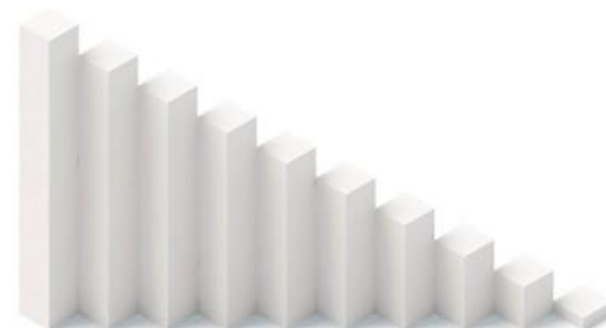




Reduction Roadmap



Mikkel H. Schlesinger
CEBRA

Sinus Lynge
EFFEKT

Steffen Maagaard
ARTELIA

Reduction Roadmap

The Reduction Roadmap is initiated by:



The Reduction Roadmap is funded by:



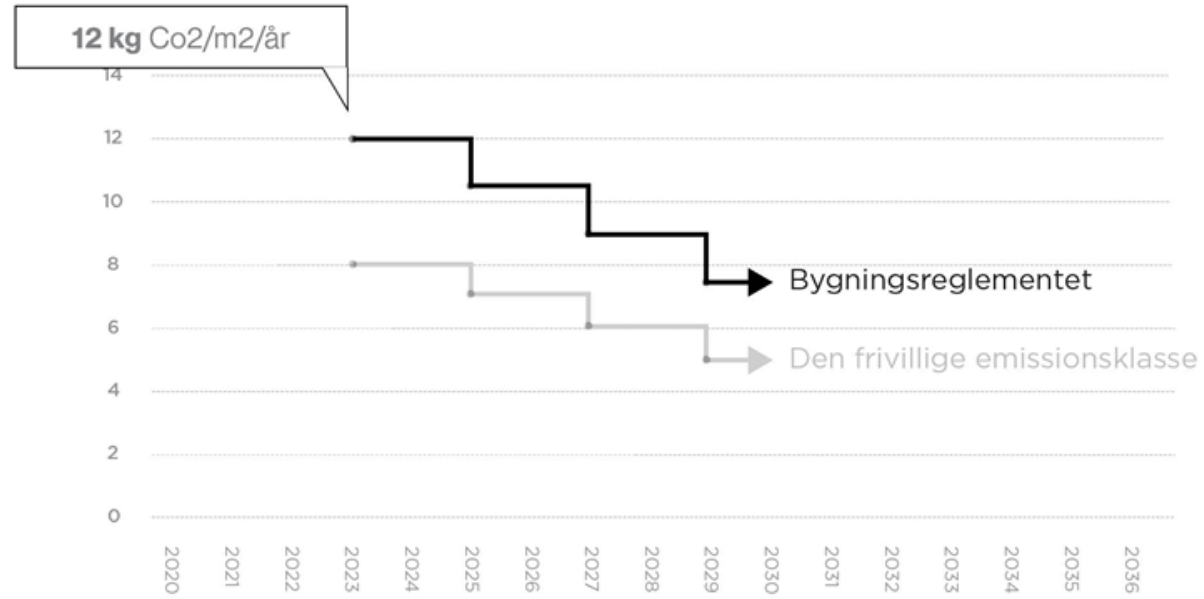
The Reduction Target is set by:



Hvorfor Reduction Roadmap?

