



Mid-IR Gas Chemical Sensing in the Home Appliance Industry

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EPIC Online Technology Meeting on Photonic Integrated Circuits for Sensing Applications

Who we are



Electrolux is a leading global appliance company that has shaped living for the better for more than 100 years. We reinvent taste, care and wellbeing experiences for millions of people, always striving to be at the forefront of sustainability in society through our solutions and operations. Our main strategic drivers are to act sustainably, create better experiences and always improve!

119
billion SEK in sales

120
markets reached

60
million products
sold annually

49,000
employees



Addressing drivers and trends

DRIVERS

New economies



Life at home



Human-scaled urban design



Climate change



Constrained resources



Breakthrough technologies



TRENDS

The smart home



Professional consumers



Eco for the masses



New Hygiene practices



Reduction in incomes



On-line shopping

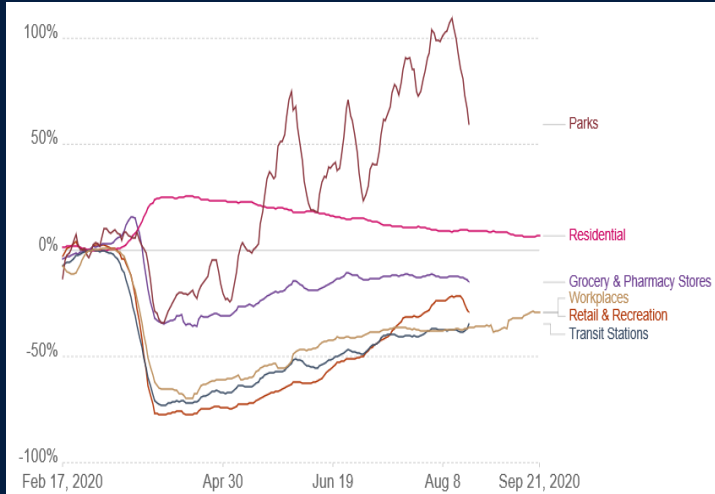


Hyper-personalization





Indoor life

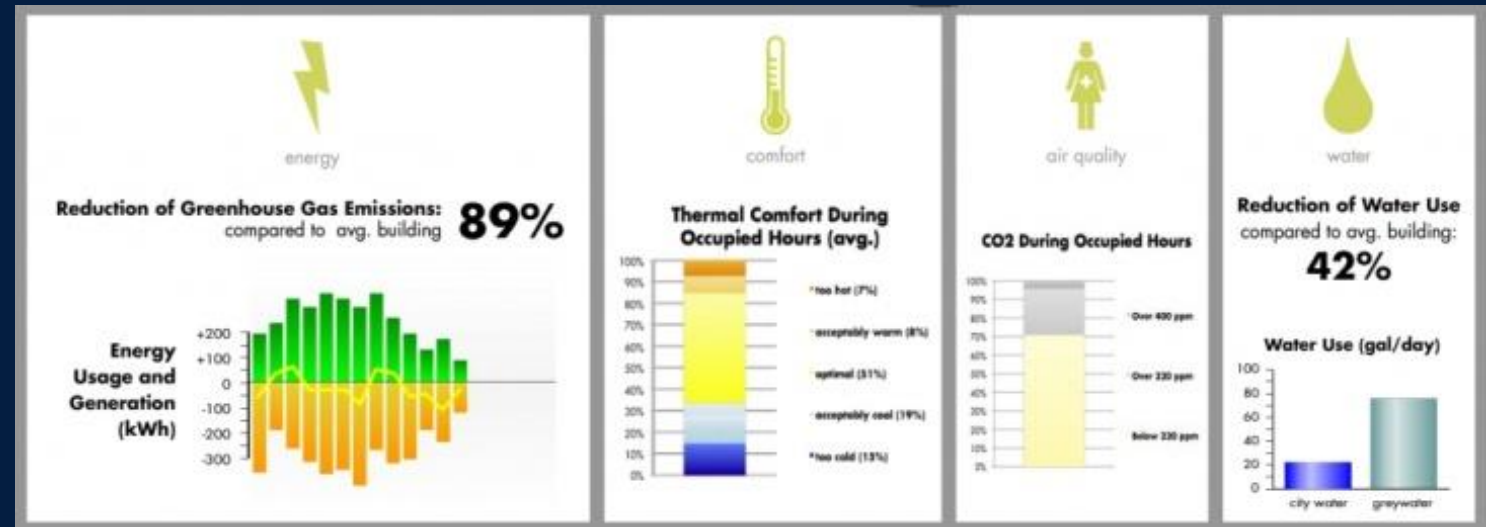


Google Mobility trends up to Sep the 25th

- Pandemic increased the time spent at home (UK, +10%)
- Indoor well-being is determined by indoor environmental quality which in turn encompasses several aspects, like sound, lighting, odor, thermal comfort
- Air quality at home is as important as other parameters of interest such as energy usage and generation, heating equipment performances and water usage



