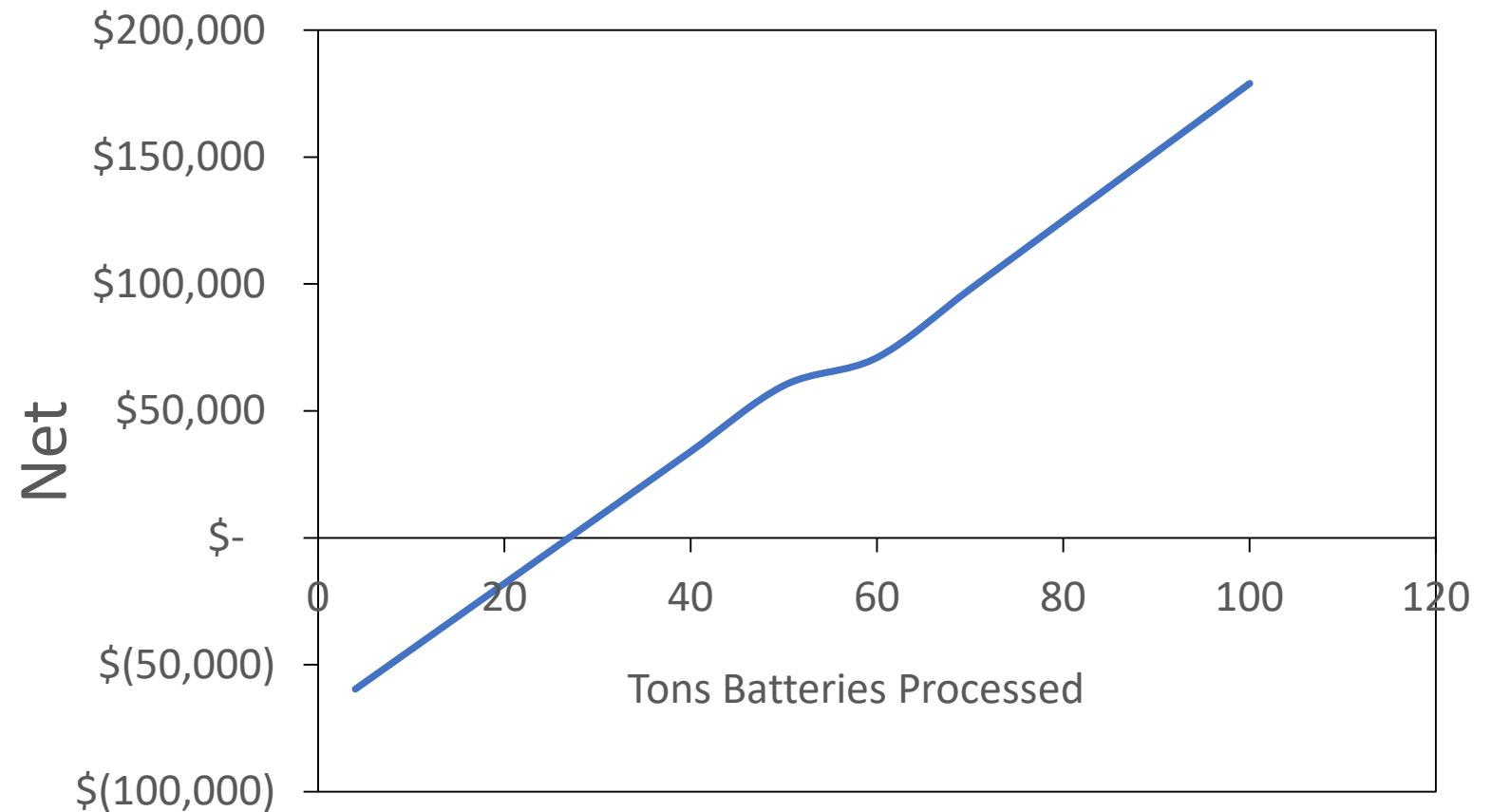
Safety Validation



Breakeven Analysis

Facility breakeven at 27 tons batteries

- \$700,000 CAPX
- Serves 250-mile radius



OnTo Team and Partners



Steve Sloop, Ph.D.

Founder and President of OnTo
Pioneer in direct recycling
14 patents



Lauren Crandon, Ph.D.

Chemical & Environmental engineer
Expert in nano-particulate environmental
health & safety



Tucker Holstun

Chemical Engineering intern



Michael Lerner, Ph.D.

Oregon State Univ. program director
World leader in solid state materials.

Robert Parker

Engineering & business advisor
Invented & licensed state-of-charge
tester to Duracell.

Myongjai Lee

Industrial cathode & battery
manufacturing expert
Builds batteries with recycled material.

SHAPE
TECHNOLOGIES GROUP



ONAMI
OREGON NANOSCIENCE AND
MICROTECHNOLOGIES INSTITUTE



**NISSAN GROUP
OF NORTH AMERICA**



Appendix

Estimating overall liability

Class 9 shipping is expensive and appropriate

- In 2030, \$5 billion liability
- \$2.49/(kg 1025 mile) (Gaines, 2019)
\$7.59/kg (US DoD)
- \$1.76/(kg 250 mile) (Bloomberg, 2019)

Appendix-Breakeven Analysis Assumptions

- Value: \$3/kg
 - Service, we pick up and harvest
 - Dominate regional market
 - Eliminate safety & liability concerns
 - Can handle dangerous and defective
- Complements existing hazardous waste service businesses (i.e. waste oil pick up and treatment)
 - Added value after pick up

Appendix-Competition

- Cryoshredding
- Boxing (explosion-proof boxes)
- Expensive
- Dangerous