ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

Combination of Dynamic Material Flow and LCA to assess ZEN

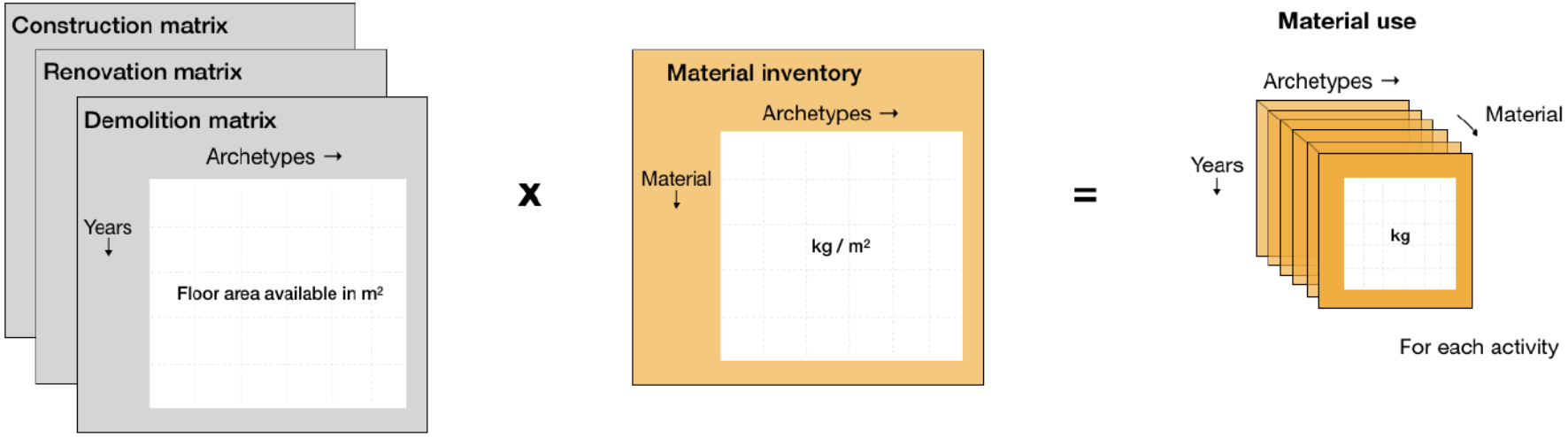
Lausselet C. [1,*], Forero Urrego J.P[1], Brattebø H. [1]

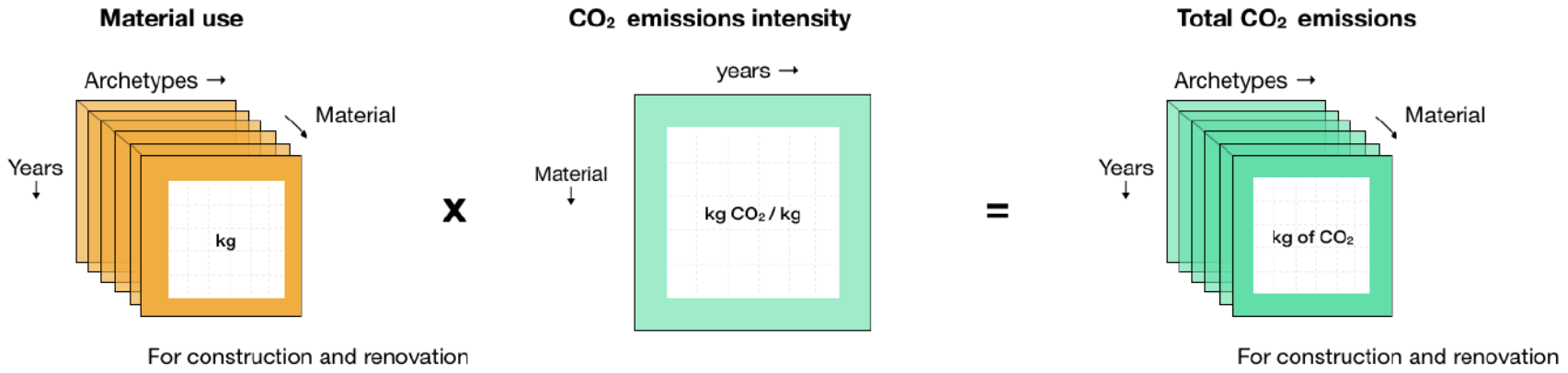
[1]Norwegian University of Science and Technology, NTNU, Trondheim, Norway

