





NW Natural®

PACIFIC POWER



Seattle City Light

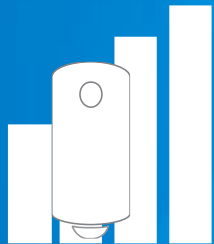




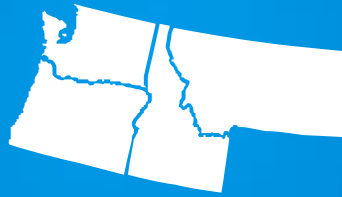
# *What Does NEEA Do?*



**Emerging  
Technologies**



**Market  
Development**



**Regional  
Studies**



**Research &  
Evaluation**



**Codes &  
Standards**

# *Market Transformation*

“The strategic process of intervening in a market to create lasting change.”

# Natural Gas Portfolio Goal

*Accelerate development and market adoption of efficient natural gas products, practices and services...*

## Activities

*5 Market Transformation programs*



Product Innovation Update

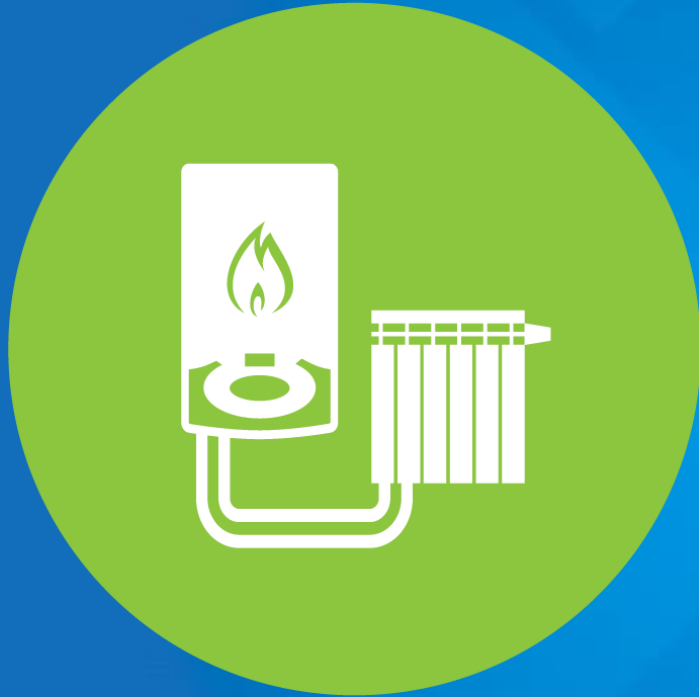


Key Findings



Collaboration Opportunities





***Combination Natural  
Gas Space and  
Water Heating  
Systems  
“Combi”***



# *Why Combi?*

- Minimum efficiency for space is 78% AFUE and water is .65EF
- Heat pump systems are achieving 140% AFUE and 1.3 EF
- Financial benefits:
  - Offset high cost of GHP water heater
  - Great new construction application



# *Why now?*

- Multiple types of heat pump technology on the market or under development
- Natural gas industry ready for new products to compete against efficient electric heat pumps
- Manufacturers open to input and collaboration
- Lots of research, development and testing taking place



# Why me (you)?

- Your awareness and *involvement* will ensure next-generation combi products deliver:



# ***Vision of transformed market***

- Major manufacturers selling cost-effective, high performing combi systems
- Increased awareness and adoption
- Decreased sales of conventional systems
- Combi systems are integrated into energy codes and alternative compliance paths for new construction
- Consumer satisfaction

# Current status



- Conducted two successful field tests
- Commercial products already in market












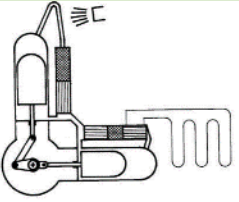



- Major OEM interested in residential product
- Many products in development



- Many products in development
- “Unfamiliar” product concept
- Installation and operation complexities
- Expected high first costs
- Low natural gas prices



# Product comparison

Technology	Space Heating	Water Heating	Space Cooling	Backup Power
				
				
				