UDLEDNING

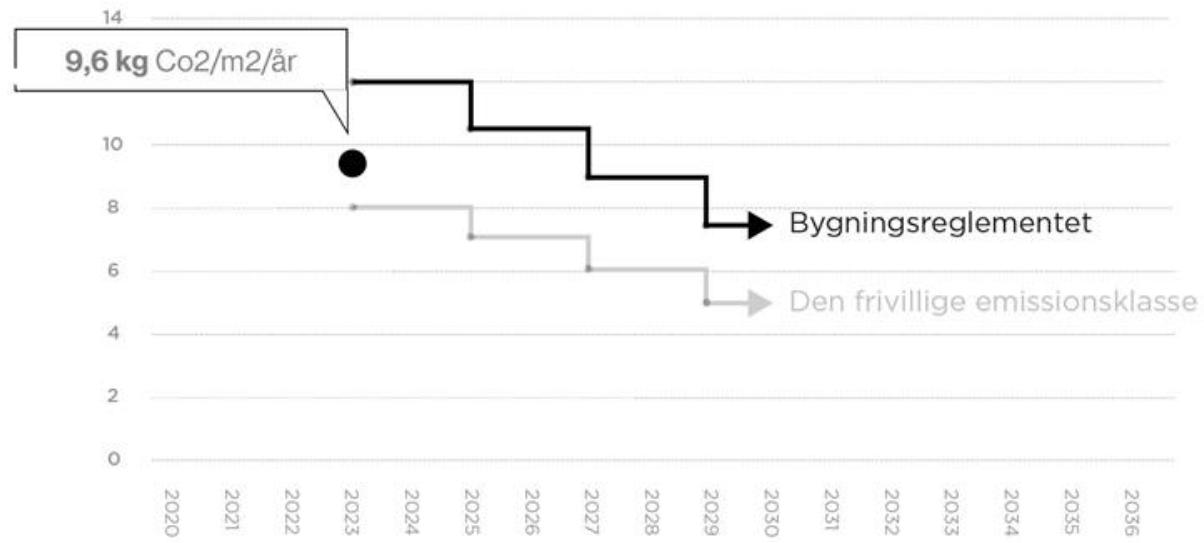
KG/Co2/M2/ÅR



ÅR

UDLEDNING

KG/Co2/M2/ÅR



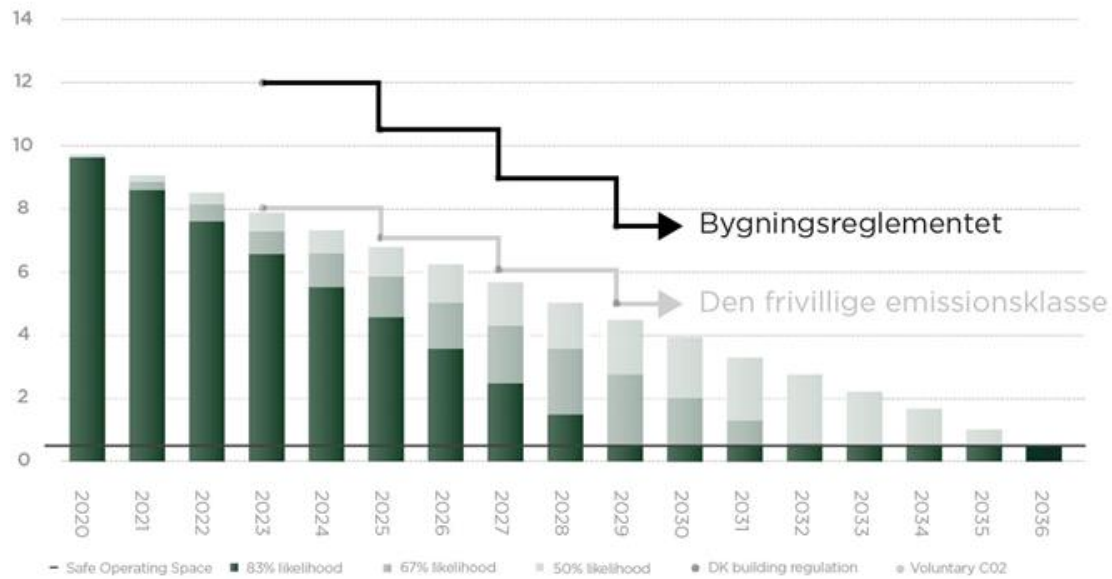
ÅR



Planeten



UDLEDNING KG/Co2/M2/ÅR



Byggeindustrien

ÅR

Kan vi bygge bæredygtigt?

..og hvordan når vi derhen?

