



# Sturman Industries

*Reinventing the way mechanical systems work....*

**Adaptive Digital Power Technology - ADP<sup>t</sup>™**



**An Energy Solution**

Presented by: Carol & Eddie Sturman



# An "ENABLING" SOLUTION

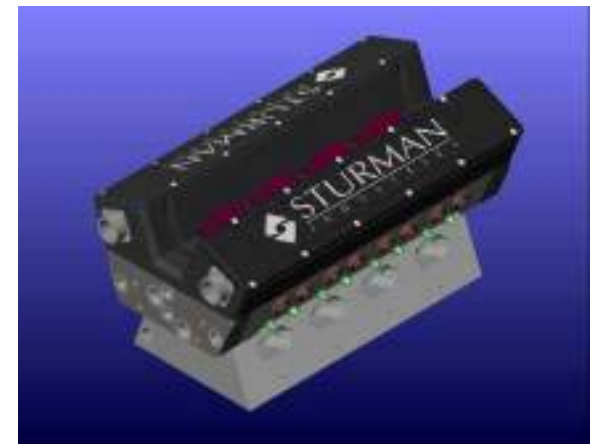
## DIGITAL HYDRAULICS

Intelligent - Precise - Flexible Process Control

*Transforming Energy Systems*

*Enabling:*

1. Ultra efficient power generation
2. Enable & optimize alternative fuel use
3. New distributed energy model
4. Wind & solar backup
5. Low cost energy delivery
7. Practical wind turbine design
6. Energy storage
5. Carbon free fuels



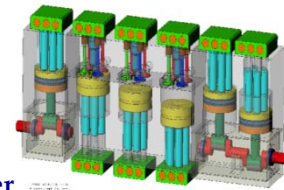
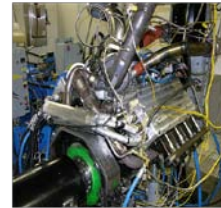


# Sturman Innovation History

First CAMLESS Truck climbs Pikes Peak



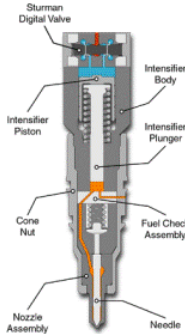
Demon of US2010 Emissions without NOx aftertreatment



SBG Beverage Carbonation Dispenser National Beer Retailer PRODUCTION

All Fuel AdaptivePower

1st Fuel Injector with Digital Valve control



1993

G2 Fuel System Navistar PRODUCTION



2002

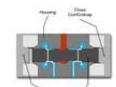
Pic-N Place Valve PRODUCTION



2000



+2011



PRODUCTION Path Auto Component Valve program

2009

2003



First Camless Car using Digital Injection & HVA



PRODUCTION Program D2 Large Bore Injector for Marine, Locomotive, and Power Generation Engines

1995

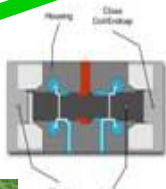
1st Camless Hydraulic Valve Actuation System



1st Camless Truck completes 10,000 miles and Wins Popular Science Award!

1999

1989 Sturman Industries Founded



SBG Irrigation & water Conservation innovations



Digital Valve Invented for the Apollo Program by Eddie Sturman

1965



***“It is the most exciting engine technology in the world that I know of. It has revolutionary implications in many uses, not only vehicles”***

Amory Lovins  
Chief Scientist & Chairman



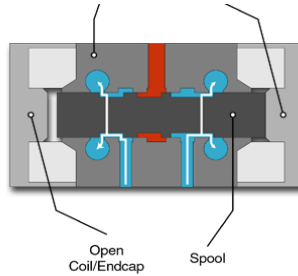
- R&D
- Design
- Development
- Manufacturing
- Testing

450 Acre Innovation Campus



# Modernizing Engine Management

## Digital Valves

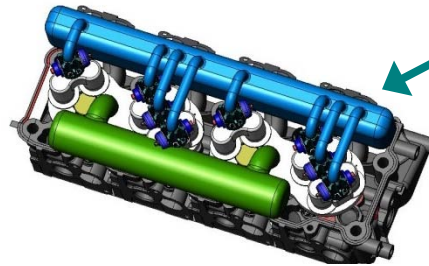


### ALL FUEL CAPABLE

- Methane
- Natural Gas
- Biodiesel
- Ethanol
- Fuel from Waste
- Etc...



