

Development of a simulation model predicting efficiency gains for residential appliances utilizing thermal integration

PI: Eckhard A. Groll

Objective:

- Model predicting household appliances operation to achieve efficiency gains from thermal integration

Problem

- 24% of residential primary energy use from hot water, refrigeration and cleaning

Expected Results / Impact:

- Development of home thermal energy management system
- Improve the refrigerator-freezer performance by 30% from heat rejection to water instead of air
- Reduce hot water energy consumption by 20% through heat recovery

Approach:

- Develop simulation model for each major appliance
- Validate model against manufacturer experimental data
- Combine individual models to identify an optimal appliance network

Schedule

- Eight months of appliance model development
- Three months embedded in model development for validation
- Two months for an optimal, integrated design

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