*carine.lausselet@ntnu.no

ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

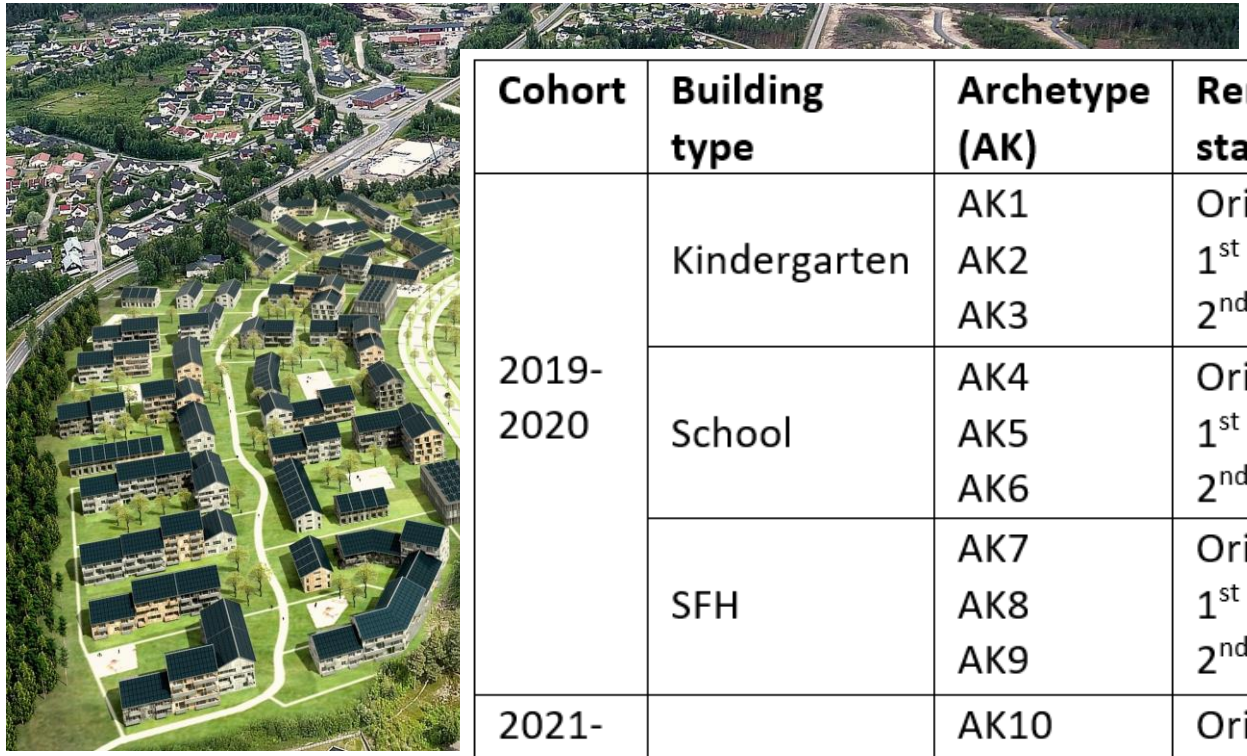
Method





ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

Case study – Ydalir, Norway

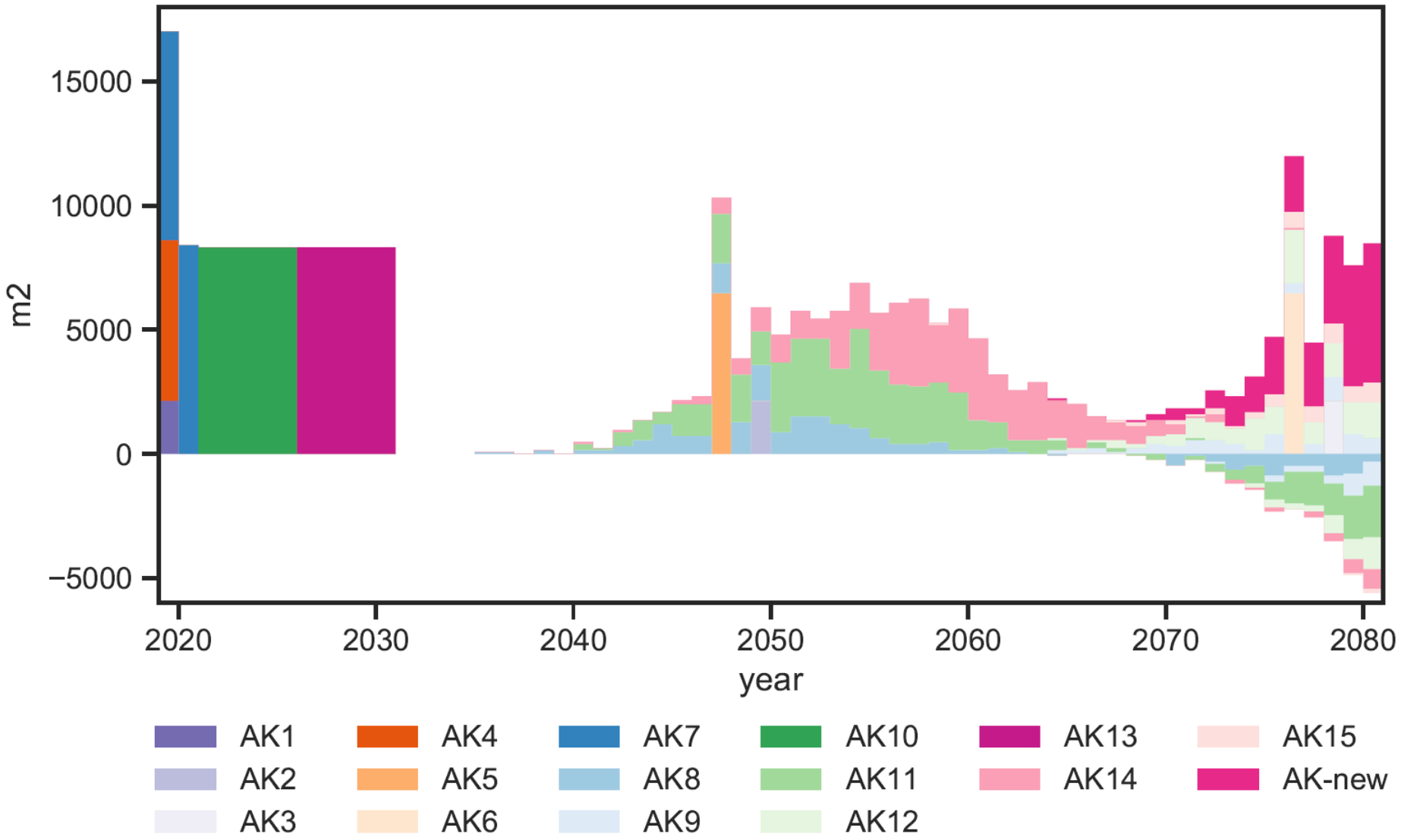


Illustrated by Asplan Viak

Cohort	Building type	Archetype (AK)	Renovation state	Activity	Probability distribution function
2019-2020	Kindergarten	AK1	Original	Construction	Not demolished
		AK2	1st renovation	Renovation	N ~ (30,2)
		AK3	2nd renovation	Renovation	N ~ (30,2)
	School	AK4	Original	Construction	Not demolished
		AK5	1st renovation	Renovation	N ~ (30,2)
		AK6	2nd renovation	Renovation	N ~ (30,2)
	SFH	AK7	Original	Construction	N ~ (60,5)
		AK8	1st renovation	Renovation	N ~ (30,5)
		AK9	2nd renovation	Renovation	N ~ (30,5)
2021-2025	SFH	AK10	Original	Construction	N ~ (60,5)
		AK11	1st renovation	Renovation	N ~ (30,5)
		AK12	2nd renovation	Renovation	N ~ (30,5)
2026-2030	SFH	AK13	Original	Construction	N ~ (60,5)
		AK14	1st renovation	Renovation	N ~ (30,5)
		AK15	2nd renovation	Renovation	N ~ (30,5)

