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Methane emissions from landfill/ Prognos/ ifeu study

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KANADEVIA INOVA AT IFAT 2026
STAND A4.441

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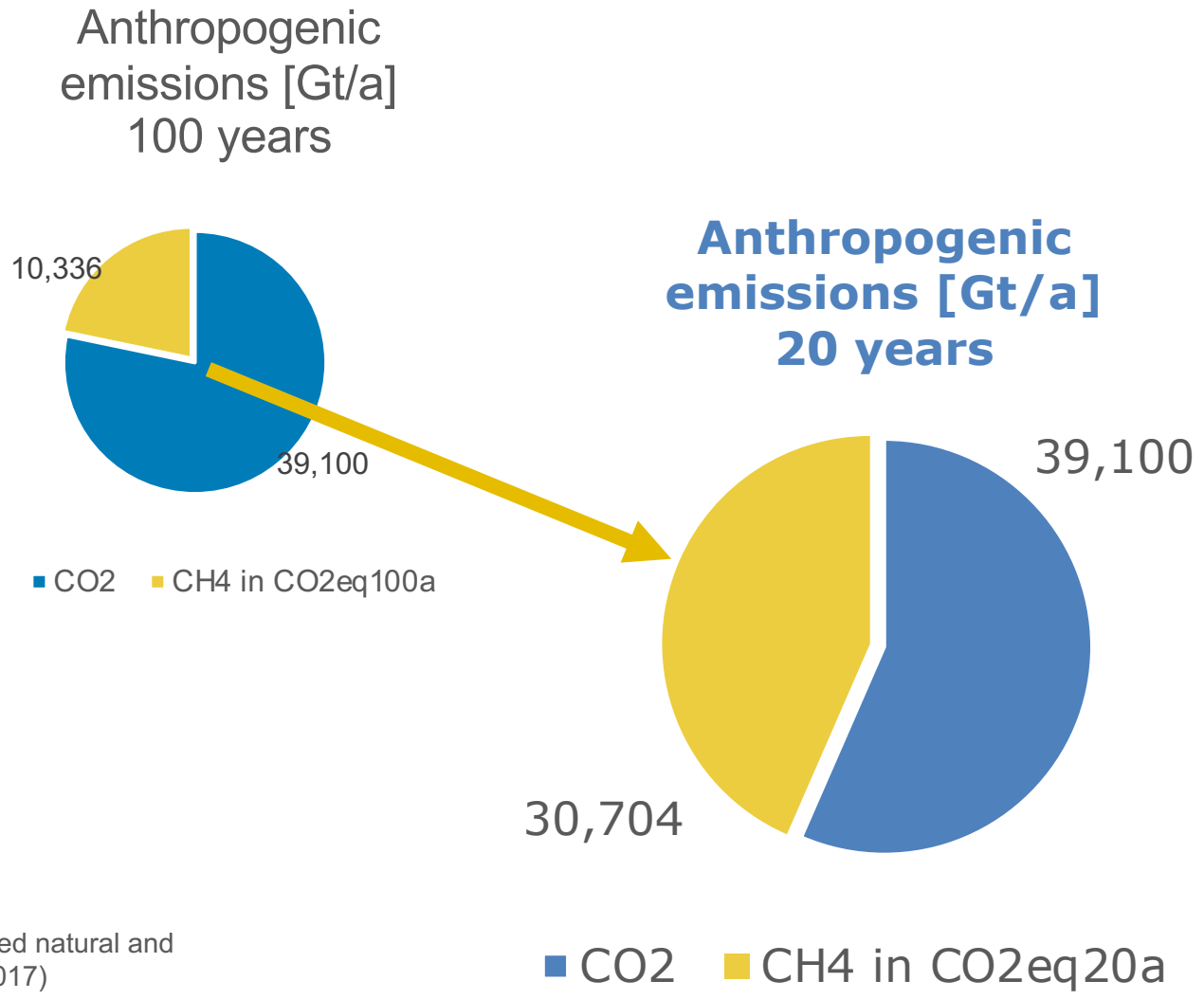
Global GHG emissions

