

A horizontal banner with a green and blue color scheme. On the left, there are two vertical white lines. The background features a stylized landscape with green hills, a blue sky with white clouds, and a large blue and green arrow pointing right. The text "E3 CLEAN TECHNOLOGIES" is written in white on a dark green rectangular background.

E3 CLEAN TECHNOLOGIES

Clean Water, Clean Air, Clean Energy.

E3 Clean Technologies Inc.

GUIRR Roundtable

October 22, 2014



E3 Clean Technologies GreenBox™ Electrolyzers



Multiple Markets

Global Patents



Platform Technology



**Disruptive
Electrochemical
Technology**

The Problems We Fix

NOx Exhaust Emissions



SMOG



SCR
GreenBox™

Ammonia Contamination



ALGAE BLOOMS



Ammonia
GreenBox™



SCR GreenBox™ - NOx Emissions

#1 Market : \$6.5 billion



- **Diesel Vehicles**

- Meets future diesel regulations
- “Invisible” to customers

- **Industrial/Power Plant**

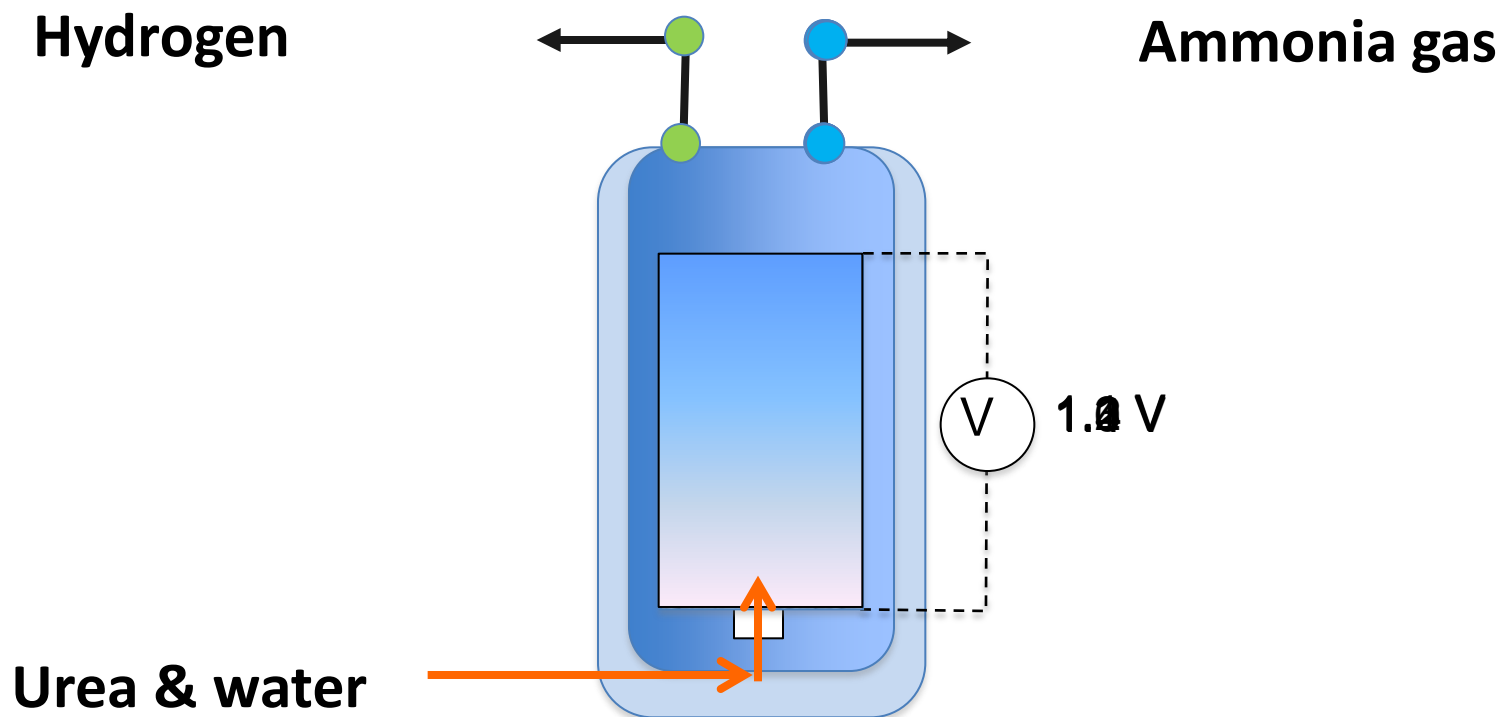
- **50/60 Advantage**

- 50% lower capital cost
- 60% lower operating cost

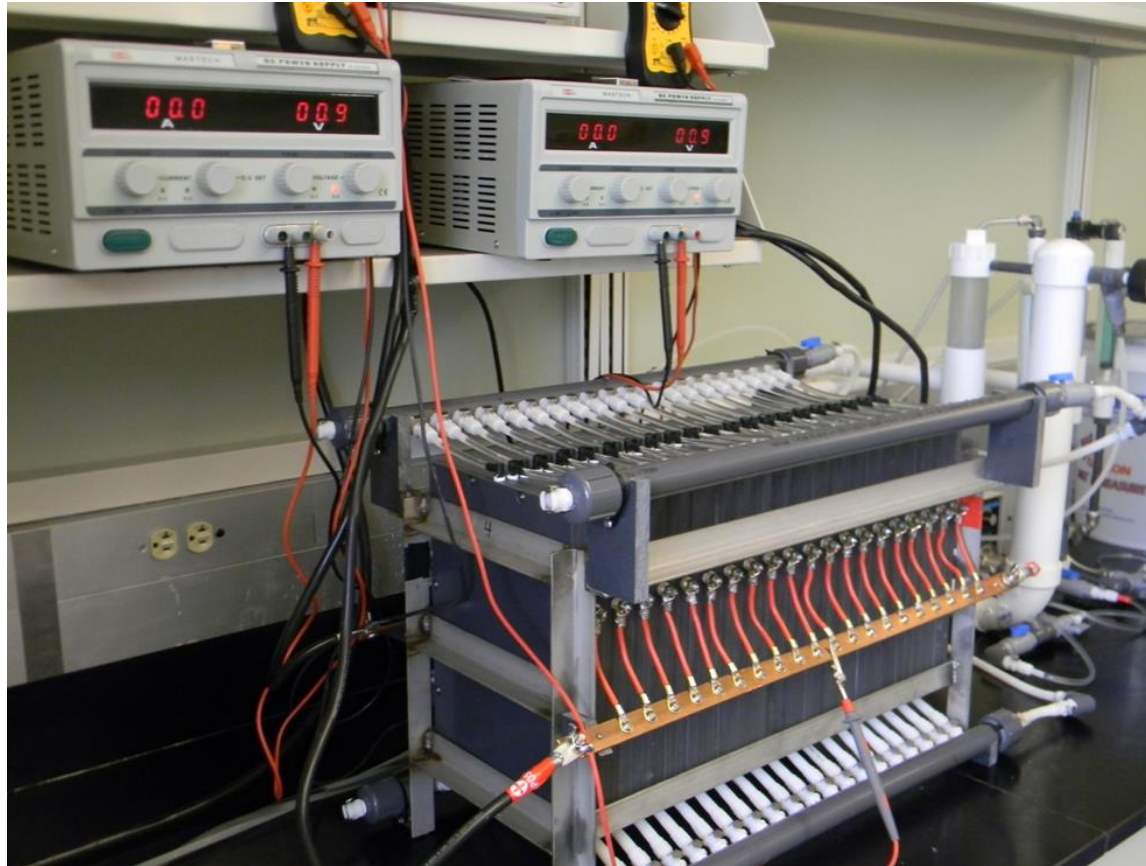