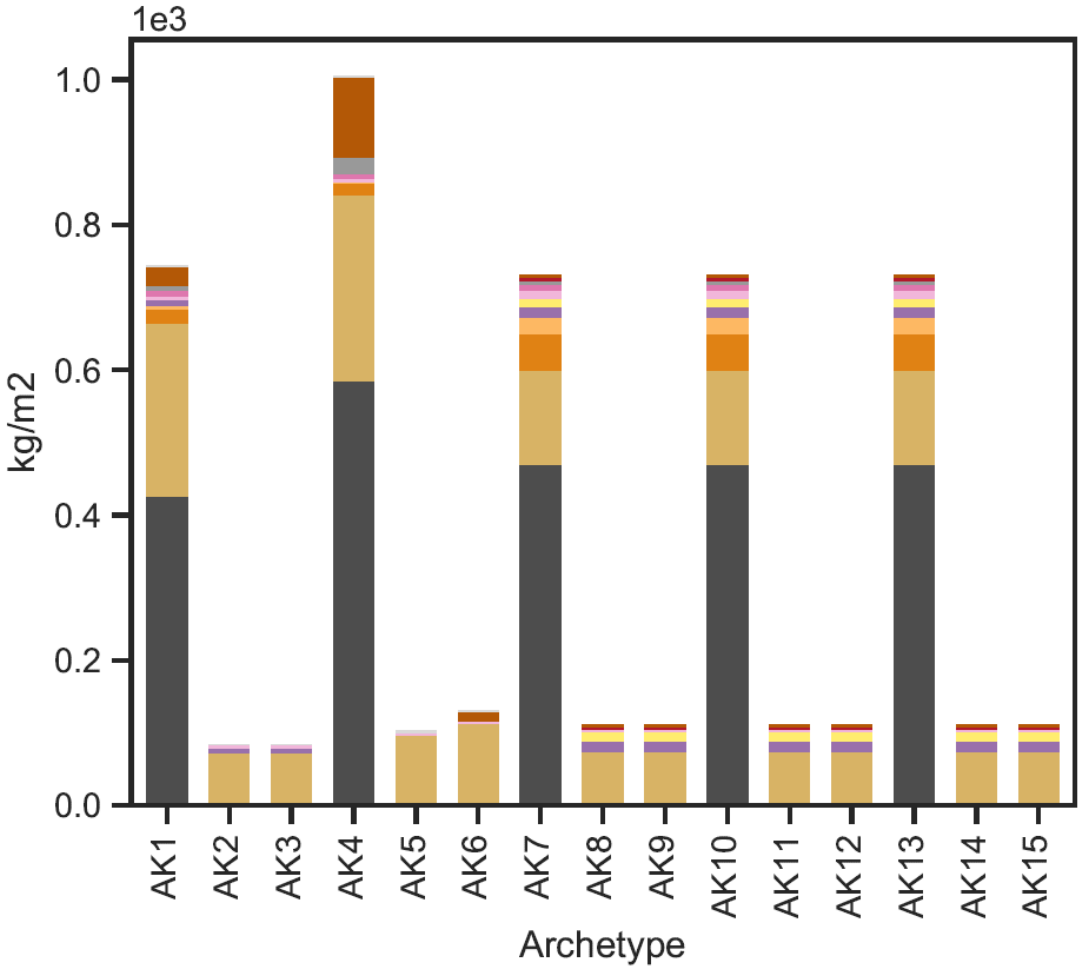
ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