## Air Control



## Ultra Efficient Combustion



# Distributed Power Generation

- **PON-08-001 Public Interest Energy Research Grant**
  - “Adaptation of Advanced Mobile Combustion Engine Technologies for Distributed Energy Resources and Combined Heat and Power Applications”
    - **Cummins ISX 15L engine converted to NG and equipped with Sturman HVA with the following goals:**
      - > 40% BTE
      - < 0.064 g/kw-hr NO<sub>x</sub>
      - Single self optimizing solution for mobility and power generation
      - Enabling Miller Cycle, Variable CR, internal EGR





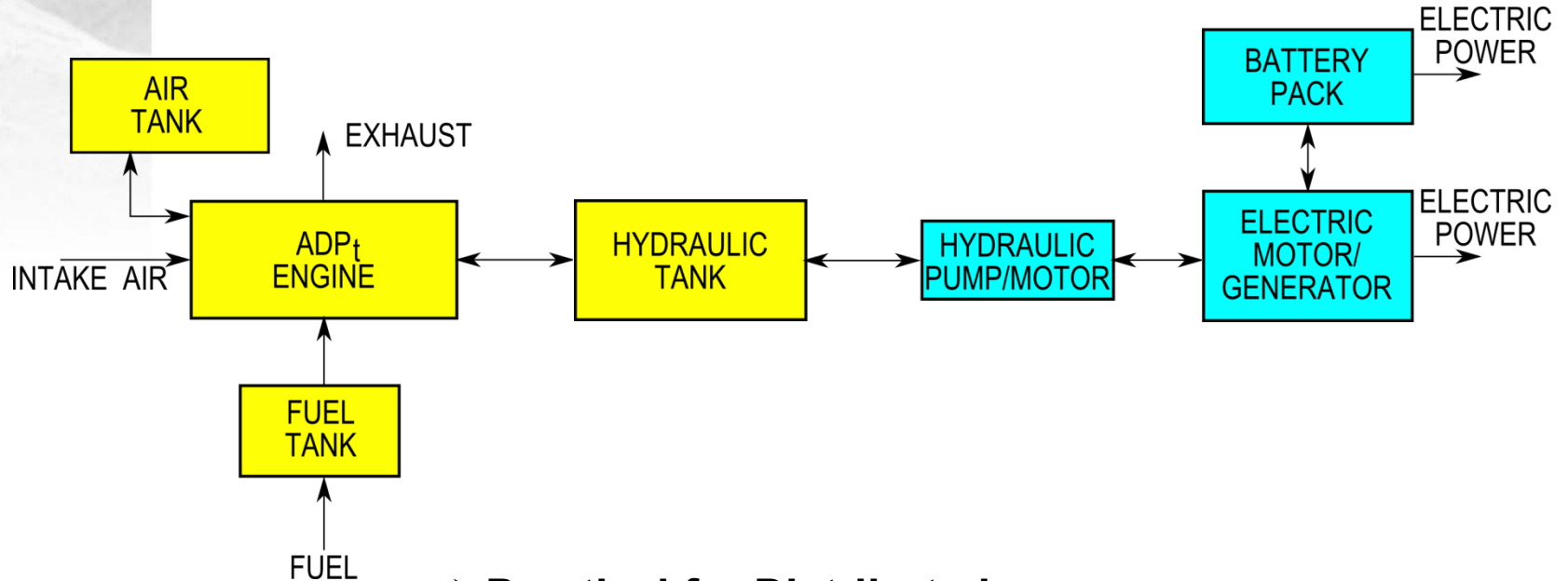
# Breakthrough Engine Efficiency & Emissions

- Demonstrated peak engine efficiencies over 40%
- Up to 18% reduction in fuel consumption at part load





## STATIONARY POWER



➤ **Practical for Distributed or Central Power Generation**

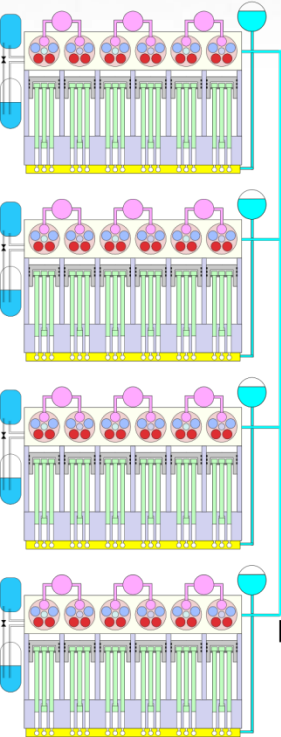
➤ **Enables Wind / Solar Energy Demand-Supply Backup**





