

A residential building is shown under renovation. The roof is partially covered with wooden shingles, and workers are visible on the roof. The building is surrounded by scaffolding and safety netting in green and orange. The background shows other houses and a cloudy sky.

NEW TRENDS IN VENTILATION SYSTEMS AND THE IMPACT ON IAQ, ENERGY PERFORMANCE AND THE INSTALLATION FITTER

TNO innovation
for life

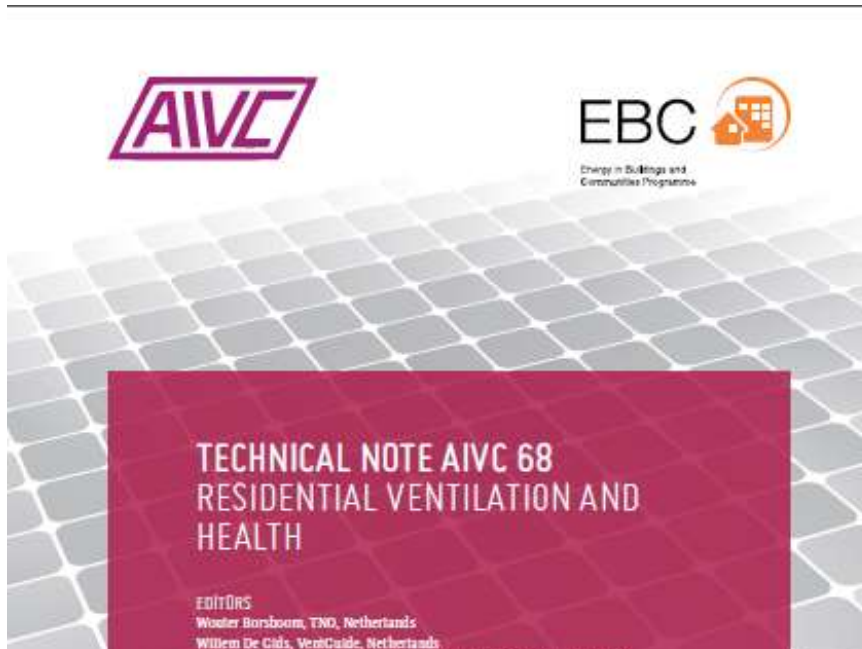
Wouter Borsboom

NEWCOM

New qualification schemes
to build high quality

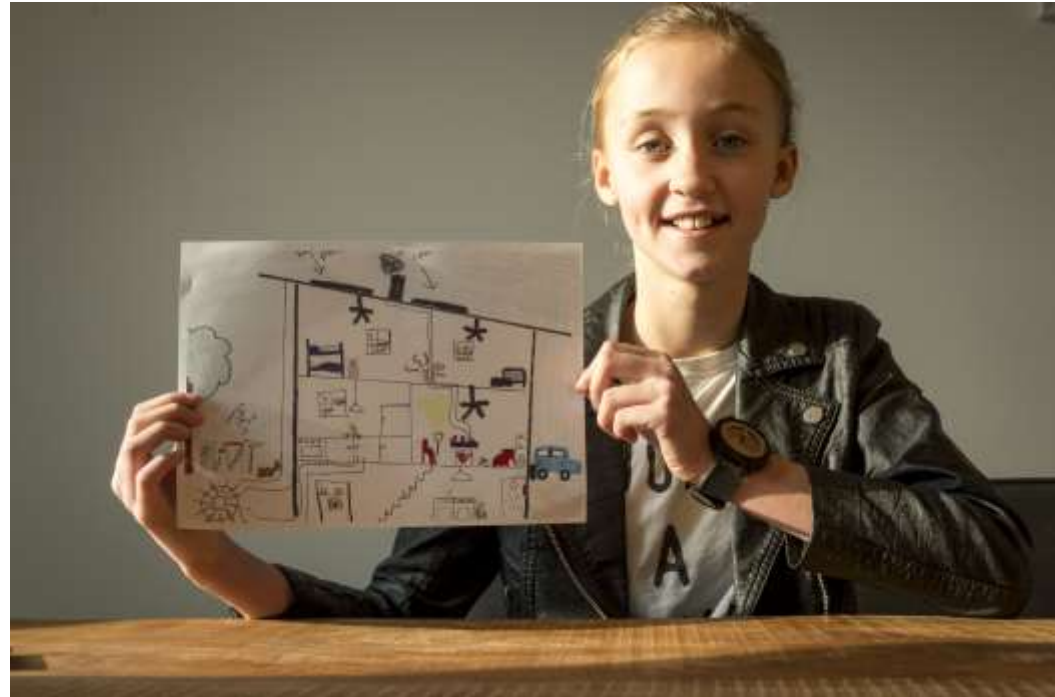
WOUTER BORSBOOM, TNO