100 years
Traditional horizon for evaluating THG emission effects

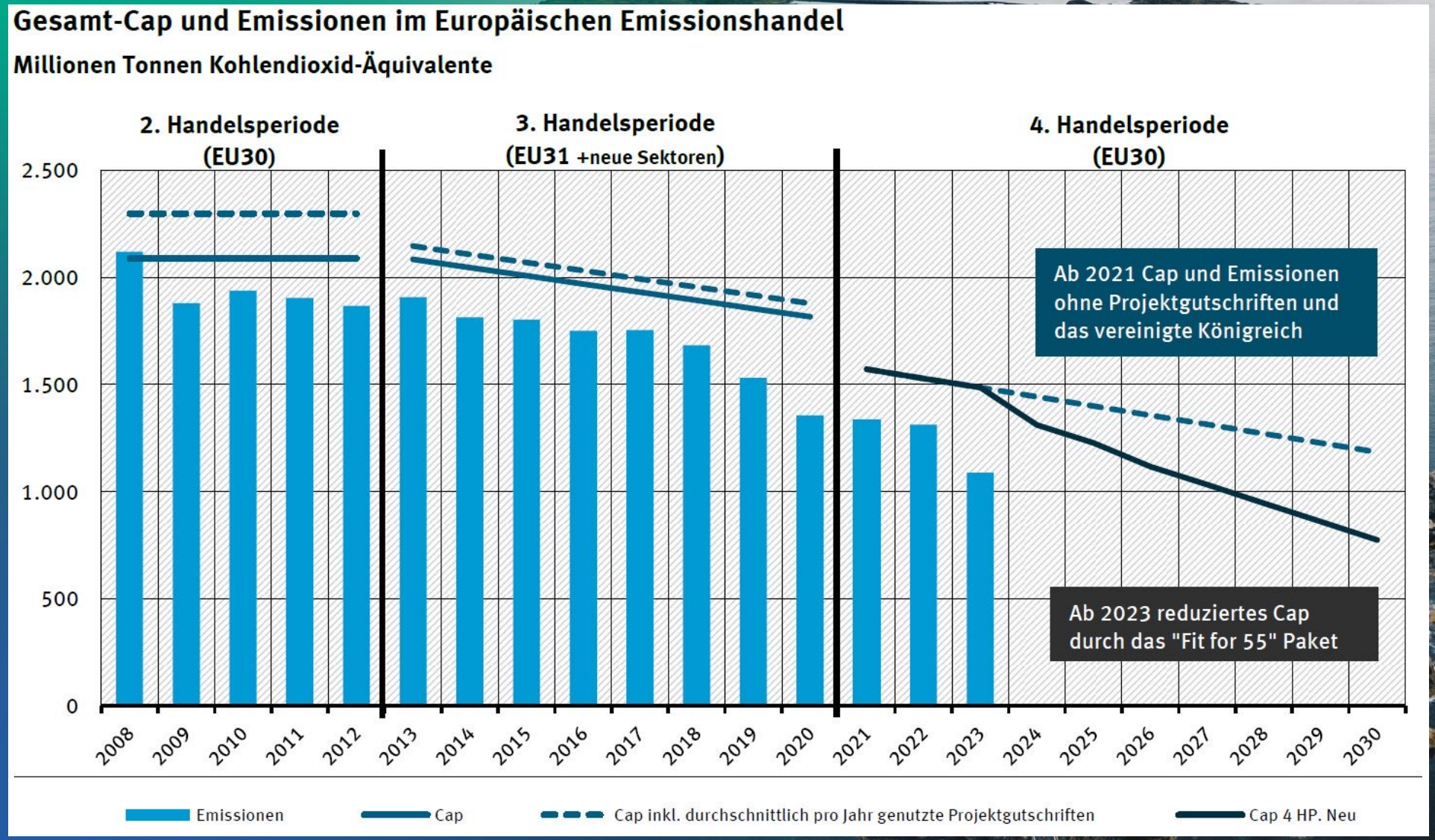
20 years
Horizon required due to 2050 climate targets

Methane is significant although landfill GHG are underreported!