# Low Cost Hydraulic Distributed Energy

Engine Station



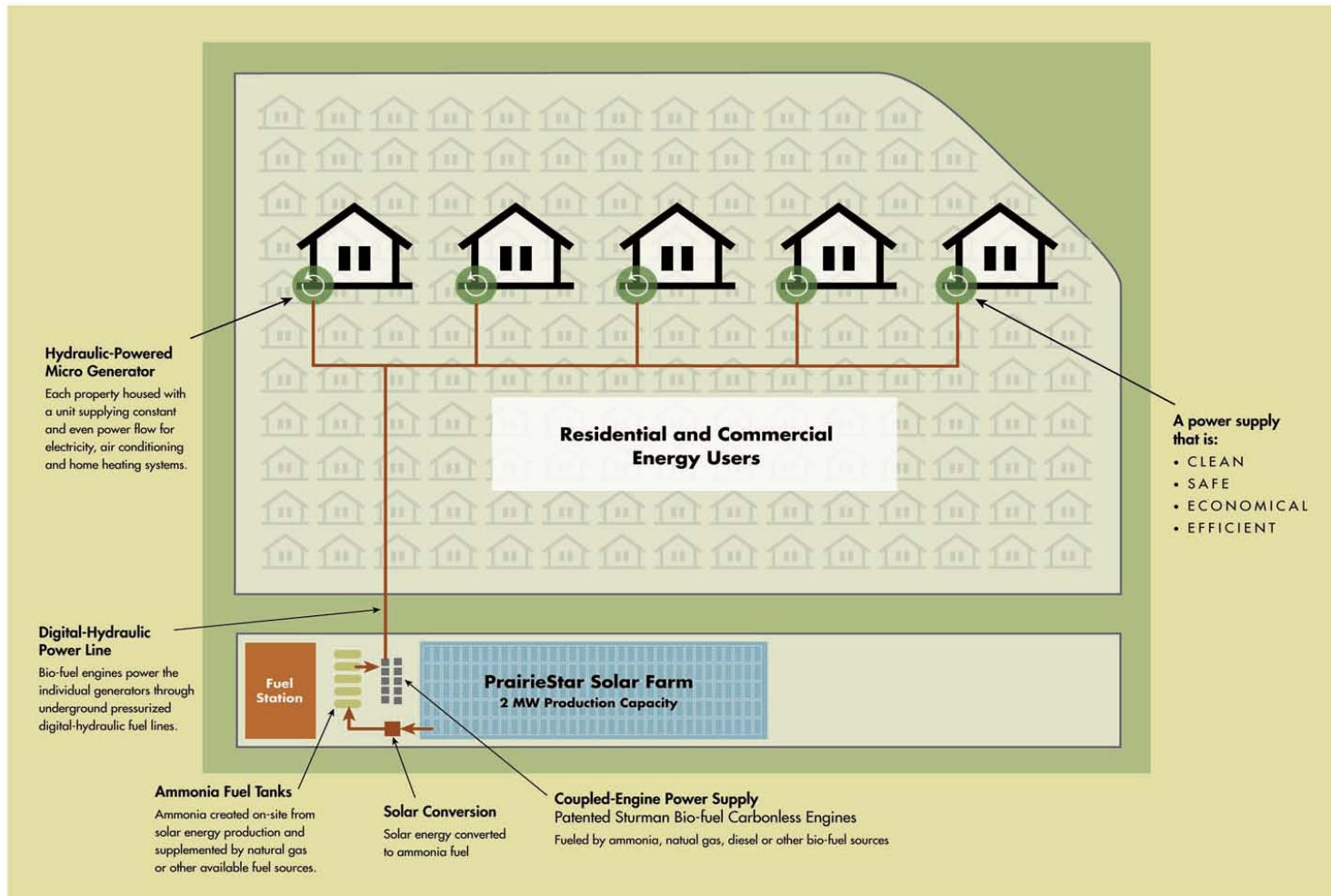
Hydraulic energy to homes



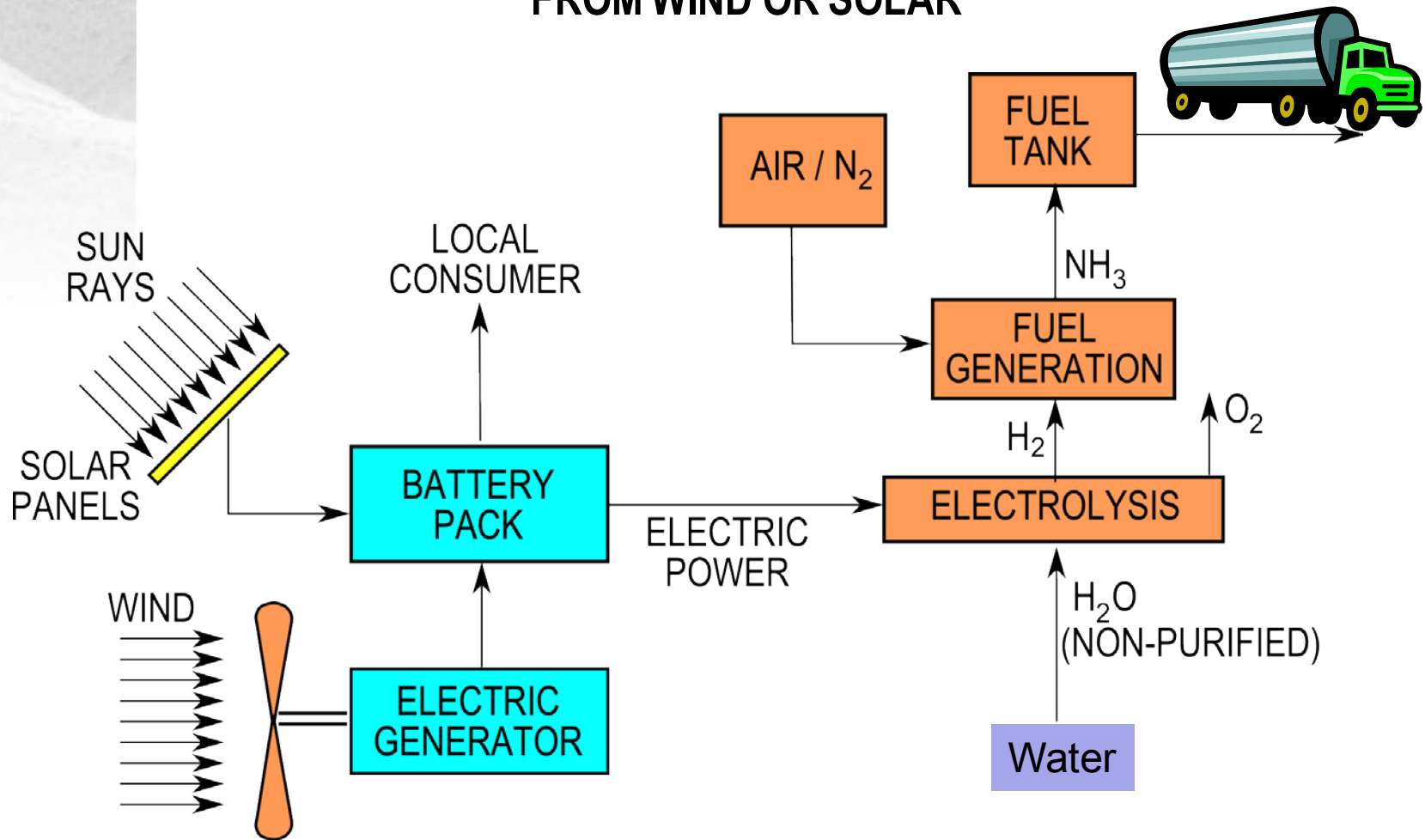


# PrairieStar Off-Grid Carbon-Free Energy Program

## Dual Source Digital-Hydraulic Power System



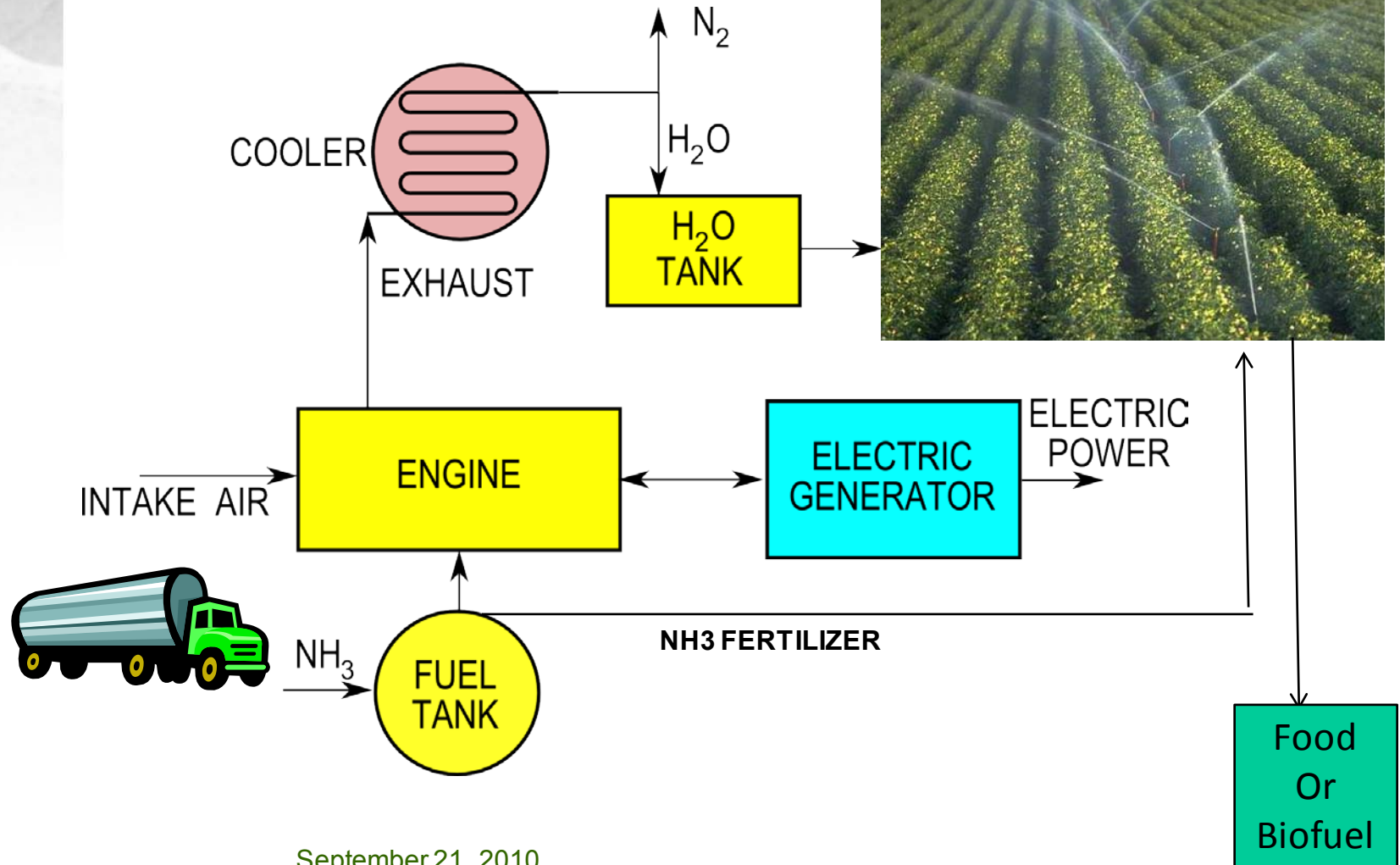