SCR GreenBox™

Electrolyzer Operation

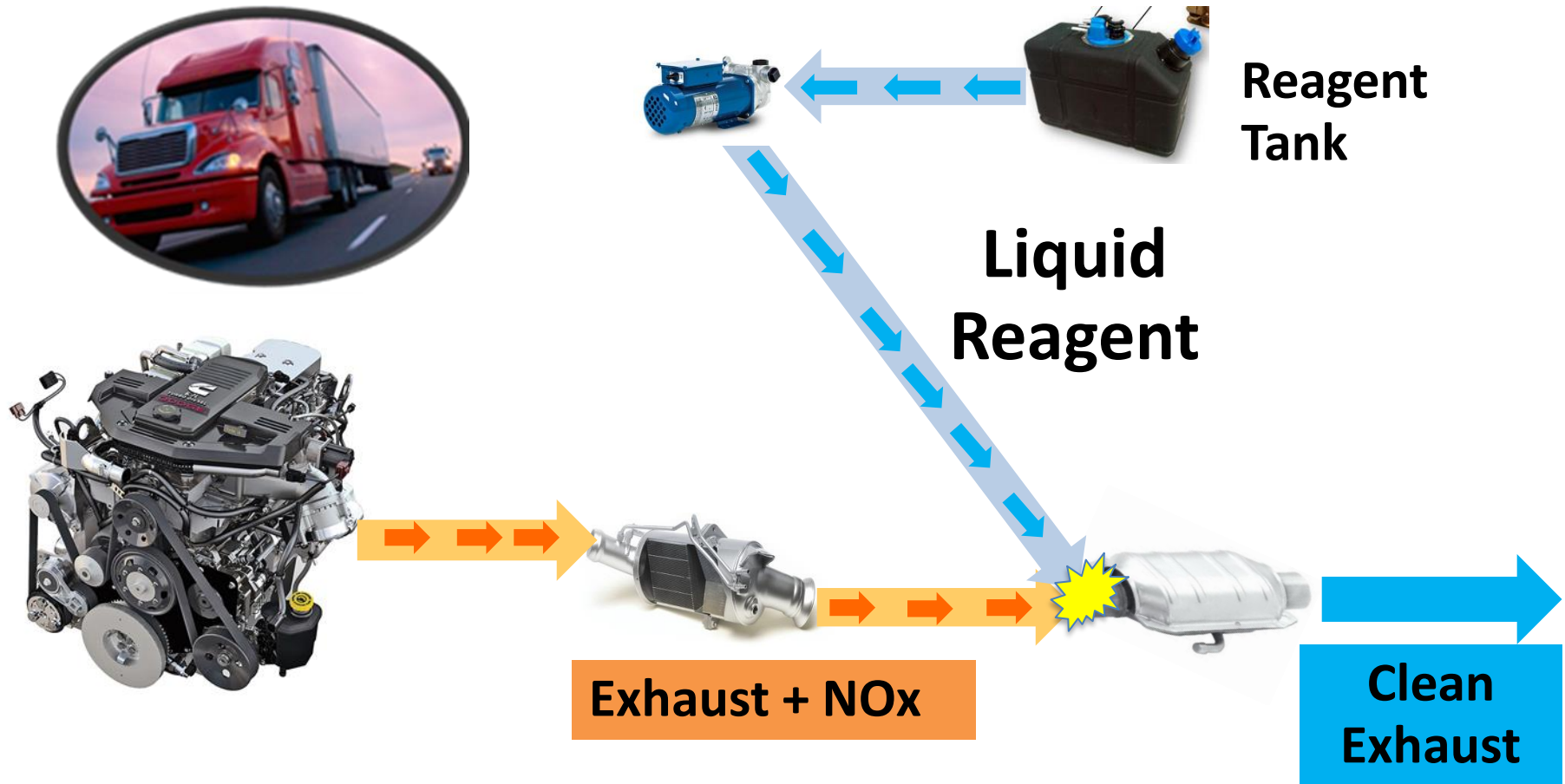


SCR GreenBox™ Electrolyzer

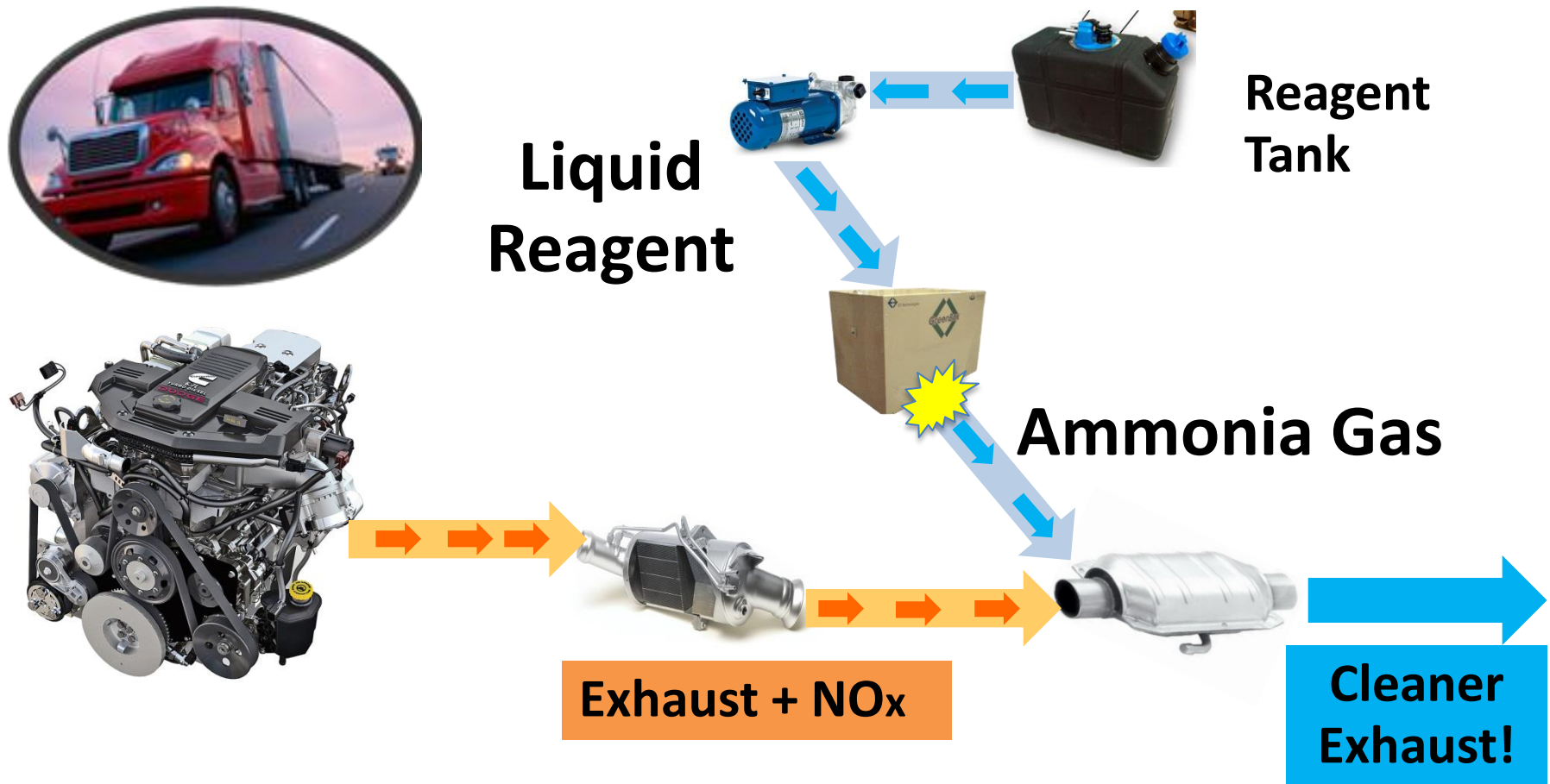


How it Works - Existing Technology

Heavy Duty Truck Example



E3's Technology – Gas Injection Maximizes NO_x Reduction



Fast-to-Market Technology “Critical Component”



System Integrators
(Bosch, Tenneco...)