47.9

billion tons CO₂eq/yr



Global yearly emission

Ca. 95% reduktion



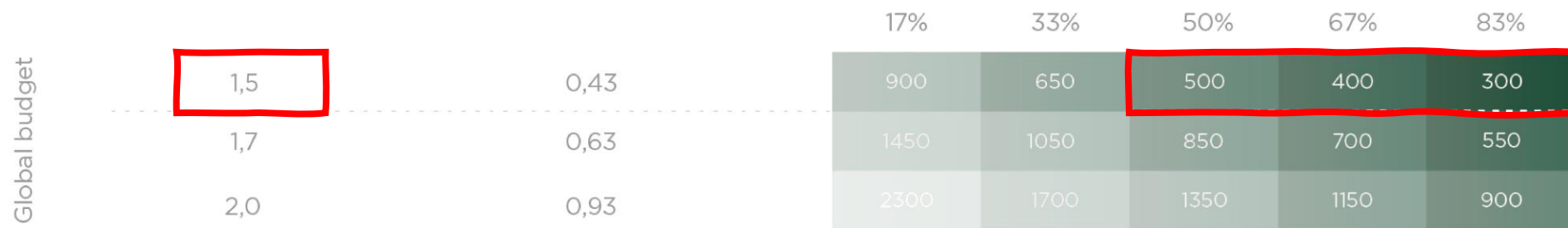
2.51

billion tons CO₂eq/yr



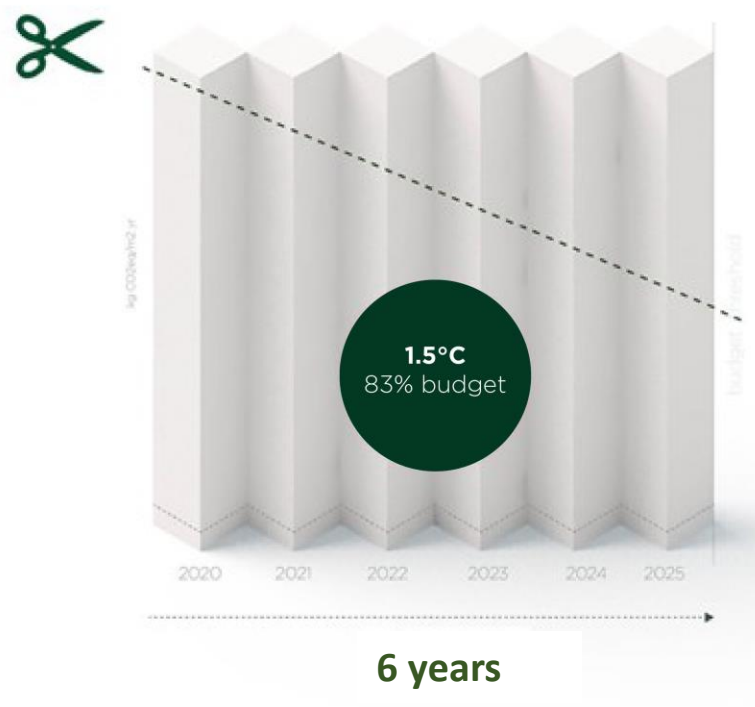
Safe operating space

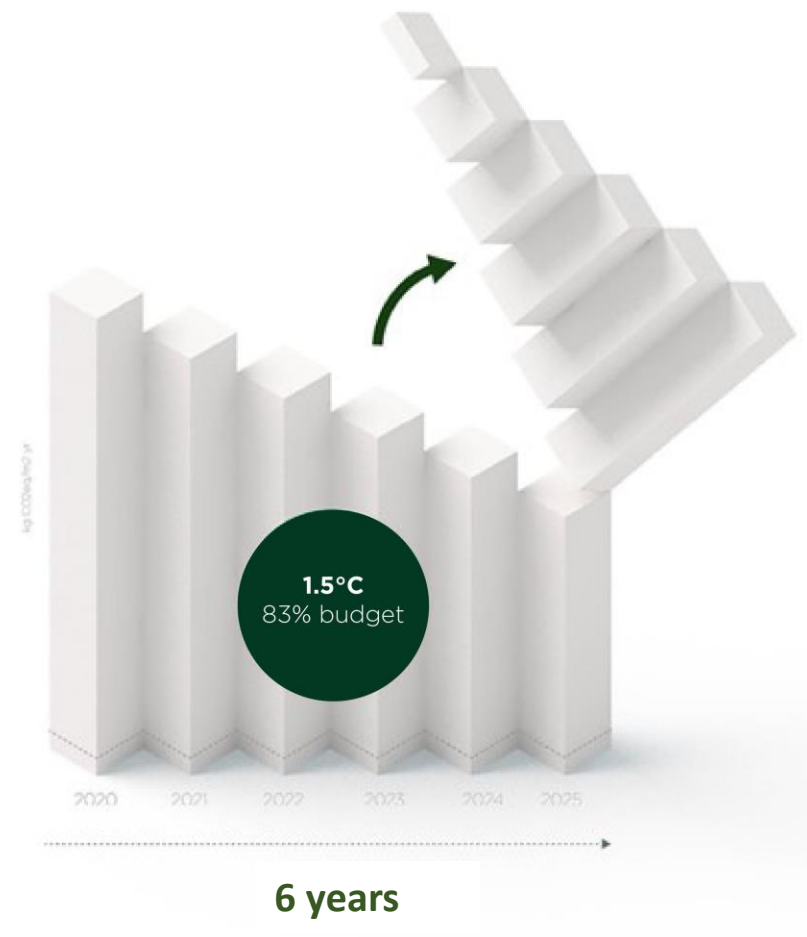
Parisaftalen

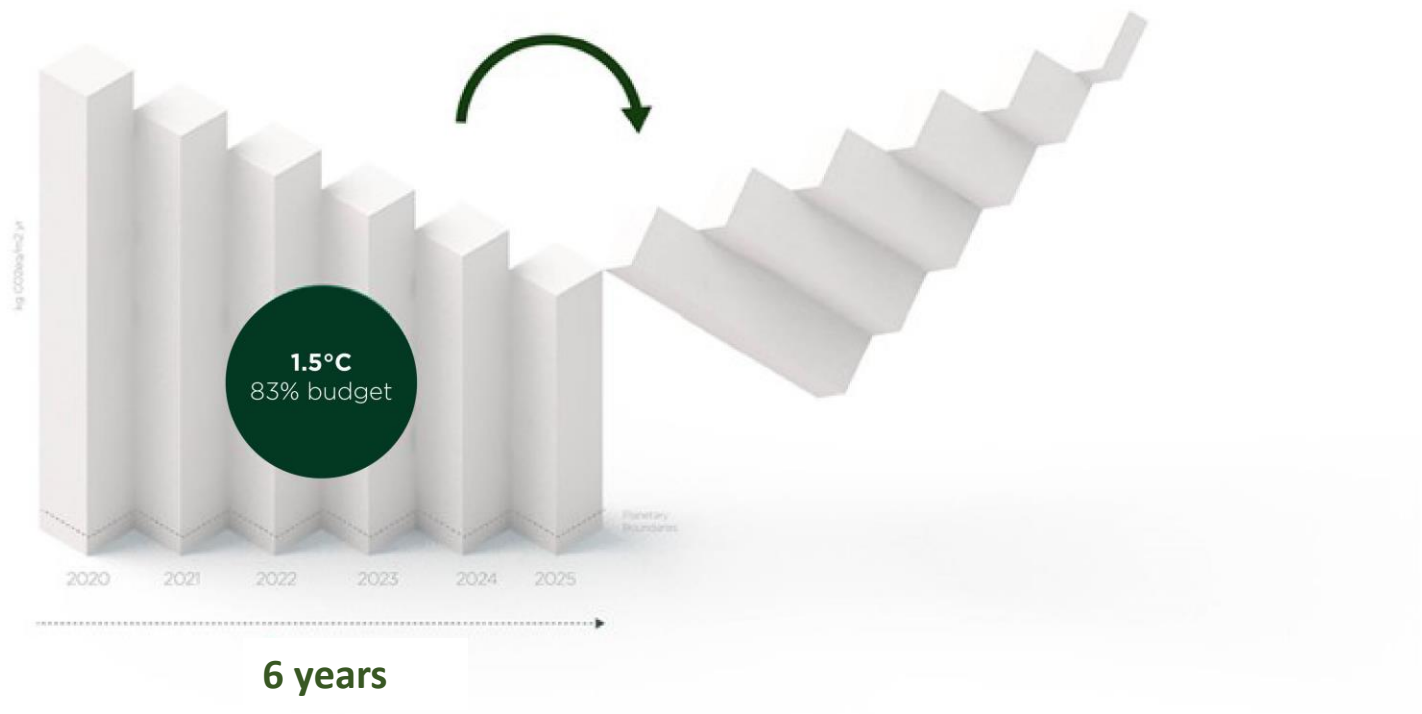


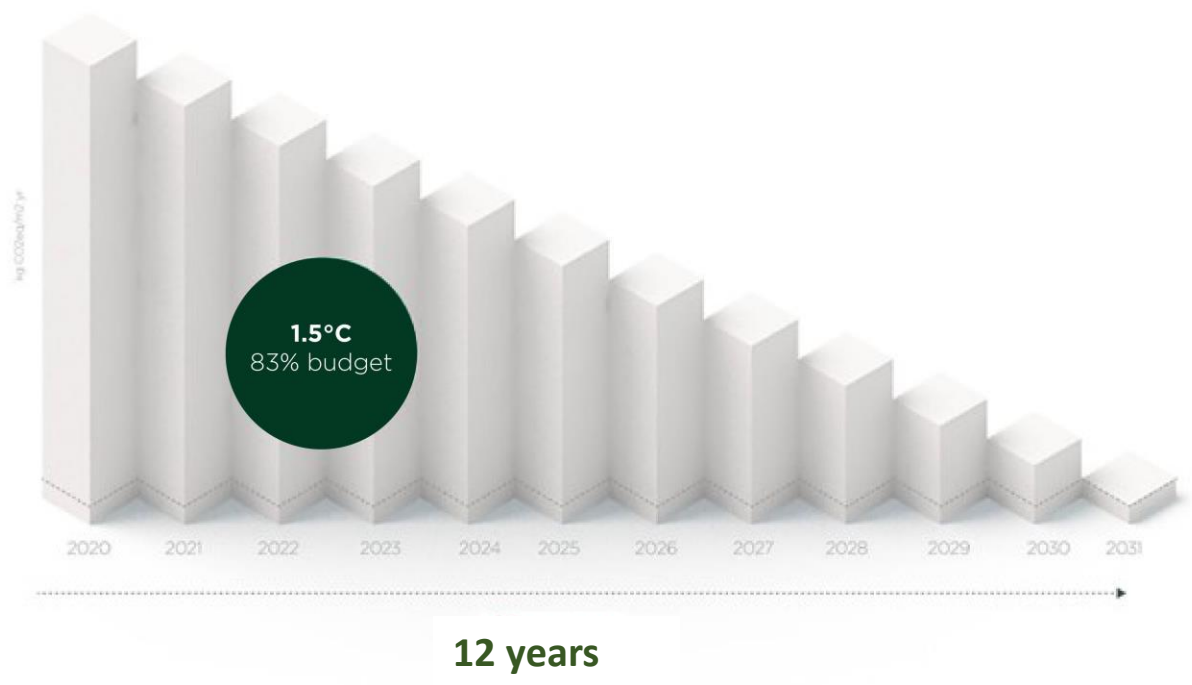
To stay within the 1,5 degree warming scenario we have a global budget of 300-500 Gt Co2-eq emissions remaining (IPPC AR6)