Sources:
- IPCC, GWP100 CH4=27.2, GWP20 CH4=80.8
- UNEP Global Methane Assessment 2021, as estimated natural and anthropogenic sources and sinks of methane (data 2017)

Ambitious EU/ UK defossilisation targets



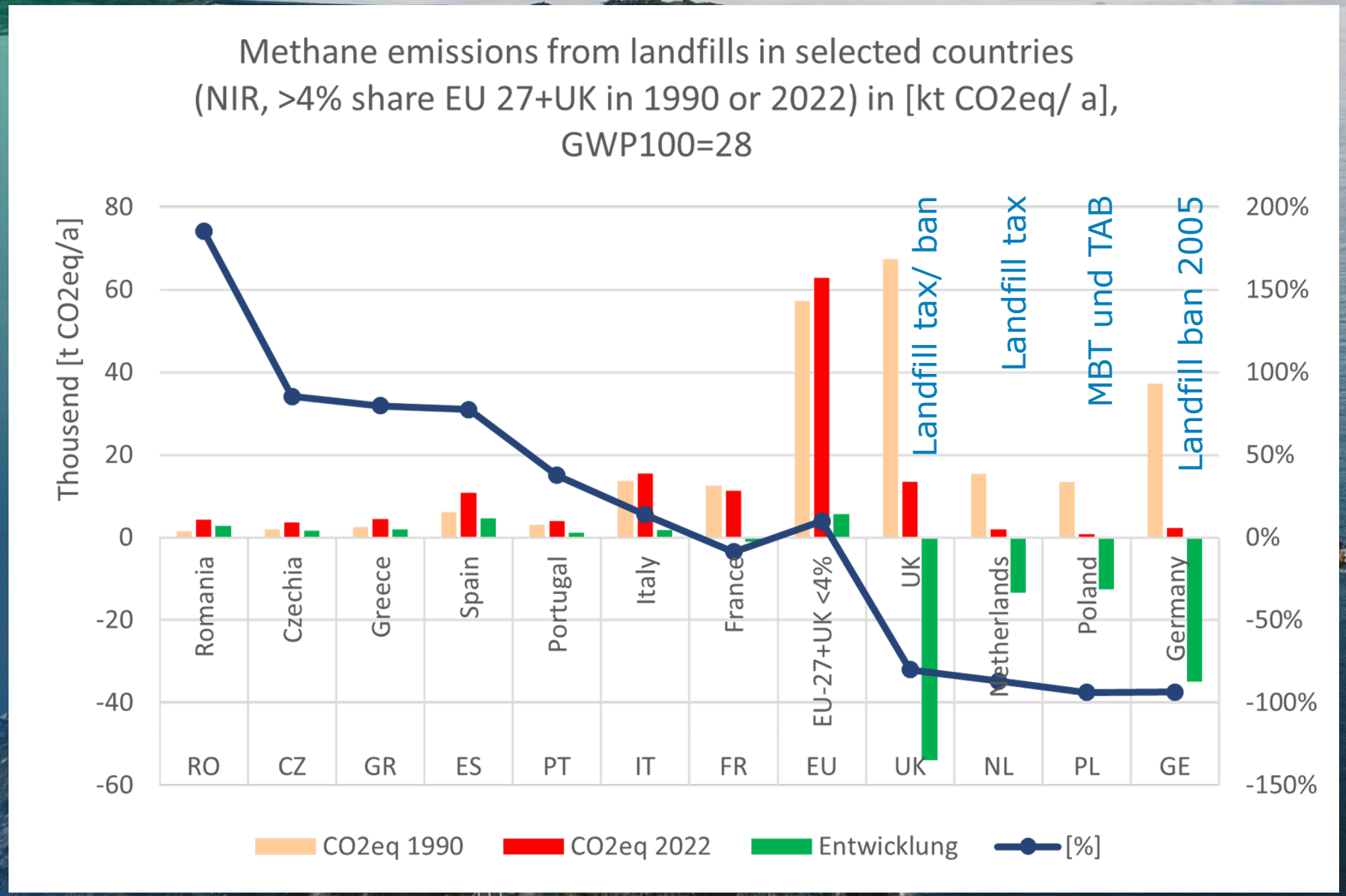
Quelle:
UBA 2024, Deutsche Emissionshandelsstelle, eigene Berechnungen auf Basis von Daten der Europäischen Umweltagentur und der Europäischen Kommission (2013/448/EU); Stand 05/2024

Landfill emissions in EU

1990-2022:
Landfill GHG reduced where there is more WtE

Landfills: despite capturing, leaks remain

Do we really want to continue landfilling biogenic MSW fractions?



Prognos/ ifeu study

Methane emissions from Europe's landfills

Scenario 1
Status Quo (SQ)

- Waste amount deposited based on 2022 levels.

Scenario 2
Current Status (CS)

- Waste amount deposited based on average annual change as between 2018 and 2022.
- For countries with a positive growth rate, the highest observed share of total MSW deposited on landfills was applied and held constant for scenario years.