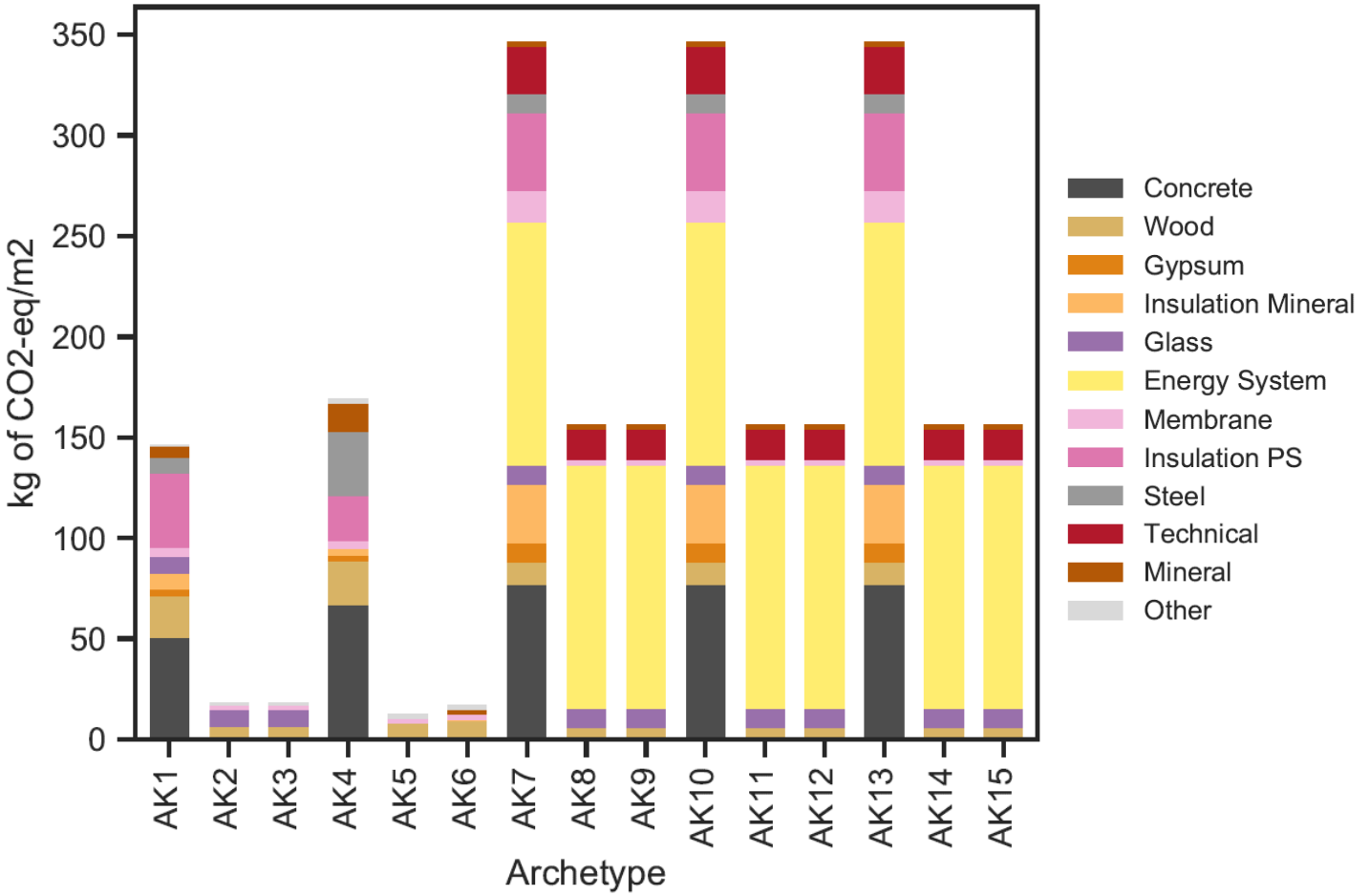
Results



ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

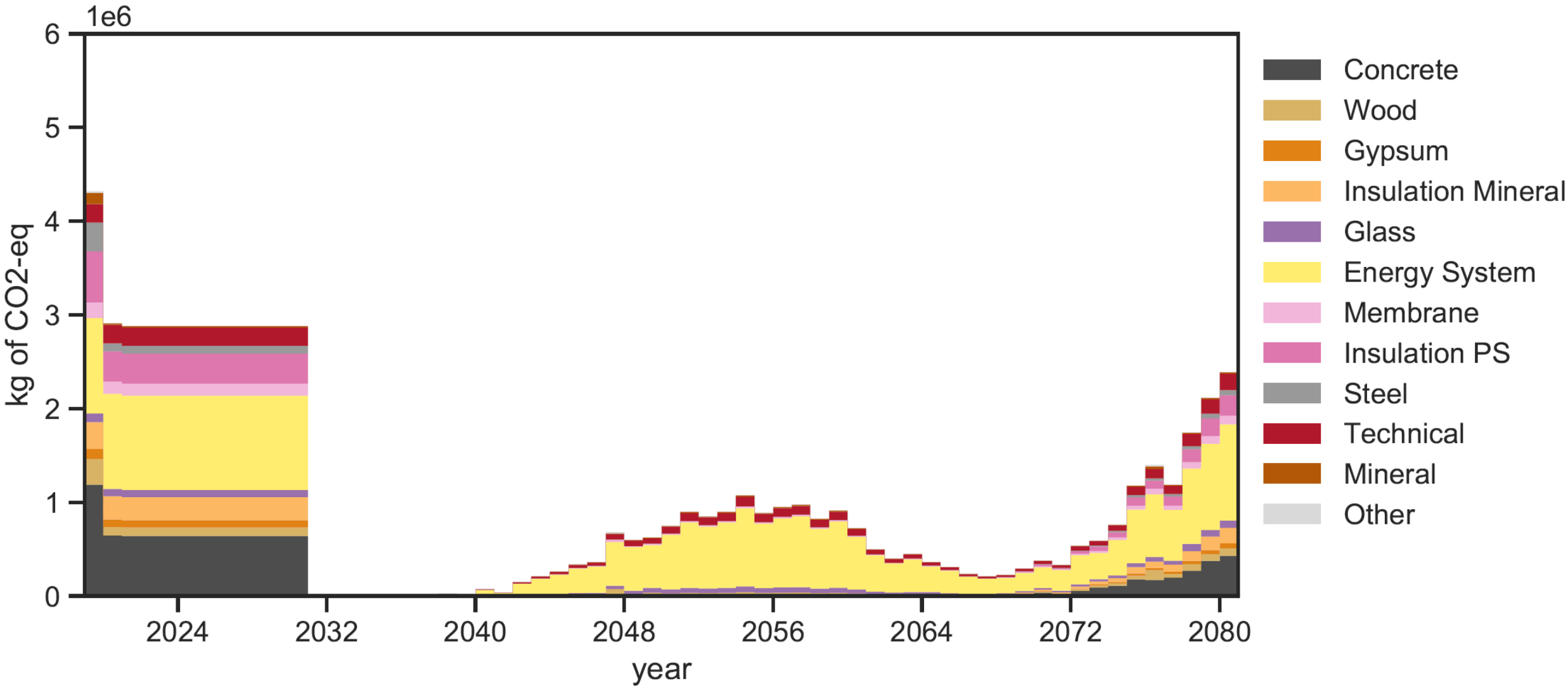