## NH<sub>3</sub> GENERATION / ENERGY STORAGE FROM WIND OR SOLAR



September 21, 2010



## ELECTRIC POWER GENERATION FROM NH<sub>3</sub> (Power User Site)



September 21, 2010



# Destination: SUSTAINABLE RENEWABLE ENERGY

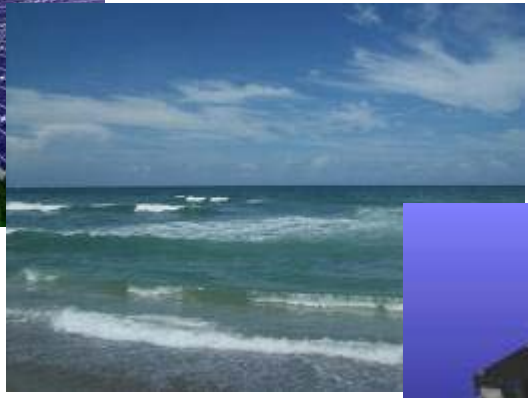
Wind



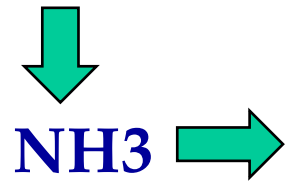
Sun



Waste or Fresh Water



ADPt™





# Energy Solutions NOW



## SAVING:

- MONEY

- NATURAL RESOURCES

- THE ENVIRONMENT

- ❖ And creating new rural energy economy opportunities.



# Thank You!

- For further information, please contact:

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Proprietary