9.63



**Yearly emission
pr. m2 / year**

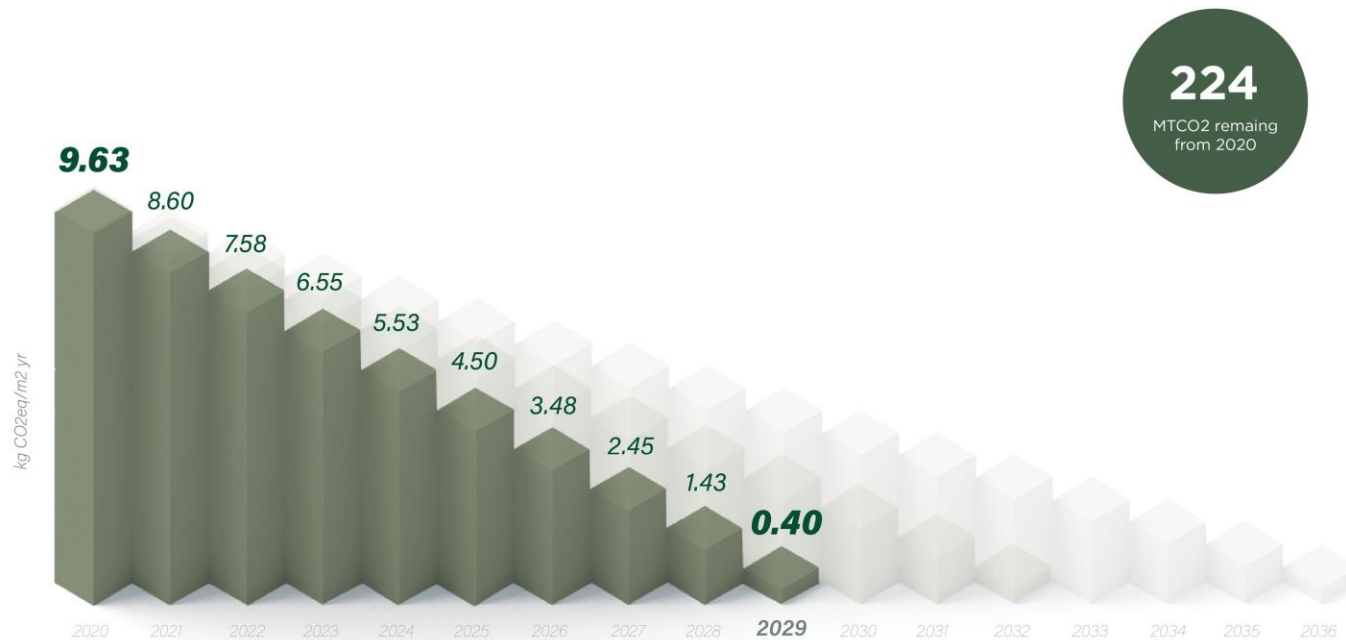
Ca. 95% reduktion



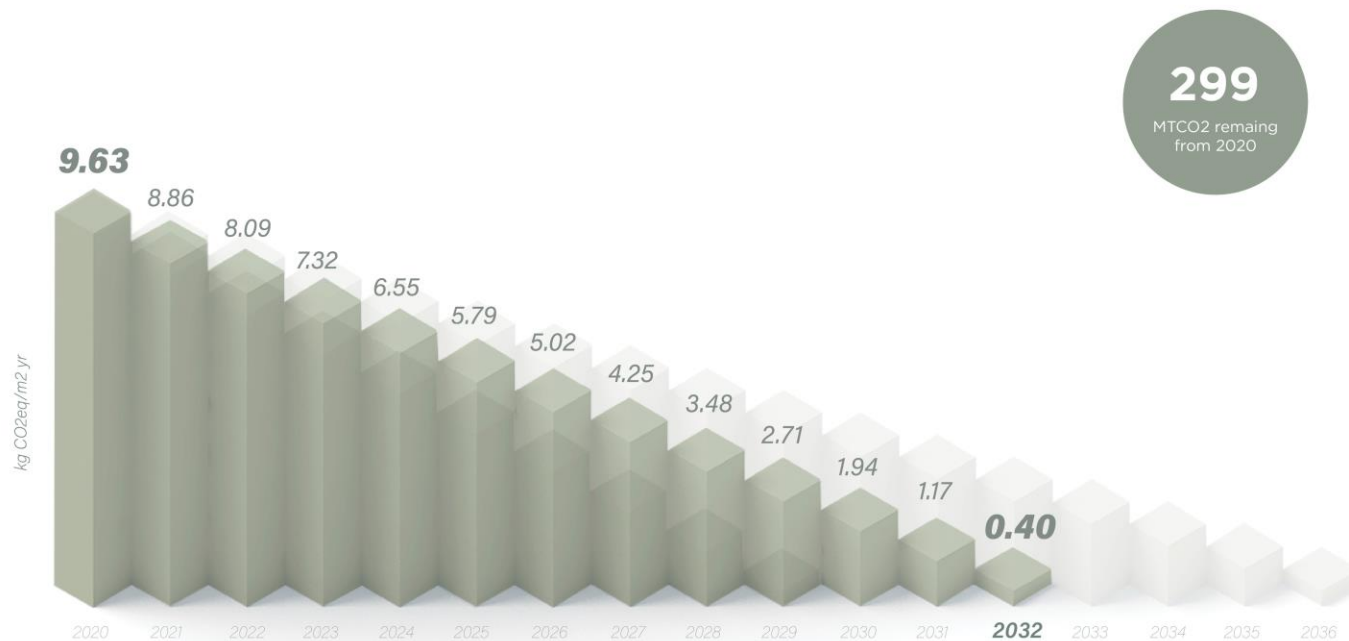
0.40



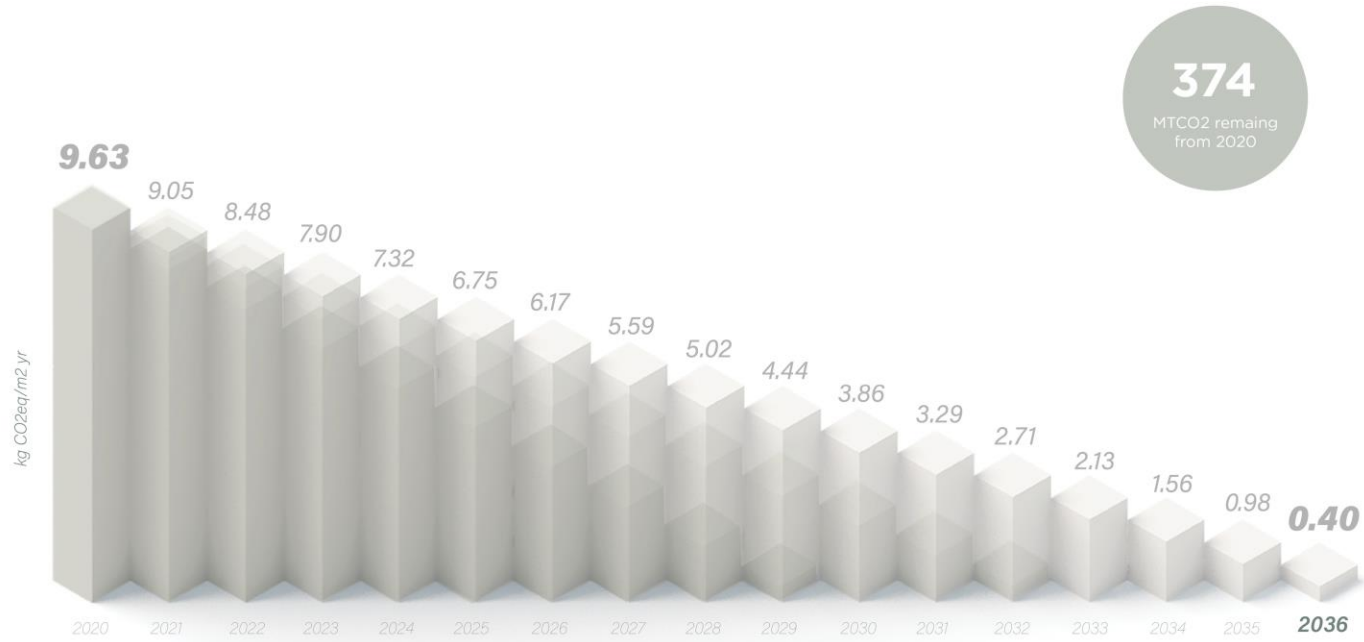