Business consultant, energy built environment.



WHAT SHOULD A HEALTHY ENERGY EFFICIENT DWELLING OFFER?

- › A dwelling with sufficient ventilation
- › A cool house in the summer
- › A dwelling with less exposure to contaminants

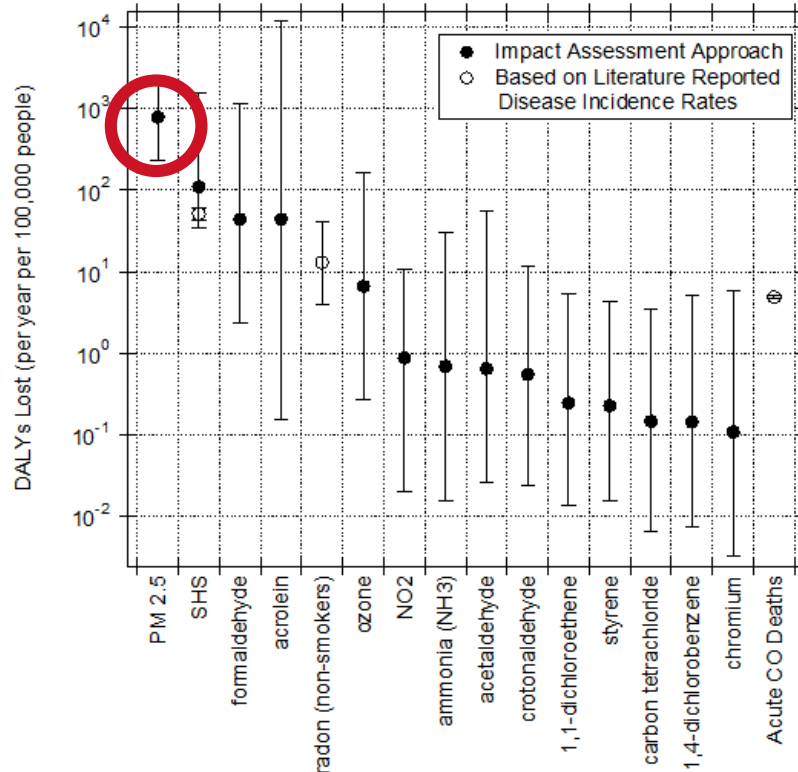


PRIORITIZING POLLUTANTS: ADVERSE HEALTH EFFECT

Priority Pollutants for Chronic Exposure	Potential Acute Exposure Concerns
Acetaldehyde	Acrolein
Acrolein	Chloroform
Benzene	Carbon Monoxide
Butadiene, 1,3-	Formaldehyde
Dichlorobenzene, 1,4-	NO ₂
Formaldehyde	PM _{2.5}
Naphthalene	
NO ₂	
PM _{2.5}	

