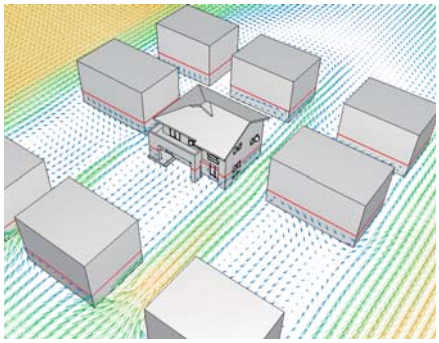
Evaluating Ventilation Effect on a House

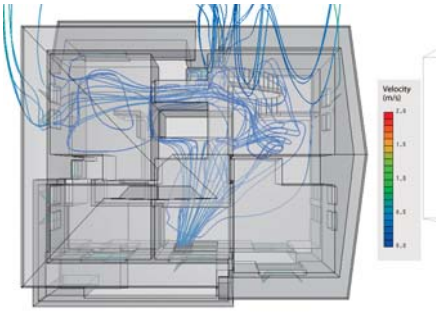
Evaluating how natural ventilation inside a house can lower energy use scSTREAM is used to examine the energy savings potential of a natural home ventilation

3D Analysis of Natural Ventilation Effect

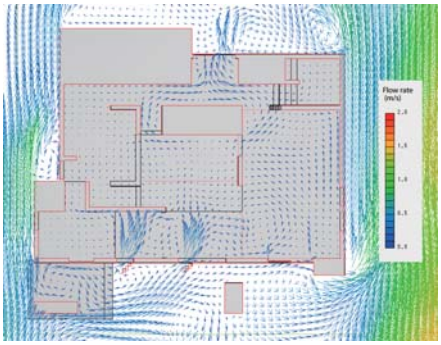
Identifies influence of surrounding buildings



Visualizes streamlines of air through windows



Creates vector flow diagram of airflow on each floor of the house



Setting Conditions

Outdoor Air (m/s):	Wind Velocity 3m/s (reference height 74.5m)
Outdoor Temperature (°C):	Updated every hour based on weather statistics
Internal Heat Generation:	Based on the volumetric heat generation model fromthe Architectural Institute of Japan

Calculation Conditions

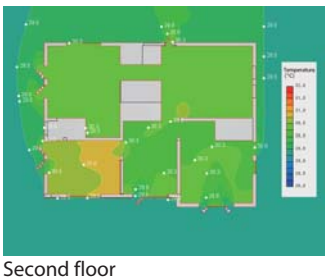
Number of Mesh Elements:	5,553,060 (multi-block meshes)
Calculation Time:	300 cycles in 4 hours 15 minutes (2 cores) for steady-state analysis (fluid flow and heat)5040 cycles in 9 hours 30 mins (2 cores) for transient analysis (heat only)

Estimate of Internal Heat Generation and Ventilation Effects over 24 Hour Period

Evaluation of the contribution of natural ventilation to the reduction in hourly thermal load is performed using scSTREAM.

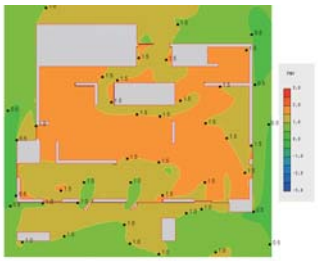
Indoor temperature distribution at 21:00

First floor

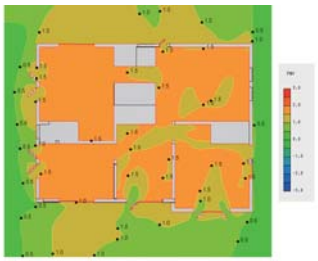


Second floor

PMV* index distribution at 21:00



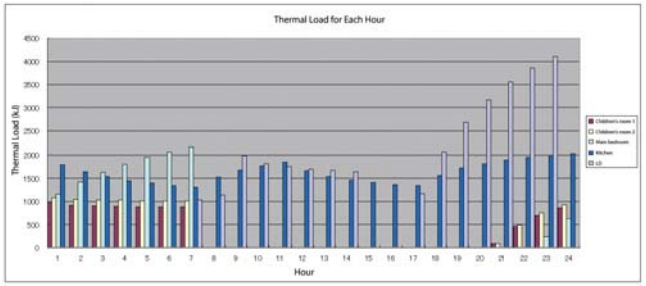
First floor



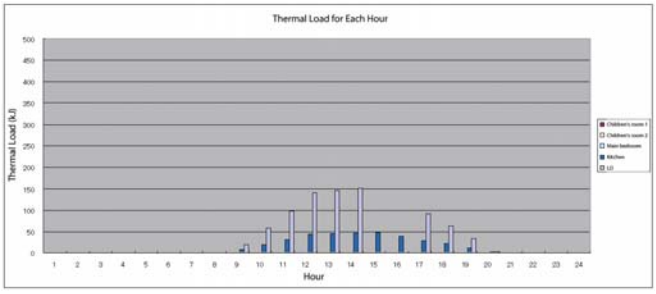
Second floor

* PMV = Predicted Mean Vote

Cooling load for each room (no ventilation)



Cooling load for each room (ventilation active)



* Based on the air-conditioning setting for indoor temperature of 27°C

Notes

scSTREAM enables engineers to perform complex home thermal load calculations over extended periods of time and visualize the invisible airflow that is difficult to observe in actual tests. The simulation accounts for changes in environmental conditions, internal heat generation, and natural ventilation.