End Users

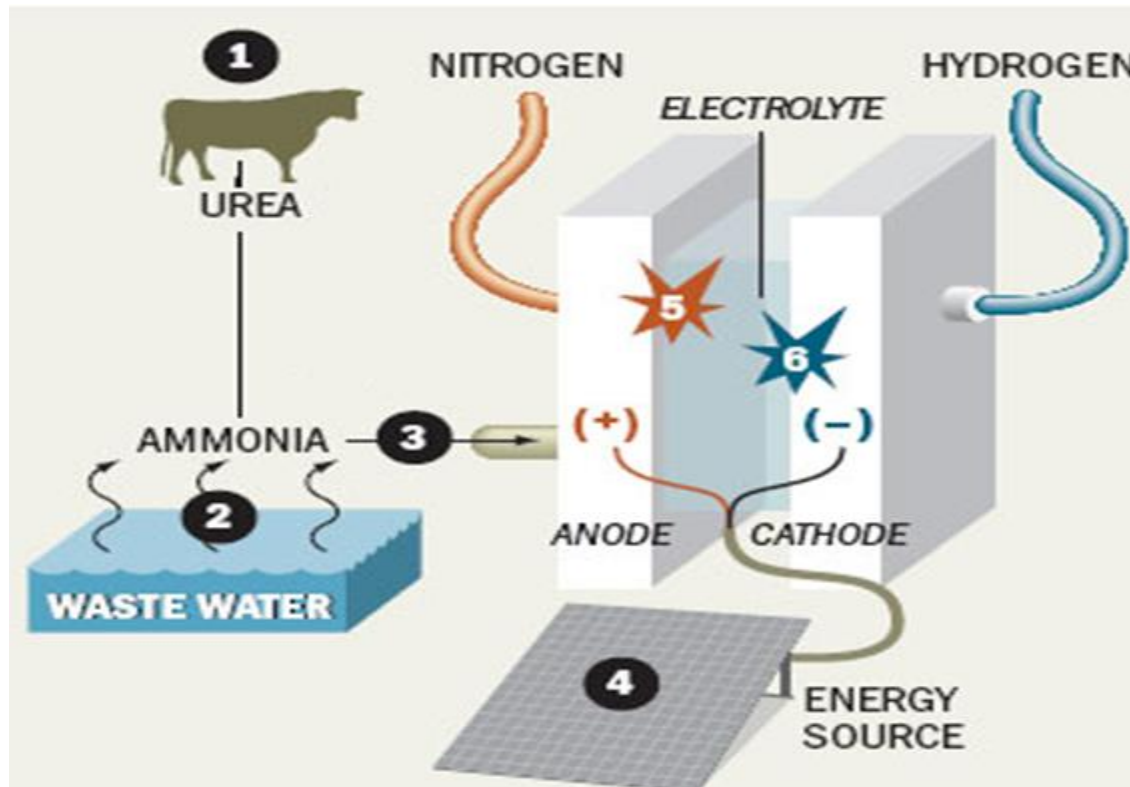
- Diesel vehicle producers
- Industrial / power plants