**Yearly target emission
pr. m2 / year**



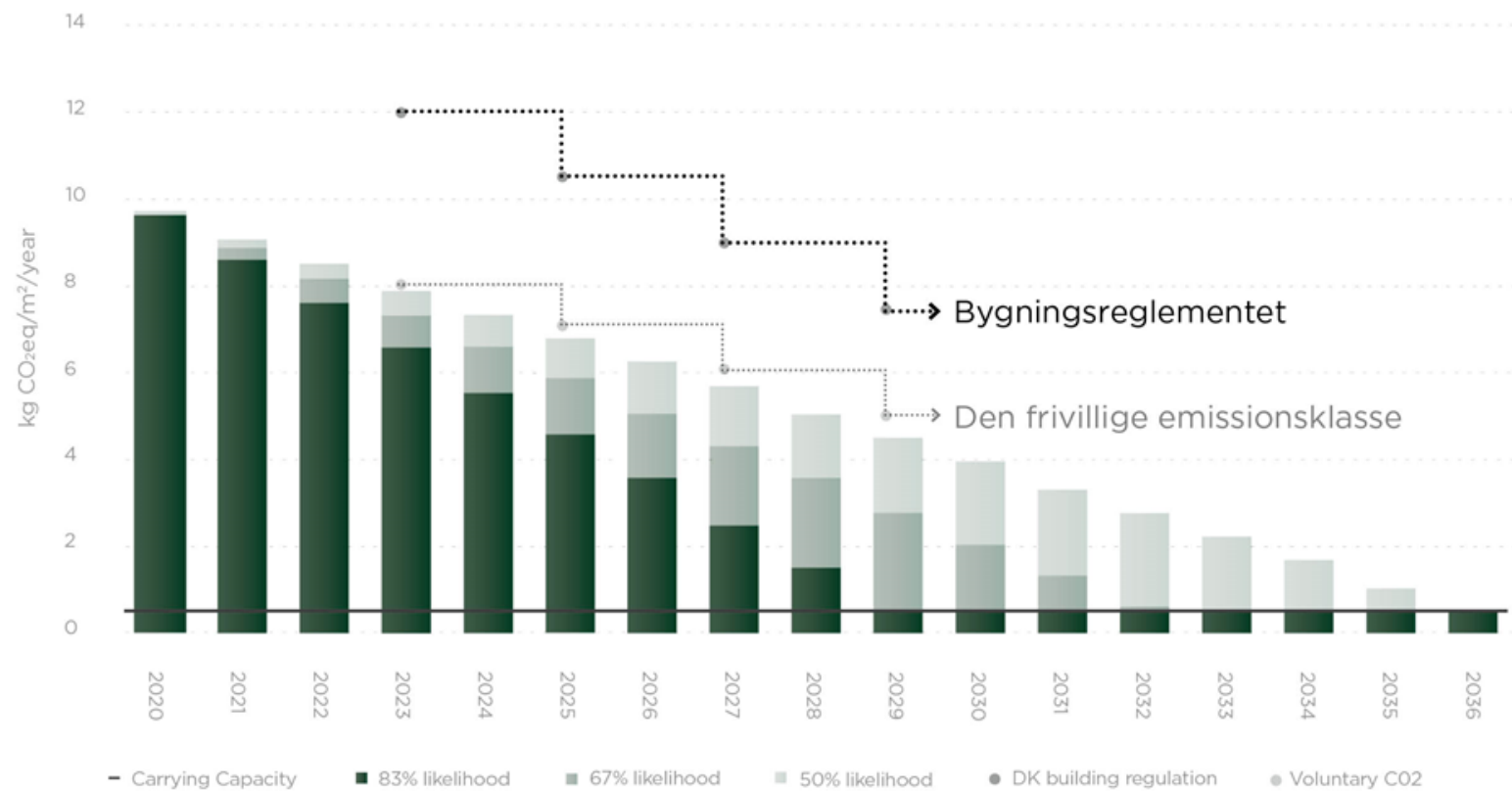
From this Danish budget a linear reduction path can be drawn with different scenarios with different risk levels