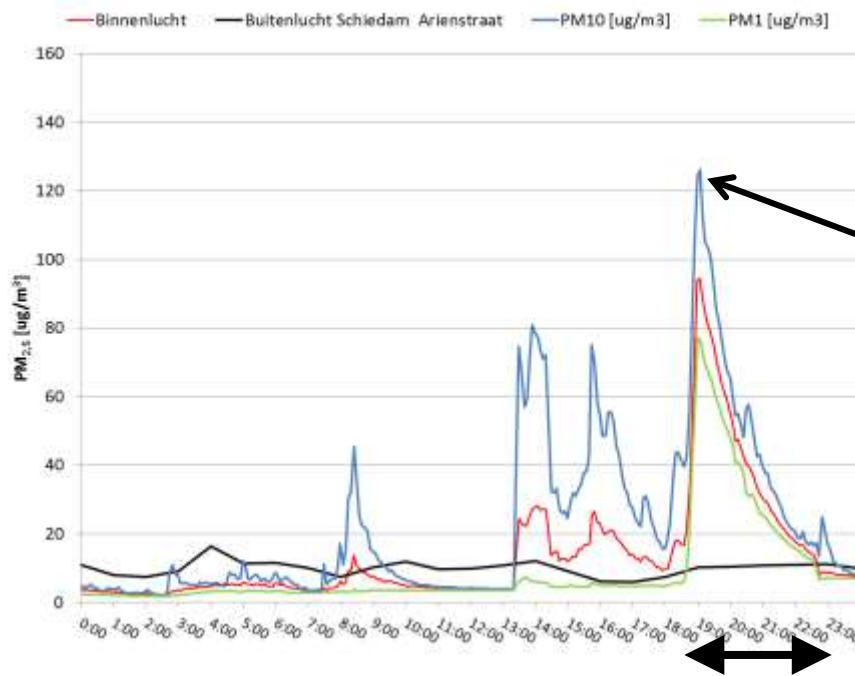


15 POLLUTANTS WITH HIGHEST HEALTH AFFECT



- PM 2,5 10 times more effect as SHS
- Same order as traffic accidents
- Cooking can be an important source

AIRTIGHT DWELLING: OPEN KITCHEN / LIVING ROOM



4 hours !

Too high concentration
ineffective ventilation

PROBLEMS IN VENTILATION PERFORMANCE: IT FAILS DUE TO EXECUTION & DESIGN



A FIRST STEP IS TO SET REQUIREMENTS, SECOND TOUGH STEP IS REALIZING IT.....

80% dwellings in NL flow rates fails

100% performance check is necessaire



HOW TO IMPROVE?

- › Better design
- › Better execution
- › Inspection
- › Education & Training

Performance contracting can be a driver

PERFORMANCE CONTRACTING FOR ENERGY AND INDOOR AIR QUALITY

What is Performance Contracting?



Schools and governments want to conserve water/energy and hire Performance Contractor



Performance Contractor does energy/water audit and guarantees financial savings after upgrades



School or government gets a loan from the bank to do energy/water upgrades



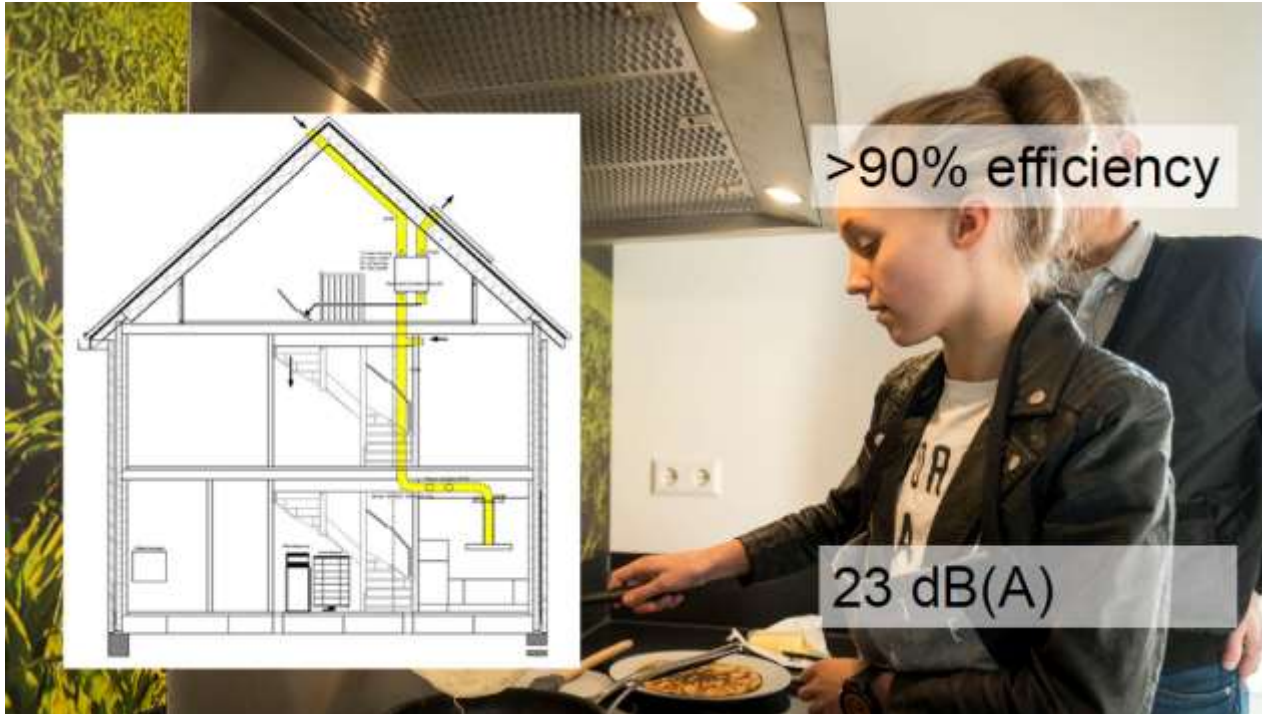
Performance contractor does energy/water upgrades. Money saved from upgrades pays for loan*