Ammonia GreenBox™

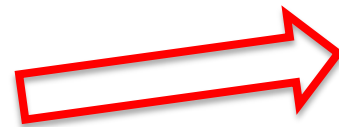
#2 Market : \$5.5 billion

Ammonia Converted to Hydrogen & Nitrogen



Ammonia GreenBox™

Disruptive Waste Water Technology

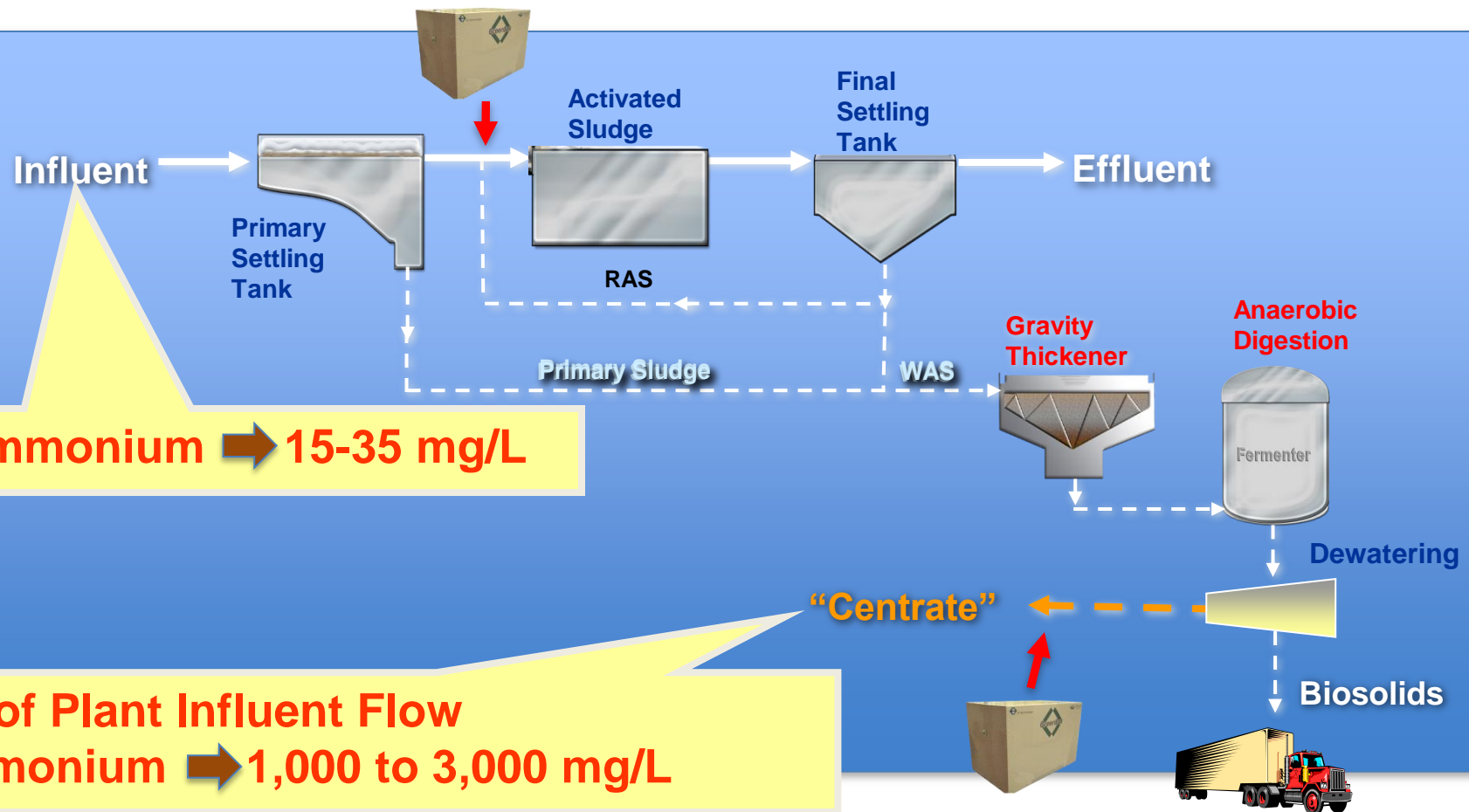


50/70 Advantage:

- 50% Lower Capital Cost
- 70% Lower Operating Cost
- Quick/Flexible Installation

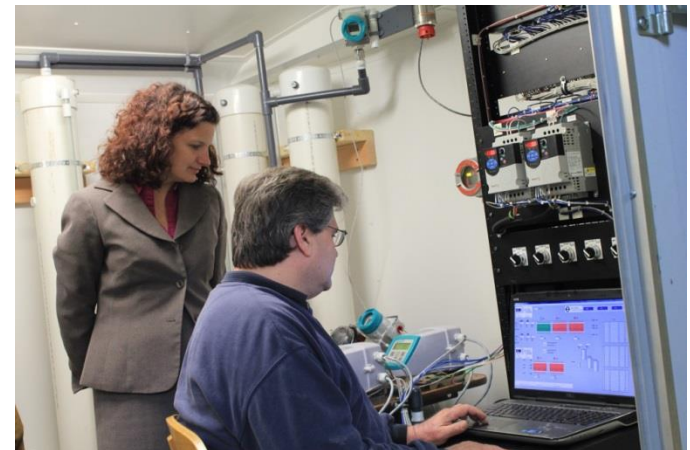
Ammonia GreenBox™

Installation Flexibility



Ammonia GreenBox™ Configuration Flexibility

Mobile Ammonia GreenBox™ - Ohio Municipal waste water plant



Ammonia GreenBox™ Hydrogen Fuel Production



Meeting DoD's Environmental Challenges

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About SERDP
and ESTCP

Program
Areas

News and
Events

Featured
Initiatives

Tools and
Training

Technical Approach

The novel approach pursued in this research utilizes three sustainable technologies in concert—anaerobic membrane bioreactors (AnMBRs), clinoptilolite ion exchange, and **GreenBox™ ammonia electrolysis**. The synergistic combination of these technologies will enable the first anaerobic treatment system that is capable of removing ammonia, a critical pollutant in municipal waste streams that is conventionally degraded using energy-intensive aeration processes. The component technologies are currently at an

Ammonia GreenBox™ Hydrogen Fuel Production

US Department of Defense H₂ Demonstration System





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E3 CLEAN TECHNOLOGIES

Clean Water, Clean Air, Clean Energy.

THANK YOU

Kent Shields

<http://e3cleantechnologies.com/>