Results





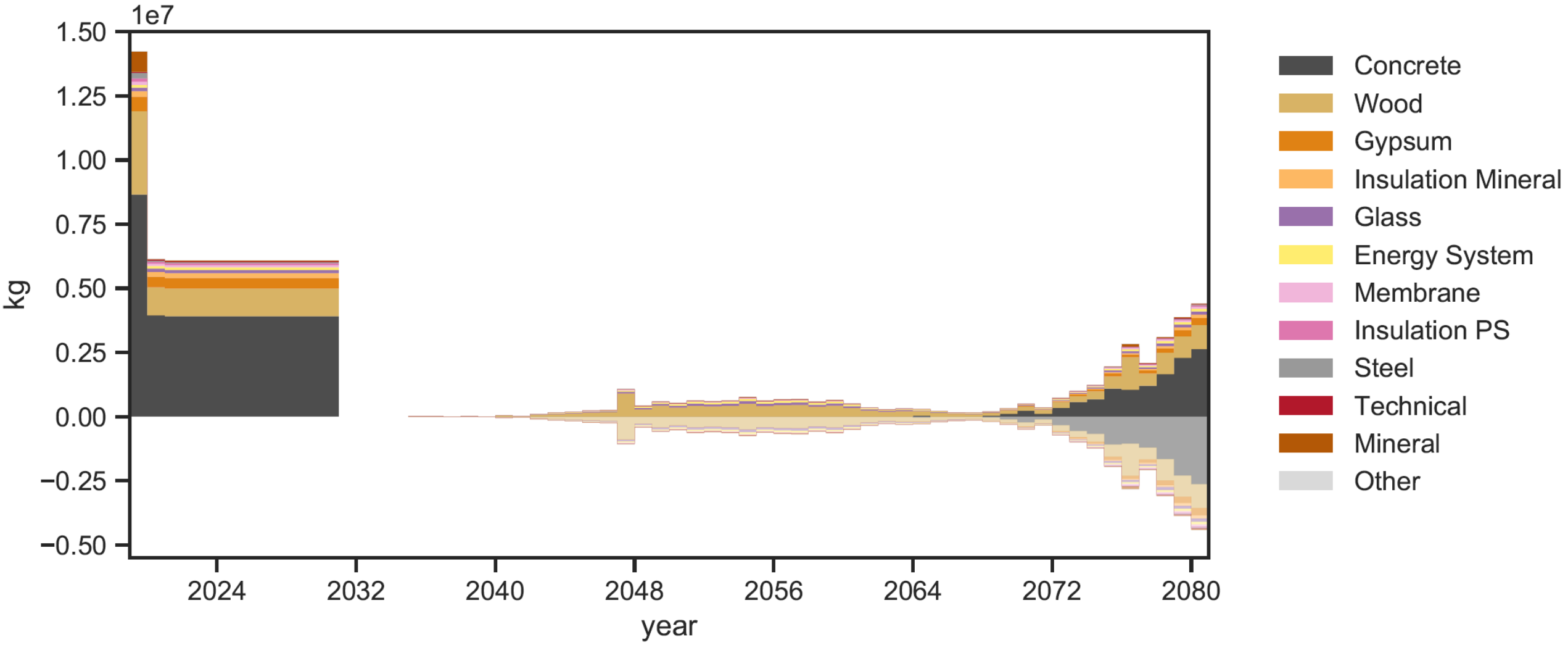
ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