From this Danish budget a linear reduction path can be drawn with different scenarios with different risk levels

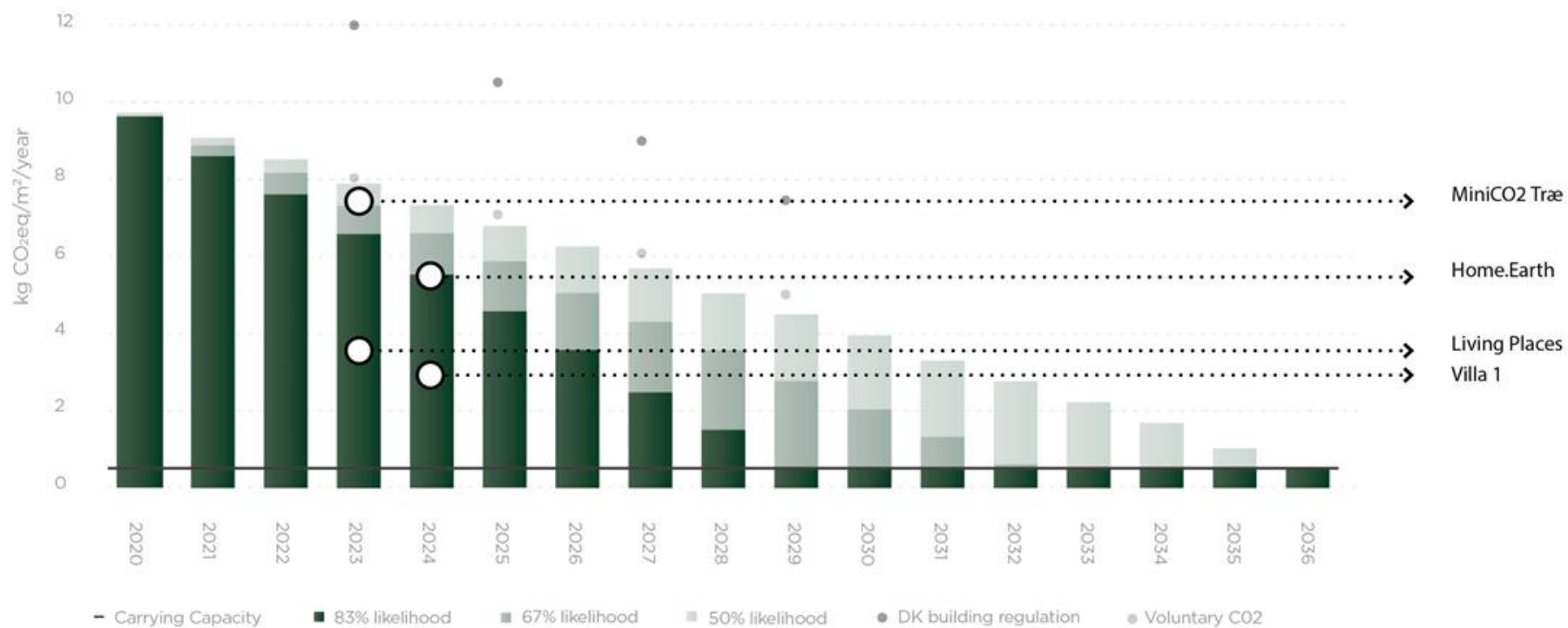


The 50% scenario for 1,5 degrees warming is closing in on the 83% likelihood for meeting 1,7 degrees



**Er det muligt?
Og hvad koster det?**

Eksempler





Mini CO2 TRÆ, 2023

Realdania By og Byg, JAJA Achitects, ONV Arkitekter, Artelia, Eigil Rasmussen A/S

MiniCO2 TRÆ

Bygningstypologi

Etagebolig

Opvarmet Bruttoareal

565 m²

Byggeprincip

Fundament:	Betonpæle
Terrændæk:	Betondæk
Bærende system:	CLT
Facader:	Trækassetter
Isolering:	Træfiber
Varmekilde:	Fjernvarme
Ventilation:	Mekanisk

Klimabelastning 7,7 kg CO₂eq./kvm/år

Materialer: 67%

Drift: 33%

Pris:

Anlægsomkostninger: 17.000-20.000 kr/m²



An architectural rendering of a modern residential courtyard. The buildings are multi-story with light-colored wood cladding and balconies. The courtyard is lush with greenery, including trees, shrubs, and a gravel path. People are shown walking and sitting in the courtyard, suggesting a vibrant community. The sky is clear and blue.