Schools and governments
Save energy
Save water
Save Money!



INNOVATIVE DESIGN: VENTILATION SYSTEM INCLUDING RANGEHOOD



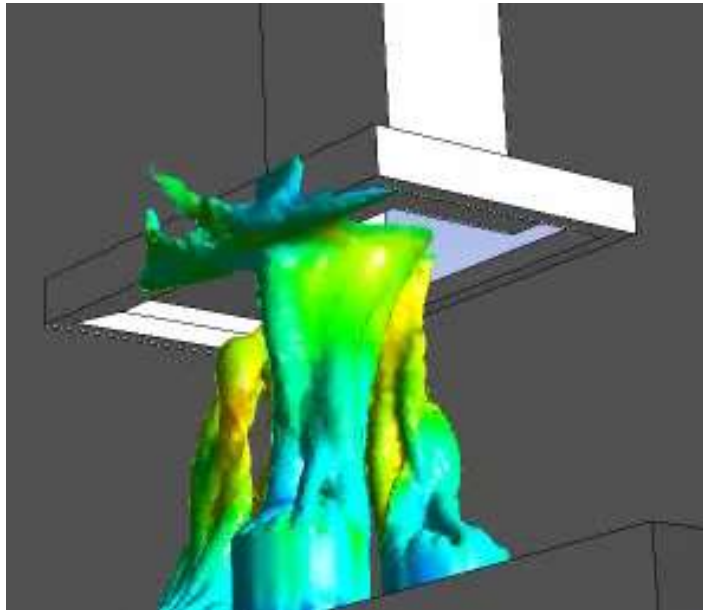
EFFECT OF FLOW ON CAPTURE EFFICIENCY

ATAG
we love to cook

bribuskeukens

KOPPEN
bouwexperts

TNO



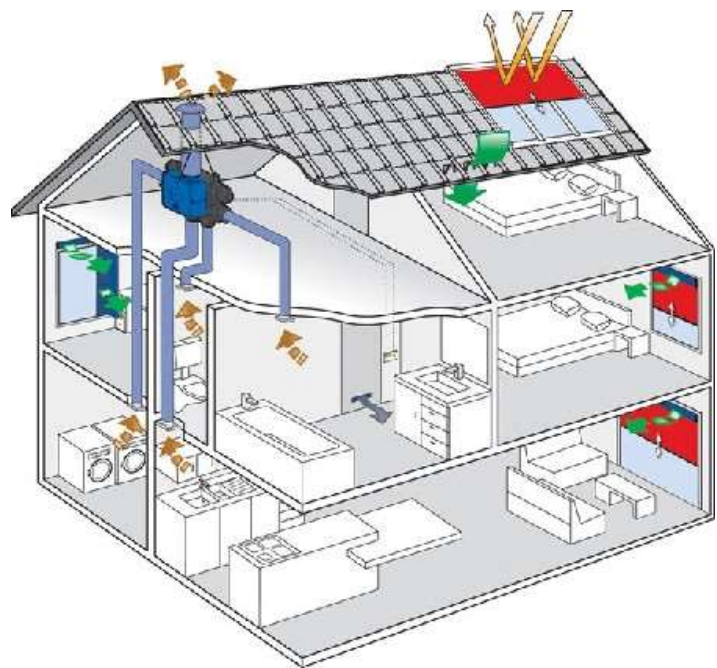
Extract ventilation kitchen 75 m³/h

Simulaties: Andreas Mack, TNO

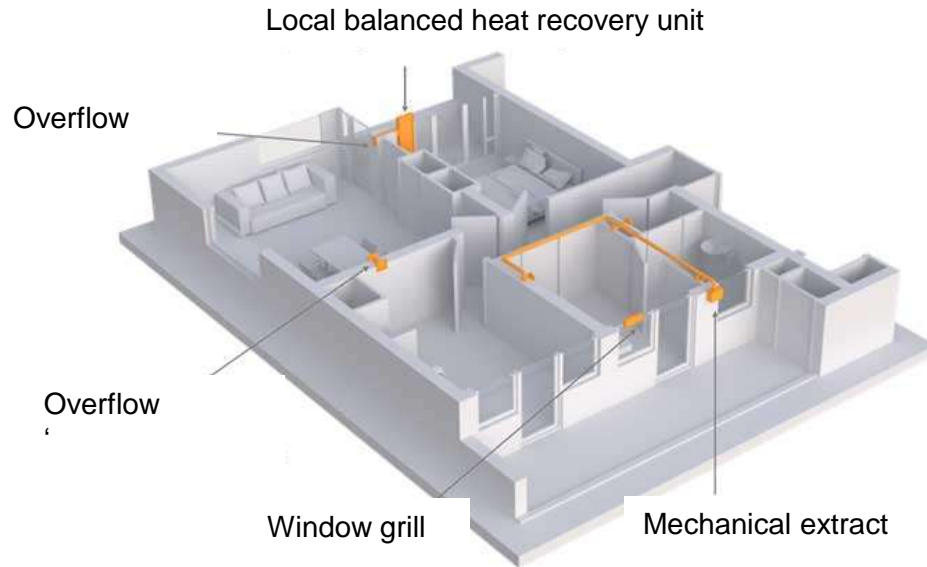


4 times 300 m³/h

INNOVATIVE DESIGN: DEMAND CONTROL WITH MECHANICAL EXTRACT AND NATURAL SUPPLY



INNOVATIVE DESIGN: LOCAL HEAT RECOVERY IN LIVING, NATURAL SUPPLY AND MECHANICAL EXTRACT BEDROOMS



INNOVATIVE DESIGN: HEAT RECOVERY BALANCED VENTILATION WITH MIXING FANS





KEY POINT FOR PERFORMANCE CONTRACTING: TRAINING INSTALLATION FITTER



EU PROJECT NEWCOM: DEVELOPING EUROPEAN TRAINING SCHEMES

- › Training ventilation fitters for Nearly Zero Energy Buildings and performance contracting (NZEB)
- › Ventilation fitters will be qualified to ensure the energy standard qualities.
- › Status: Specifying the needed skills and knowledge for fitters

NEWCOM

New qualification schemes
to build high quality



An aerial photograph of a residential construction site. In the foreground, a house is under construction, with its roof partially covered in dark solar panels. Several workers in blue and orange safety gear are visible on the roof. The house is surrounded by green safety netting and orange scaffolding. In the background, other houses with brown roofs are visible under a cloudy sky.

THANKS FOR YOUR ATTENTION

Contact:
Wouter Borsboom
wouter.borsboom@tno.nl

TNO innovation
for life