Material storyline

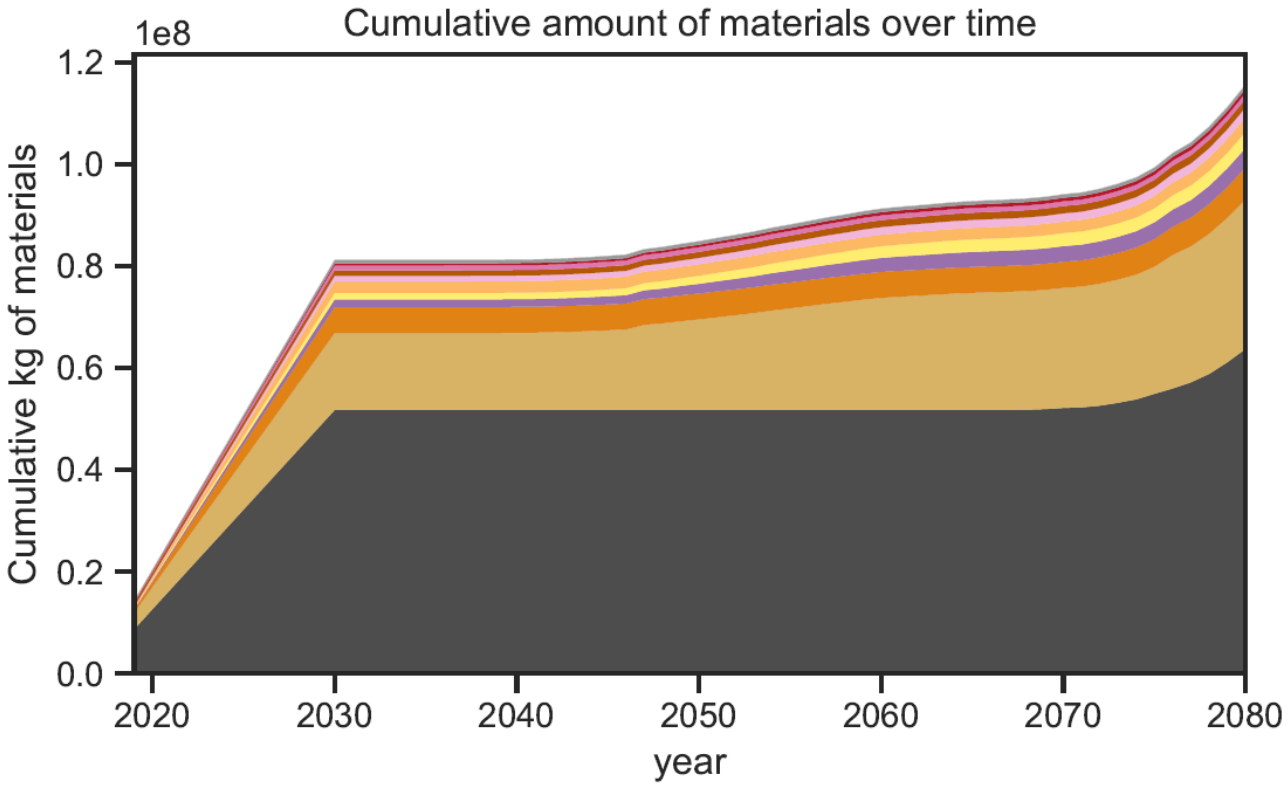


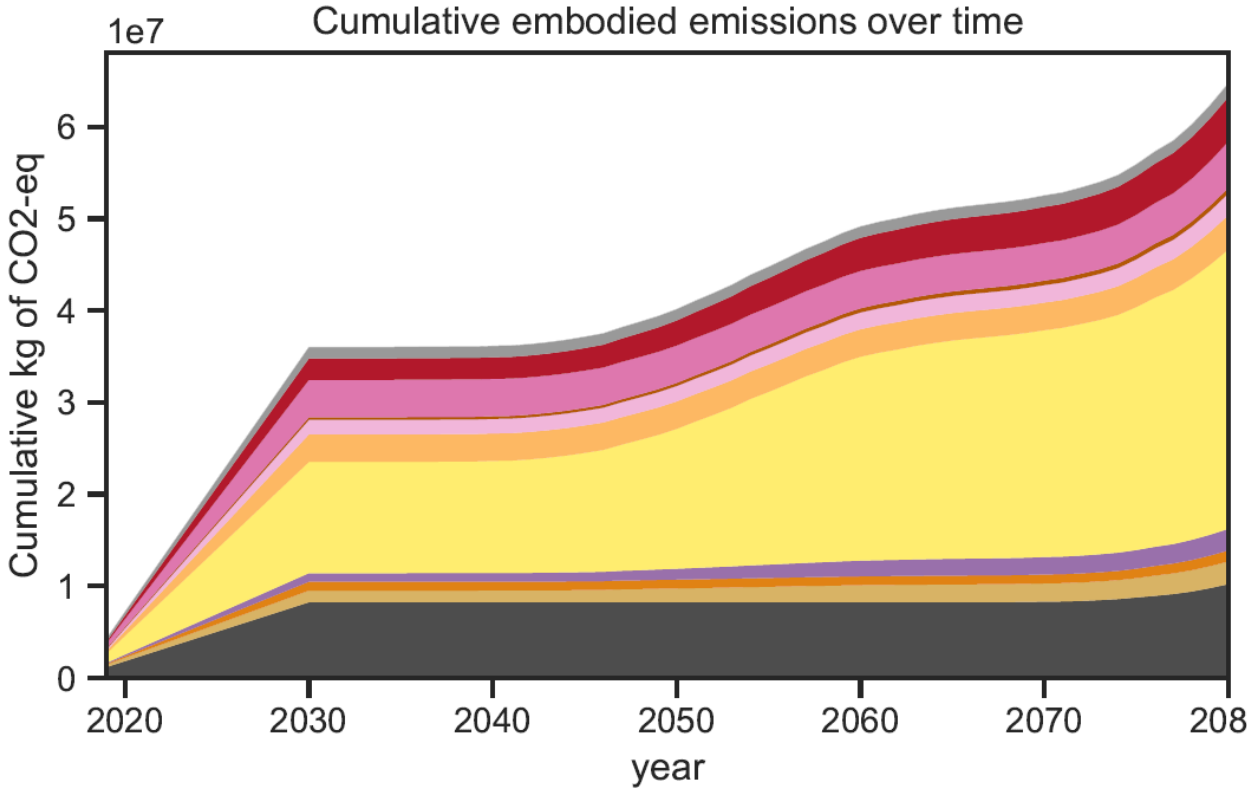
ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

Emissions storyline



ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES





Concrete
Wood
Gypsum
Glass
Energy System
Insulation Mineral
Membrane
Mineral
Insulation PS
Technical
Steel
Other

ZERO EMISSION NEIGHBOURHOODS IN SMART CITIES

On-going work

Variable		Scenarios	
	Description	**Names**	**Description**
Floor area	Area built (initial variable) Constructed area: floor area types, cohorts and distribution Renovated area: renovation function, renovation stages Demolished area: demolition function, lifetime of buildings	S1-Ren20	Renovation function is changed to N ~ (20,5) for all buildings
		S2-Ren40	Renovation function changes to N ~ (40,5) for all buildings
		S3-Con80	Demolition function changes to N ~ (80,10) for SFHs
		S4-Con100	Demolition function changes to N ~ (100,10) for SFHs
Material intensity	Definition of archetypes Material need in the construction of each archetype Material need in the renovation of each archetype Lifetime of materials	S5-MFH16	SFHs are replaced by MFHs of 16 units each set
		S6-MFH32	SFHs are replaced by MFHs of 32 units each set
		S7-noPV	SFHs do not have PV panels
Emission intensity	Emission intensity of materials Categorization of materials Change of emission intensity over time	S8-decrease	Emission intensities decrease 40% from 2019 to 2050
		S9-EPD	Emission intensities are replaced with EPD values
		S10-high	Emission intensities are replaced with highest values *
		S11-low	Emission intensities are replaced with lowest values *