Scenario 3
Waste Framework Directive (WFD)

- Waste amount deposited reduced to max. 10 % by 2035.
- Derogation option for Greece and Romania (study-focus countries) plus Bulgaria, Cyprus, Croatia, Malta and Slovakia.

Scenario 4
Landfill ban from 2023 (Ban)

- No waste amounts deposited as of 2023.

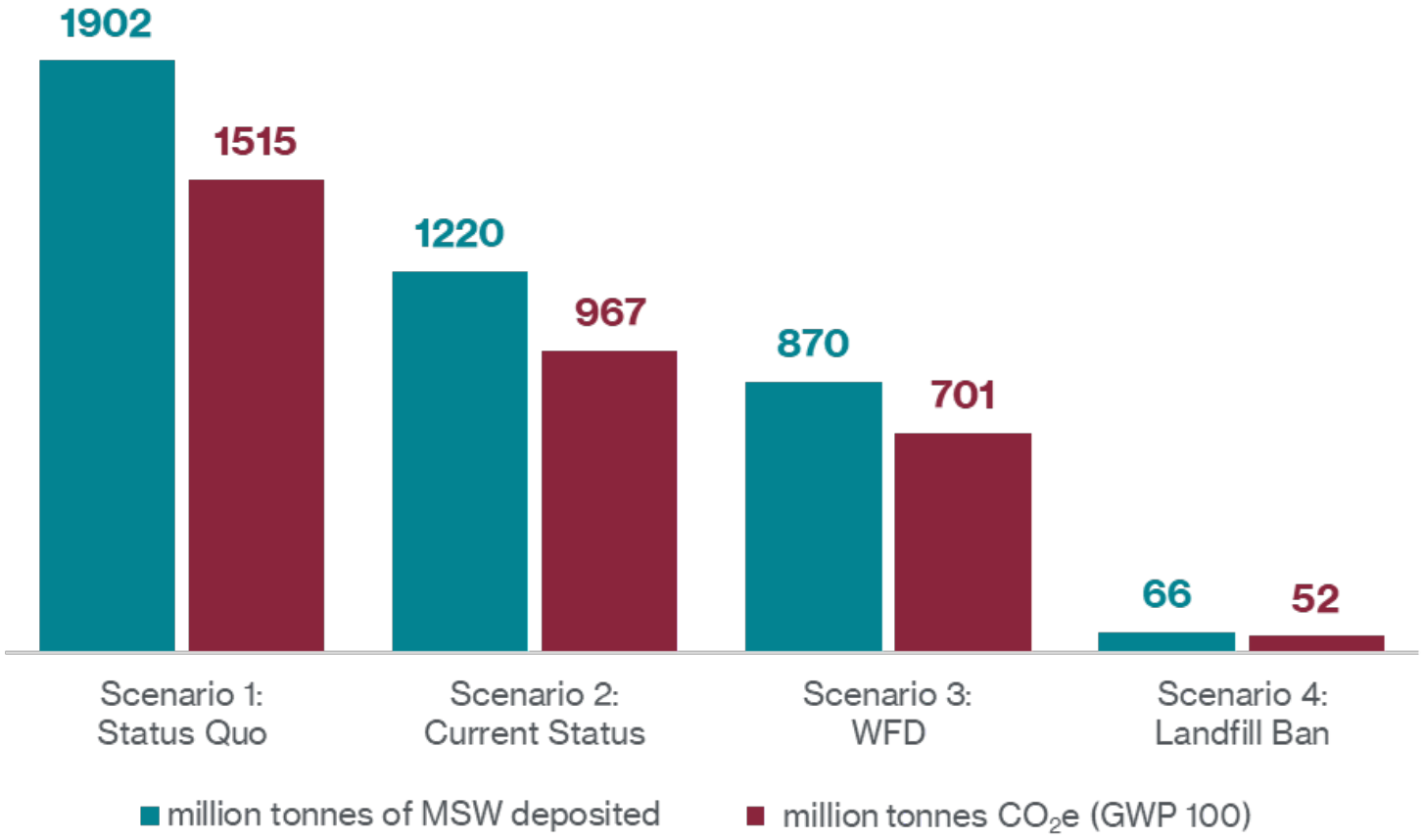
Prognos/ ifeu study

Methane emissions from Europe's landfills

The actual trend misses the targets from WFD and Landfill Directives.