Nærheden, 2024
Home.Earth, Vandkunsten, EFFEKT, Sweco

Home.Earth – Nærheden

Bygningstypologi

Etagebolig

Opvarmet Bruttoareal

~1500 m²

Byggeprincip

Fundament:	Beton
Terrændæk:	Trækonstruktion med flydebeton
Bærende system:	Træskelet og boxbyggeri i træ
Facader:	Skiffer og træbeklædning
Isolering:	Mineraluld
Varmekilde:	Energy machine og solceller
Ventilation:	Mekanisk

Klimabelastning 5,2 kg CO₂eq./kvm/år

Pris:

Anlægsomkostninger: 16.000 kr/m²





Living Places, 2023
VELUX, Artelia, EFFEKT, Enemærke & Petersen

Living Places

Bygningstypologi

Enfamiliehus

Opvarmet Bruttoareal

147 m²

Byggeprincip

Fundament:	Skruefundamenter
Terrændæk:	Hævet trækassette
Bærende system:	Træskelet
Facader:	Trækassetter
Isolering:	Papiruld
Varmekilde:	Luft til vand varmepumpe og solceller
Ventilation:	Naturlig

Klimabelastning 3,8 kg CO₂eq./kvm/år

Materialer: 93%

Drift: 7%

Pris:

Anlægsomkostninger: Ca. 15.000 kr/m²





Villa 1, 2024

MTHøjgaard Property Development, CEBRA, Søren Jensen

Villa 1

Bygningstypologi

Enfamiliehus

Opvarmet Bruttoareal

134 m²

Byggeprincip

Fundament:	Skruefundamenter
Terrændæk:	Hævet trækassette
Bærende system:	Træskelet
Facader:	Trækassetter
Isolering:	Papiruld
Varmekilde:	Solfangere og solceller
Ventilation:	Naturlig

Klimabelastning 3,2 kg CO₂eq./kvm/år

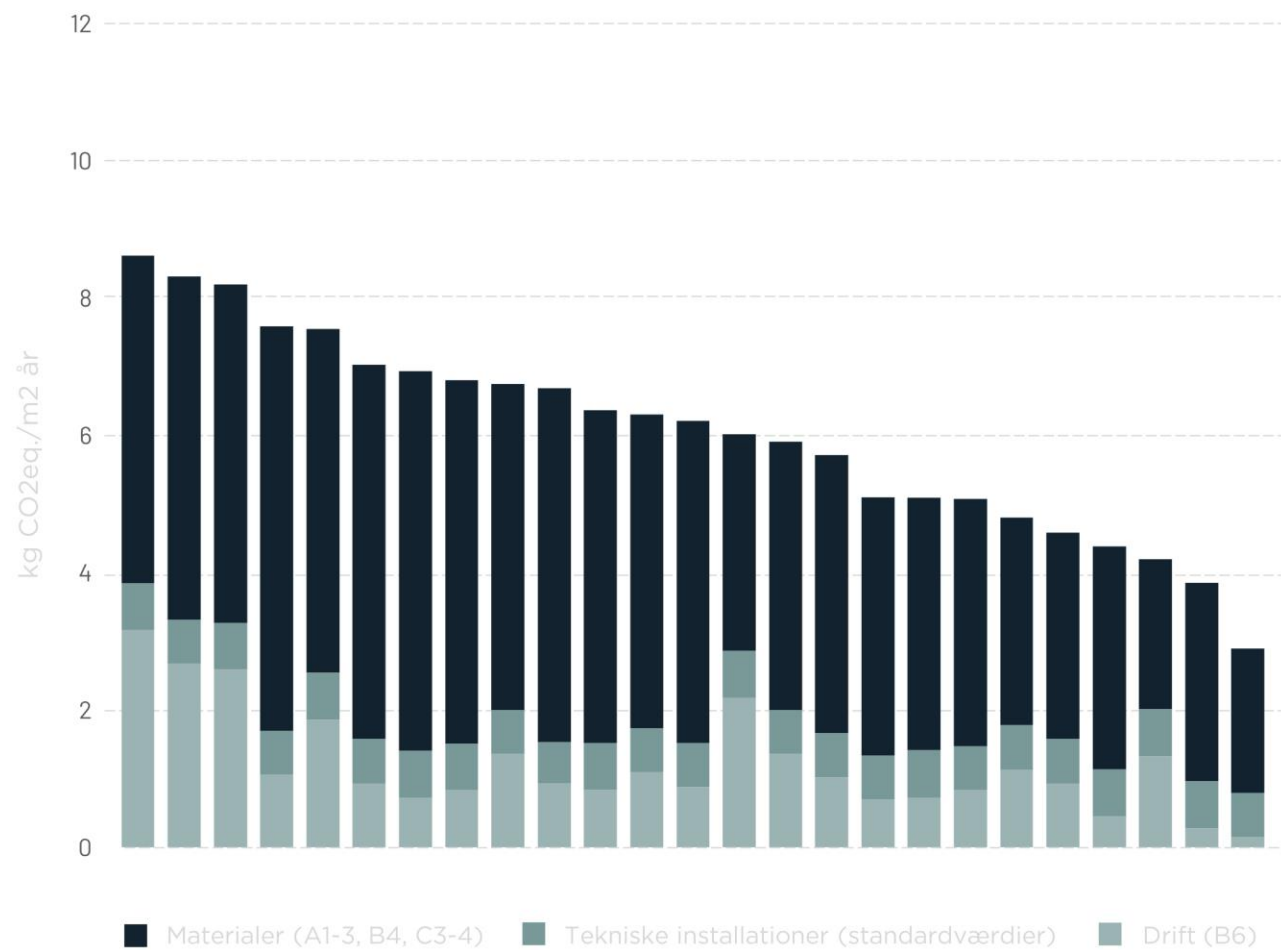
Materialer: 97%

Drift: 3%

Pris:

Anlægsomkostninger: 14.000-18.000 kr/m²





4>1Planet Best Practice Examples

“Vi har tilsluttet os Reduction Roadmap i vores nyeste bæredygtighedsprogram, som en måde at opsætte konkrete værdier for reel bæredygtighed.”

Mia Manghesi
Projektudviklingsdirektør
Pension Danmark

“Hos Rådet For Bæredygtigt Byggeri bruger vi Reduction Roadmap til at italesætte den lange og seje vej, der er foran os som branche, for at nå Paris Aftalen.

