

Potential for an Energy-Efficient Residential Clothes Dryer

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Energy Use

- After the refrigerator, the clothes dryer uses more energy than any other appliance, approximately 800 kWh/yr
 - 6% of total electricity usage
 - 2% of total gas usage
- Energy use doesn't vary much from one model to another



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Test Procedures & Standards

- Uniform Test Method for Measuring the Energy Consumption of Clothes Dryers (1981)
- AHAM HLD-1 (1992) Performance Evaluation Procedure for Household Tumble Type Clothes Dryers Standards
- AHAM HLD-2EC Test Method for Measuring Energy Consumption of Household Tumble Type Clothes Dryers (1975)
- Final Rule – Energy Conservation Program for Consumer Products - Reporting requirements for clothes dryers; August 1997
- Minimum efficiency levels
 - 3.01 kWh for electric dryers
 - 2.67 kWh for gas dryers
- Energy use is not rated by an EnergyGuide Label
- Clothes dryers are not a part of the ENERGY STAR program



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Market

- Two types of clothes dryers:
 - Electric - 6,451,000 shipped in 2005
 - Gas - 1,707,000 shipped in 2005
- Four major manufacturers:
 - Whirlpool, Maytag, GE and Electrolux (Frigidaire)
 - Whirlpool is the market leader and accounts for over half of clothes dryers shipped
- Two of the leading manufacturers have funded the development of an energy efficient dryer



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Improvements in Energy Efficiency

- Incremental Improvements
 - Large promise in sensor and control technologies to reduce over-drying
 - GE Global Research Report to DOE produced a promising advanced control algorithm
- New Technologies
 - Modulating Gas Dryer
 - Heat Pump Dryer
 - Microwave Dryer



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Modulating Gas Dryer

- Pros: Significant dry time savings and fair reductions in energy use
 - TIAX and Whirlpool Product
 - 25% energy reduction for small and medium loads
 - 10-15% energy reduction for large loads
 - 35% time savings
 - Camco Product
 - 30-40% electricity savings (gas consumption remained the same)
 - reduced dry times by 30-40%
- Cons: Technologies are not available in the market
 - Whirlpool and Camco did not provide cost figures or indication of when their products will be available in the market



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Heat pump Dryer

- Pros: Significant energy savings, up to 60%
 - TIAX and Whirlpool Product
 - 30-50% energy savings
- Cons: Long dry times and expensive due to numerous components
 - TIAX and Whirlpool
 - Similar or faster dry time than market best
 - No cost information available
 - Final configurations and detailed design decisions transferred to Whirlpool in April 2003 and product is not in the market



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Microwave Dryer

- Pros:
 - Use 17-25% less energy
 - Dry clothes 25% faster than conventional electric dryer
- Cons:
 - Cost \$30 to \$395 more than conventional models
 - Technical issues need to be resolved before they are available on the market



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Market Barriers

- Technology Related
 - High cost or lack of cost information
 - Long dry times
 - Lack of availability in the market
- Test Procedures & Standards
 - Minimum efficiency standards have three major issues that may reduce accuracy of test results
 - There is no product class for condenser dryers



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Test Procedure Concerns

1. No distinction between types of sensor systems used
2. Only two drum sizes are considered:
 - Standard (greater than 4.4 ft³)
 - Compact (less than 4.4 ft³)
3. The starting moisture content requirement is between 66.5 and 73.5%



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Potential Next Steps

- Perform round-robin testing
- Investigate same test cloth issues as for clothes washer rulemaking
- Update of clothes dryer test procedure
 - Timeline for appliance federal standards revisions for clothes dryers
 - Rule initiation date is first quarter of fiscal year 2008
 - Final action date is June 2011
- Discuss an ENERGY STAR specification



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CEE Process for updating test procedures

- Talk to AHAM about updating test procedure
- Industry consensus



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