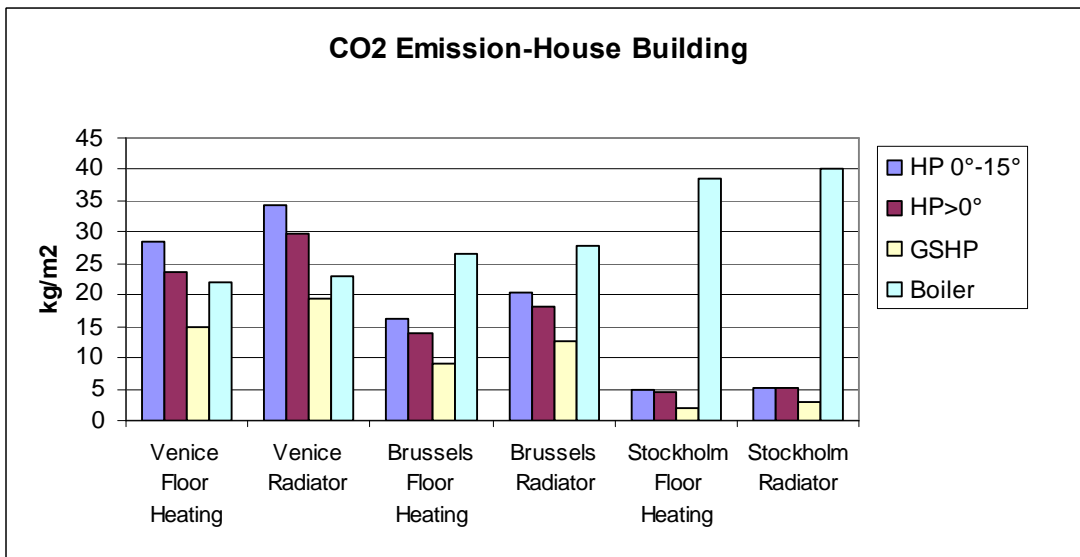
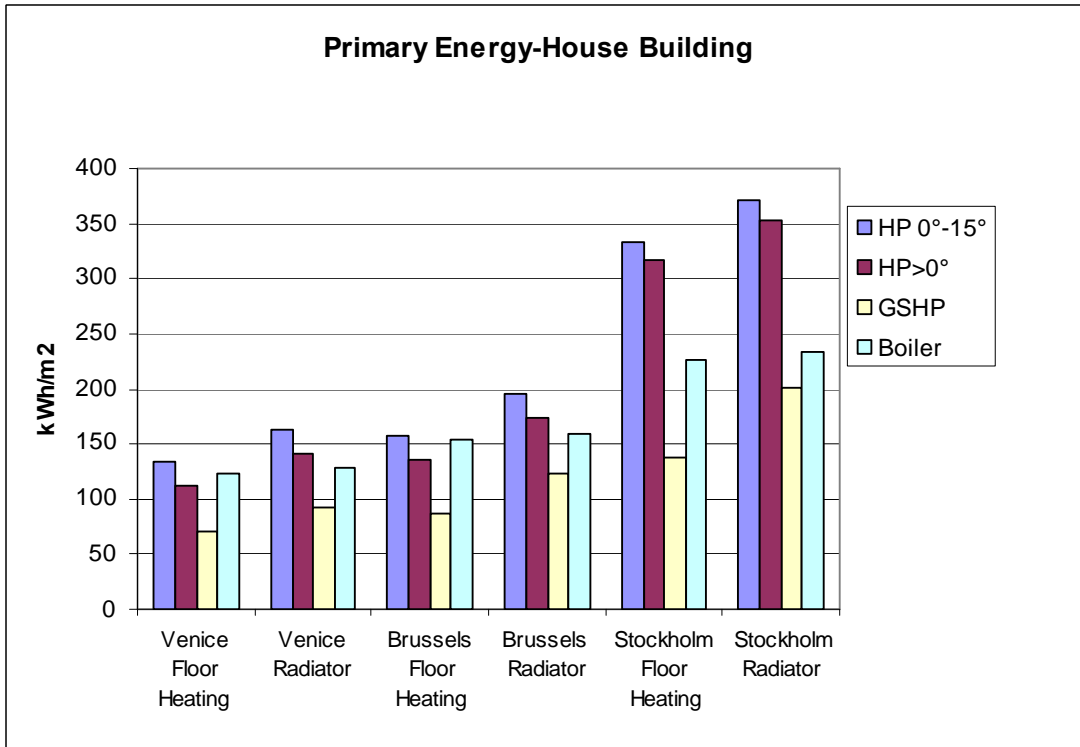


Project EN-eu-ray2005, confidential extract

Comparing part concerning energy performance



Calculation part, system performance for members use

Numerical methods for determining heating and cooling output

Simplified

Detailed

Simplified

Simplified

• EN 1264 → $\prod a_i^b$

• Finite Element Method (FEM) and Finite Difference Method (FDM)

• Resistance Method (Koschenz and Lemann)

• Nordtest (for wood floor systems)

Entry sheet

n calculated values
n values from tables

pipes distance T	0.225	m
thickness s_u	0.02	m
conductivity λ_E	1.2	W/(m K)
resistance $R_{\lambda,B}$	0.15	(m² K)/W
diameter d_i	0.013	m
thickness of pipe	0.002	m
diameter d_a	0.015	m
covering pipe layer thickness	0.003	m
diameter d_M	0.018	m
conductivity λ_R	0.2	W/(m K)
conductivity λ_M	0.08	W/(m K)
θ_V	40	°C
θ_R	35	°C
θ_i	20	°C

n calculated values from function
n input cells

B	5.0	
a_B	0.491	factor for the covering material
a_T	1.134	pipes distance factor
a_U	1.0260	covering factor
a_D	1.033	external diametere factor
$\prod a_i^b$	0.40	
$\Delta\theta_H$	17.4	°C
correction	1.0	
q	35.1	W/m²