Conclusion ESWET:
Including WtE in ETS creates further incentives to exceed the targets.

Set climate targets thus prone to be missed!



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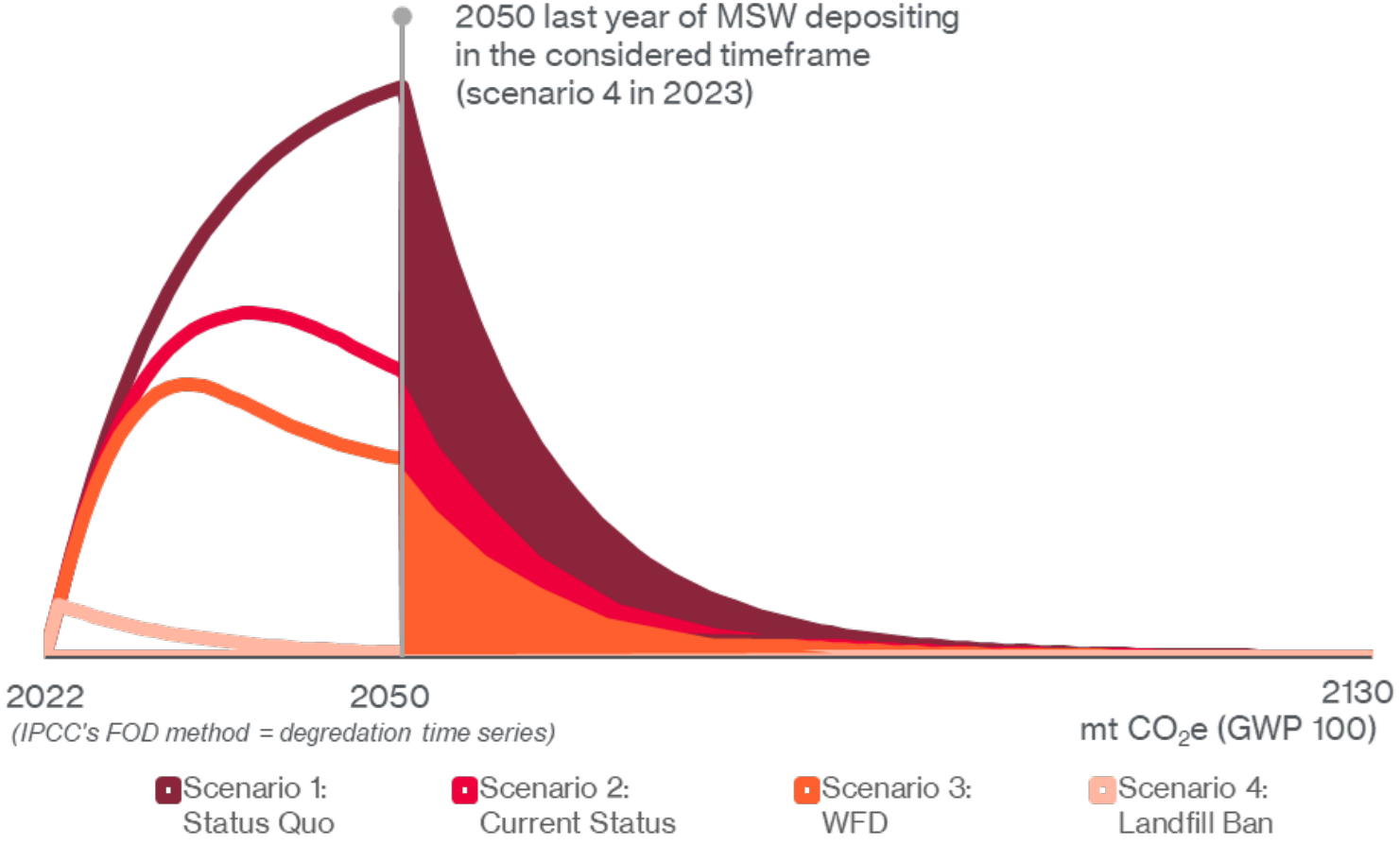


Prognos/ ifeu study

Key take-aways

Landfill methane emissions from landfills in Europe are significant, persistent over long periods, and highly sensitive to waste volumes and methane capture performance.

Immediate action—reducing or banning organic waste from landfilling, accelerating circular economy adoption, and expanding capture systems — can significantly reduce emissions before 2050.