# Internal Combustion Engine

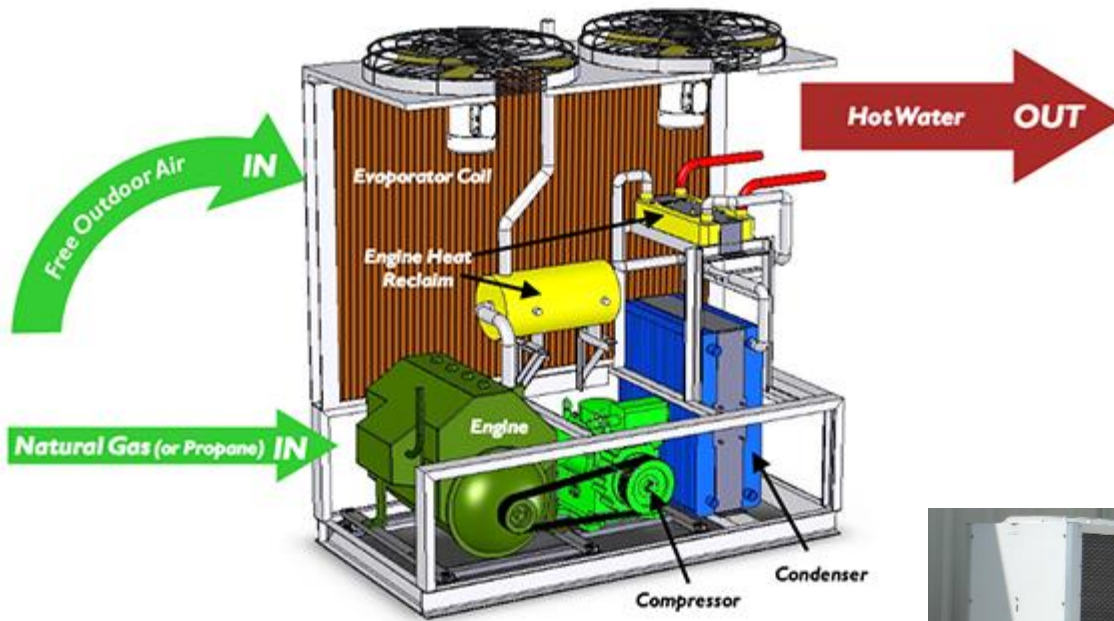


Illustration credit: Tecogen/Ilios



Image credits: Tecogen/Ilios, Mtrigen, IntelliChoice





# *Internal Combustion Engine*



Tecogen – Illios  
Intellichoice  
Mtrigen  
Yanmar



Illios field test – unit performs well, diminished cost effectiveness in NW  
Ongoing manufacturer collaborations to support product advancement



Lab/field test Mtrigen unit  
Collaborate with Intellichoice scaling product to residential size/price targets  
Scan for additional technologies







# *Internal Combustion Engine*

## Ilios Field Test Highlights : PRELIMINARY FINDINGS

- Unit works as advertised – COP ~1.35
- No significant installation or operation barriers
- Unit uses 43% less gas than traditional boilers
- Challenging economics in NW





# Sorption

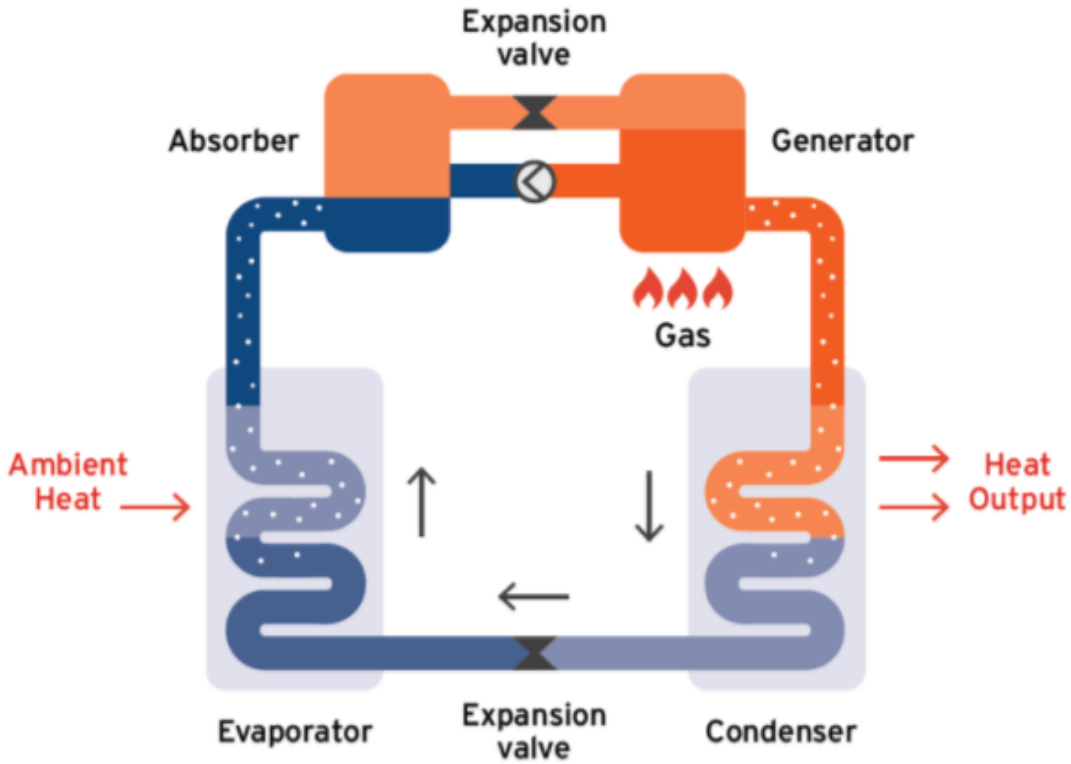


Image credit: Robur





# Sorption



SMTI  
Robur  
SaltX



Successful lab and field tests of SMTI system  
Ongoing collaborations with major OEMs to  
influence product development



Secure major OEM commitment to commercialize  
product  
Perform/analyze lab/field testing of SaltX unit  
Scan for additional technologies





# Sorption

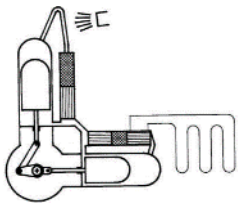
## SMTI Lab/Field Test Highlights: PRELIMINARY FINDINGS

- ~3,000 hours runtime (two field locations)
- Lab testing indicated average AFUE of 140%
- Increased product robustness and reliability
- Ready for advanced field testing and commercialization



Image credit: SMTI

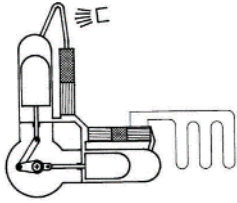




# Stirling "ish"



Image credits: boostHEAT, ThermoLift



# Stirling "ish"



ThermoLift  
BoostHEAT



Ongoing manufacturer collaboration with to  
monitor product development progress



Assess lab testing to validate performance  
Based on above, evaluate further lab and/or field  
testing opportunities  
Scan for additional technologies





# *What you can do*

- Collaborate with us:
  - Join us for field/lab testing
  - Joint market research
  - Market engagement
- Leverage our work
- Work with Gas Technology Institute (GTI) ETP and/or UTD
- What would you like to do?



***Yes, there are one, two  
Three types of combis  
And I love them!***





# *Thank you*

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