A Next Generation Heating Solution
Trends and Opportunities in Residential HVAC Systems

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Williams
Manufacturer of HVAC Equipment Since 1916
400,000 sq. ft. on 16 acres in Colton, CA

Warmolator

Hydronic HVAC Office Building
Investing in a brighter future...

Market Drivers

Competitive Advantage

Product Innovation

Technology
Global Macroeconomic Trends

Opportunity to be disruptive has never been better

1. Technology Trends
   - IoT and related machine learning technologies are setting a new bar in driving intuitive, connected, and easy to use innovations.

2. Prefab World
   - Movement toward prefabrication is here to stay
   - Streamlines labor by reducing on-site work

3. Sustainability
   - Initial movement relied on subsidies and regulations.
   - Emerging opportunities address:
     - Reduced emissions
     - Increased efficiency

4. Health & Wellness
   - IAQ
   - Restful
   - Concentration
   - Productivity
   - Recovery

5. Design for Manufacturing
   - Reduce part count
   - Use Common components
   - Modular assembly
Protecting Human Health | Reducing NO\textsubscript{x}, CO, and Methane Emissions

Critical to attain federal health-based air quality standards
The challenge of replacing an existing furnace

- No electricity
- $400-$500 for electrician
- No ability to condensate
- Cost of added pipes and pumps
- Cost and risk associated with penetrating outside walls.
- Finding a replacement furnace that fits the existing opening and works with the existing venting.
The future is here—

Introducing the Next Generation high performance, high efficiency, affordable, wall furnace heating solution.
Leadership in HVAC | Wall Furnaces

**BENEFITS:**

- No standing pilot
- **Ultra-Low NOx**, CO and methane
- **Increased efficiency** and sustainability
- Ease of retrofit installation and upgrade
- Connected device
- Self adjusting smart device
- Smart thermostat integration
- Contemporary look and feel
Energy Efficiency

New technology enables game changing increase in energy efficiency

37% Improvement!

60% 82%
Old Furnace Next Generation Furnace
Dynamic Response
Modulating input range from 15 - 30K BTU and dual wall 20 - 40K BTU

Adaptive to different Environments

Energy Savings

Superior Comfort

The new furnace adapts to a wide range of spaces
Low NOx and efficiency

- Gas Manifold
- Hot Surface Ignitor
- Circulation Fan
- Combustion Fan
- Mixing Chamber
- Burner Plate
- Combustion Chamber
- Twisted Tube (with Angular Turbulator)
- Vent Pipe
- Draft hood
- Spill Switch

Heat Transfer to the Surrounding

- Limit Switch
- Circulation Fan
- Hot Flue Gases
- Combustion Chamber
- Burner Plate
- Air/Gas Mixture
- Mixing Chamber
- Combustion Fan
- Gas from the Main Pipeline
- Proportional Gas Valve

On-board Power Harvesting

Thermoelectric power generation
- No AC power required
- Heat energy is converted to electrical energy
- Circulation fans to improve efficiency and comfort

Benefits
- No new wiring needed during installation
- Device will continue to heat with power outage
IOT Connected Devices

• **Benefits for customers**
  – Enhanced control - scheduling
  – Remote control
  – Alerts
  – Improved customer support

• **Benefits for gas utilities**
  – Use Data collection
  – Efficiency data
  – Demand response
California Gas Utility Service Area
Current replacement rate would take ~ 85 years to remediate dated technology

Installed Base
3.5 Million Units
Energy Efficiency
Based on multi-generational product roadmap within California climate zones

2,037,559 Million Metric Tons Carbon Dioxide Emissions Savings

4,981,805,868 Billion Miles Driven By Passenger Vehicles

$441,945,000 Million in Annual Savings

*2.1 MM units at 183 therms/unit savings & $.15/therm
*Greenhouse Gas Equivalencies Calculator, EPA- Environmental Protection Agency
Thank you

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