Data and methodological gaps remain a barrier to accurate tracking and effective policy design.

Even when MSW landfilling declines, historical deposits continue emitting methane for decades, underscoring the need for long-term mitigation strategies.

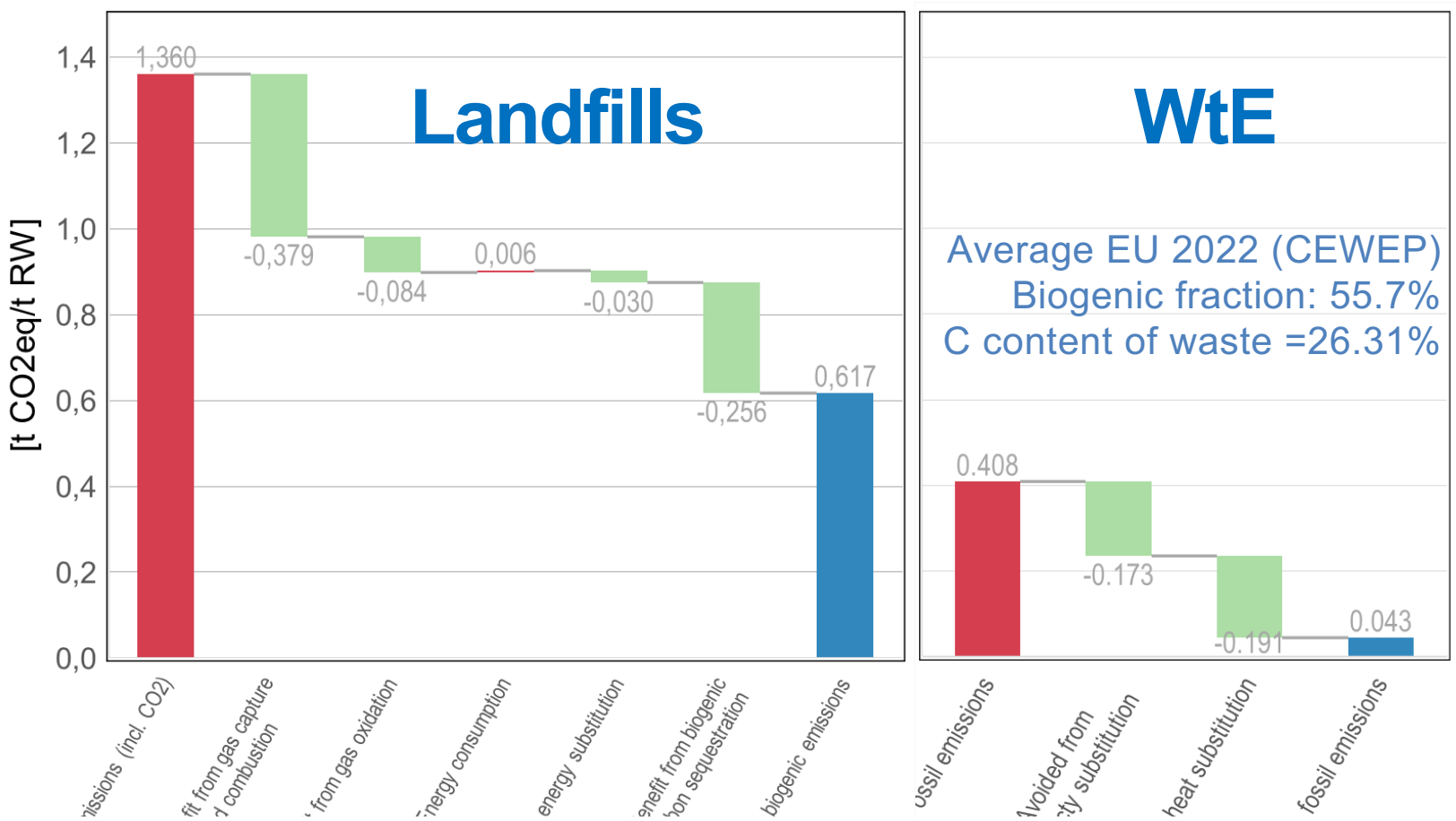
Implementing the EU Waste Framework Directive, and specifically the Landfill Directive, alone can halve methane emissions, while a full ban or near-ban of municipal solid waste offers much larger benefits.

Methane reduction is a critical near-term lever to support the EU climate targets and achieve rapid climate benefits.