Indoor environment





Air quality sensing requirements

- Applications of gas sensors indoor are in **safety** (early fire detection, poisonous gases), **health and well being** (CO₂ monitoring, sick building syndrome), **efficiency** (reduced air circulation for reduced noise)
- **Requirements for gas sensing indoor**
 - **Sensitivity-Selectivity-Stability:**
 - sensitivity from ppb
 - enabling to classify hazardous vs odorants
 - reliability over the time (no drifts)
 - **Fast response and recovery**
 - **Lifetime and maintenance**

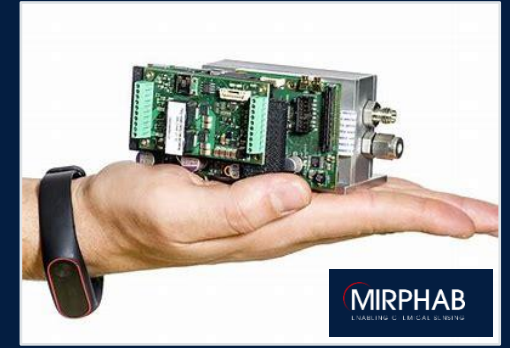
Compound		Concentration Limit	
Carbon Dioxide	CO ₂	3500	Ppm
Carbon Monoxide	CO	11	ppm (8 h)
		25	ppm (1 h)
Nitrogen Dioxide	NO ₂	0.05	Ppm
		0.25	ppm (1 h)
Particulate		40	µg/m ³ (8 h)
		100	µg/m ³ (1 h)
Sulphur Dioxide	SO ₂	0.019	Ppm
VOC ^a		1 - 5	mg/m ³
Acrolein	C ₃ H ₄ O	0.02	Ppm
Acetaldehyde	C ₂ H ₄ O	5.0	Ppm
Formaldehyde	CH ₂ O	0.1	Ppm

^a: Limits for VOCs are usually presented per individual compound. The presented value for VOCs concentration limit is a suggested target from Health Canada (Health Canada, 2007) while limits for C₃H₄O, C₂H₄O, and CH₂O are from ASHRAE (2009).

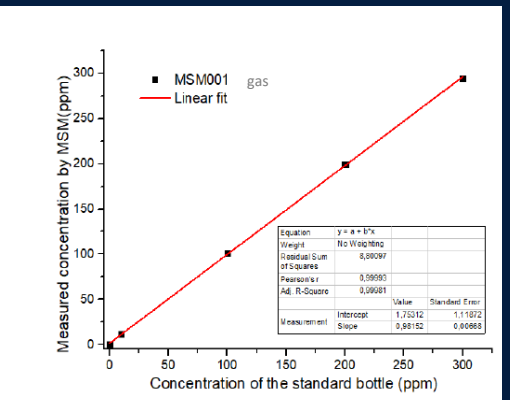
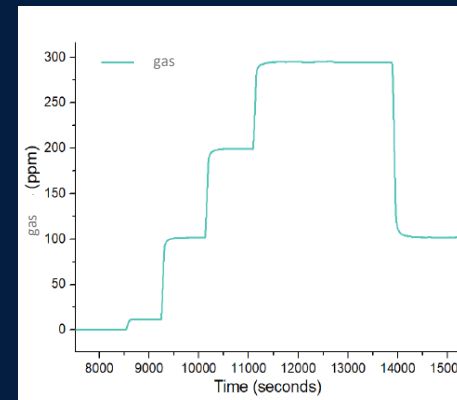


MIRPHAB

- Electrolux entered the MIRPHAB consortium in 2019 as end-user
- Specifications together with interferences analysis and Mid-IR spectrum of the target gas mixture
- The Mid-IR module will be characterized at our labs in operational conditions of interest for the final application
- Mid-IR technology miniaturization roadmap could enable large-scale low-cost devices in the near future



MIRPHAB @Electrolux Innovation Factory





Electrolux