Derudover indgår det som en milepæl for vores udvikling af en klimaudmærkelse til bæredygtighedscertificeringen DGNB.“

Mette Qvist
Fhv. Direktør
Rådet For Bæredygtigt Byggeri

Næste skridt:

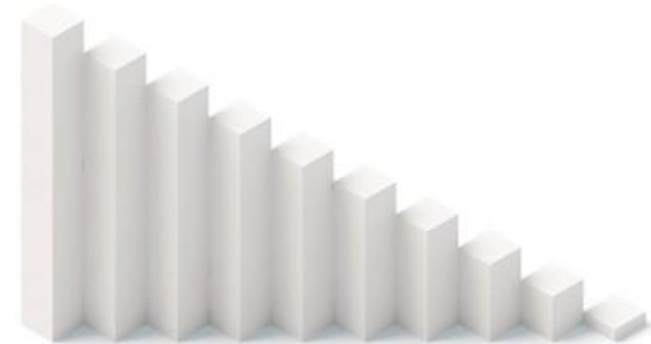
Reduction Roadmap 2.0

Første resultater august 2023

**Udvide med flere bygningstyper,
renovering og transformation**



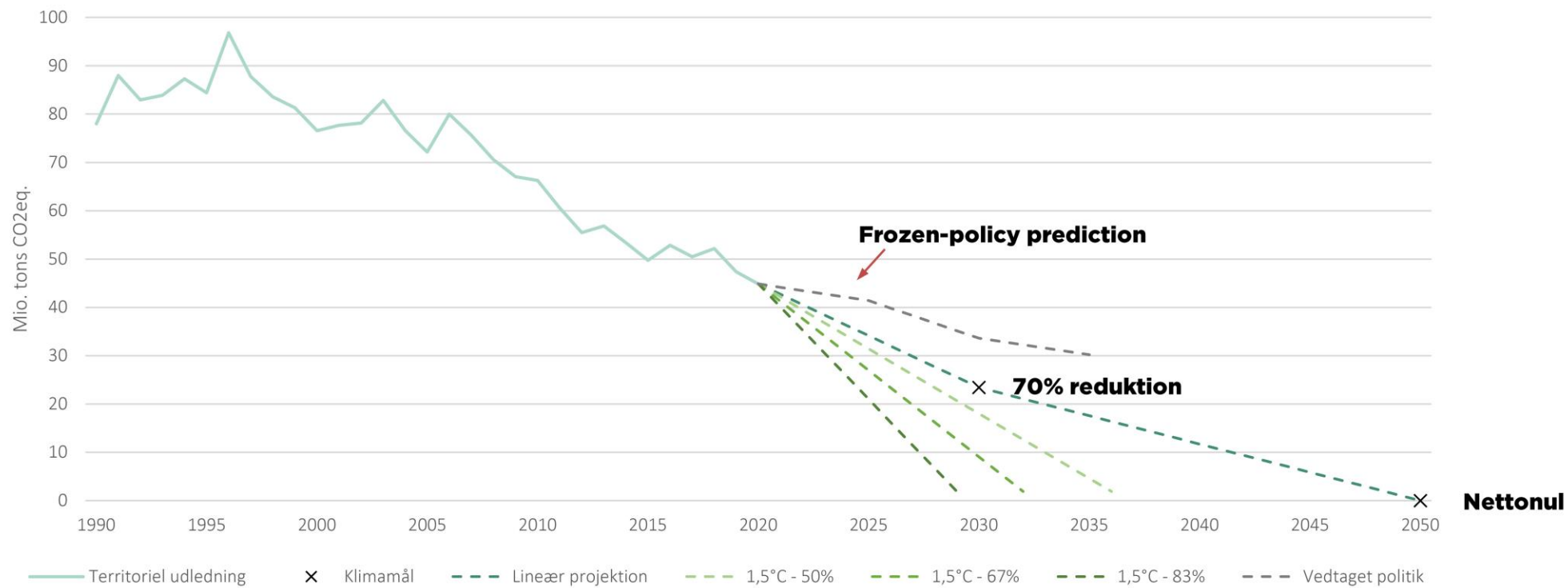
Reduction Roadmap



www.reductionroadmap.dk



Besøg os i Livingplaces, Jernbanebyen!



Dansk udledning af drivhusgasser, territorial

Today's emissions

Today's global emissions
In 2019, 46.9 billion tons of CO₂eq were emitted globally. (Climate Watch, 2022).



47.9
billion tons

GLOBAL



2.51
billion tons

Target emissions

Global emission target
The global carbon budget is 2.51 billion tons of CO₂eq per year (The Safe operating space for greenhouse gas emissions by Petersen, S. et al., 2022).

Today's national emission
Denmark emitted 44.9 million tons of CO₂eq in 2020 (EEA, 2022) exceeding the budget of 1.882.500 CO₂eq per year nearly 24 times.



44.9
million tons

NATIONAL



1.882.500
tons

National emission target
Denmark is allotted 0,075% of the global carbon budget This equates to 1882.500 tons CO₂eq per year for all carbon-producing activity in Denmark.

Today's new build housing emission
New housing accounts for 3,3% of all Danish carbon emissions, which is equivalent to 1.481.700 tons CO₂eq per year (Reduction Roadmap, 2022).



1.481.700
tons

HOUSING SECTOR



62.123
tons

New build housing emission target
If new housing is allocated the same share of the Danish carbon allowance in the future, as today then new housing in Denmark is allocated 3,3% of the total Danish carbon allowance, equivalent to 62.123 tons CO₂eq per year.

Today's housing m2 emission
On average Denmark builds 3.072.000m² of new housing each year (Devici, N.et al, 2020). This leads to an average emission level for new housing in Denmark, 482kg CO₂eq/m².



482 kg
CO₂eq/m²

HOUSING M2



20.22 kg
CO₂eq/m²

Housing m2 emission target
On average Denmark builds 3.072.000 m² of new housing each year (Devici, N.et al, 2020). This leads to an average emission level for new housing in Denmark, 20,22kg CO₂eq/m².

Today's LCA emissions
Based on a 50-year reference period, the median footprint of Danish housing is 9,6kg CO₂eq/m²/year.



9.6 kg
CO₂eq/m²/yr

CO₂ /M₂ /YEAR



0.4 kg
CO₂eq/m²/yr

LCA emission target
Based on a 50-year reference period, the target footprint of Danish housing is 0,4kg CO₂eq/m² per year.



Partnerskaber om fælles mål

Nye samarbejder på tværs af byggebranchen

Hvor meget er 20 kg CO₂eq?



Driving a car 8km in congested traffic emits on average 20 kg CO₂eq.

From *How bad are bananas?* by Mike Berners-Lee



The average footprint of a mobile phone in use for two years is 21 kg CO₂eq.

From *How bad are bananas?* by Mike Berners-Lee



The average footprint of 100 gram of beef protein is 20 kg CO₂eq.

From *"How bad are bananas"* by Mike Berners-Lee



The average footprint of 3 cotton t-shirts is 21 kg CO₂eq.

www.carbonfacts.com