Net GHG Emissions in Europe/ UK

GWP100(CH4)=27.2
HFC (9.5 MJ/kg)
Gas capture rate=31%
Biogenic fraction: 51.2%
Internal comb. Engine

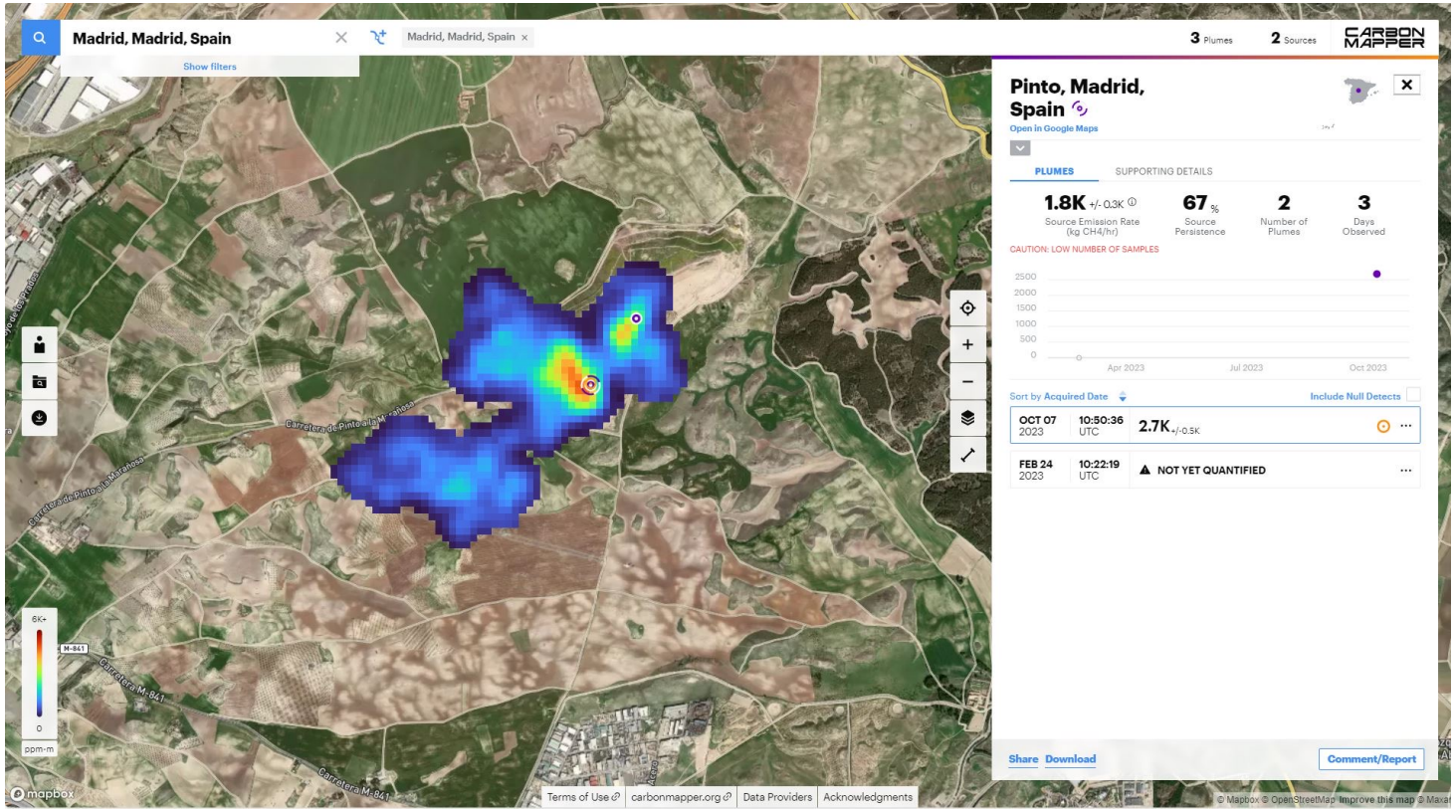
[No direct CO2 emissions from landfill considered]



Average GHG emissions from WtE are close to neutral already (even without CCS and material recovery).

GHG emissions from landfills are modelled and reported too low

- Model-Uncertainties
- FOD “First Order Decay”
- Parameters for FOD
  - Waste stream
  - Gas capture rate
  - Oxidation rate
  - Landfill design and operational practices



➔ Controlling these emissions from satellite is nowadays state-of-the art.

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GHG emissions from landfills are modelled and reported too low

Measuring uncertainties from satellites

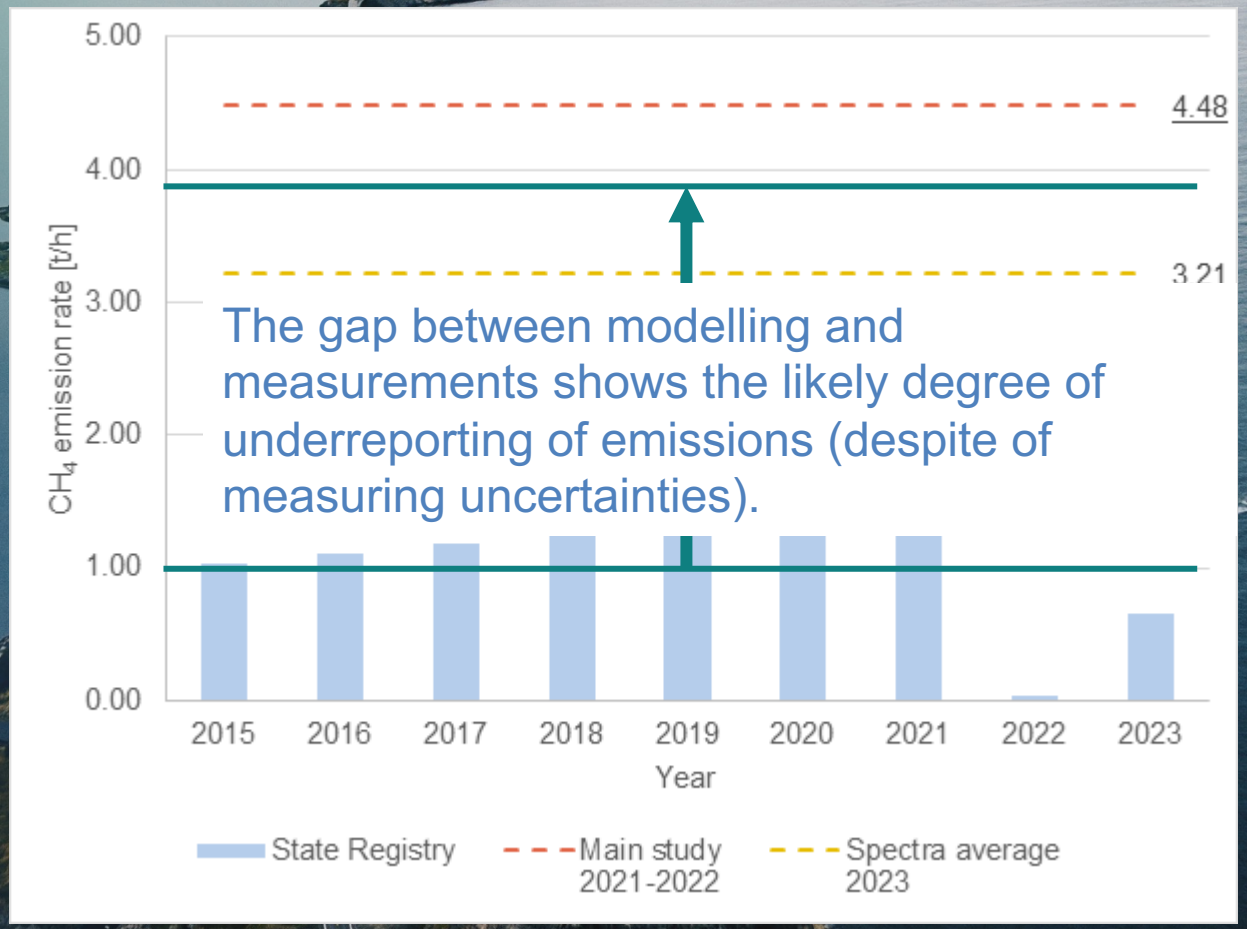
Measuring threshold (conservative)

Topography

Undiscovered fluctuations (diurnal)

Meteorological data

Post processing



Emissions from Pinto landfill in Spain, as reported in NIR and measured by satellite

"Fair" taxation of WtE and landfills

WtE: Taxation of fossil CO_2 emissions

Landfill: Taxation of essentially biogenic methane emissions

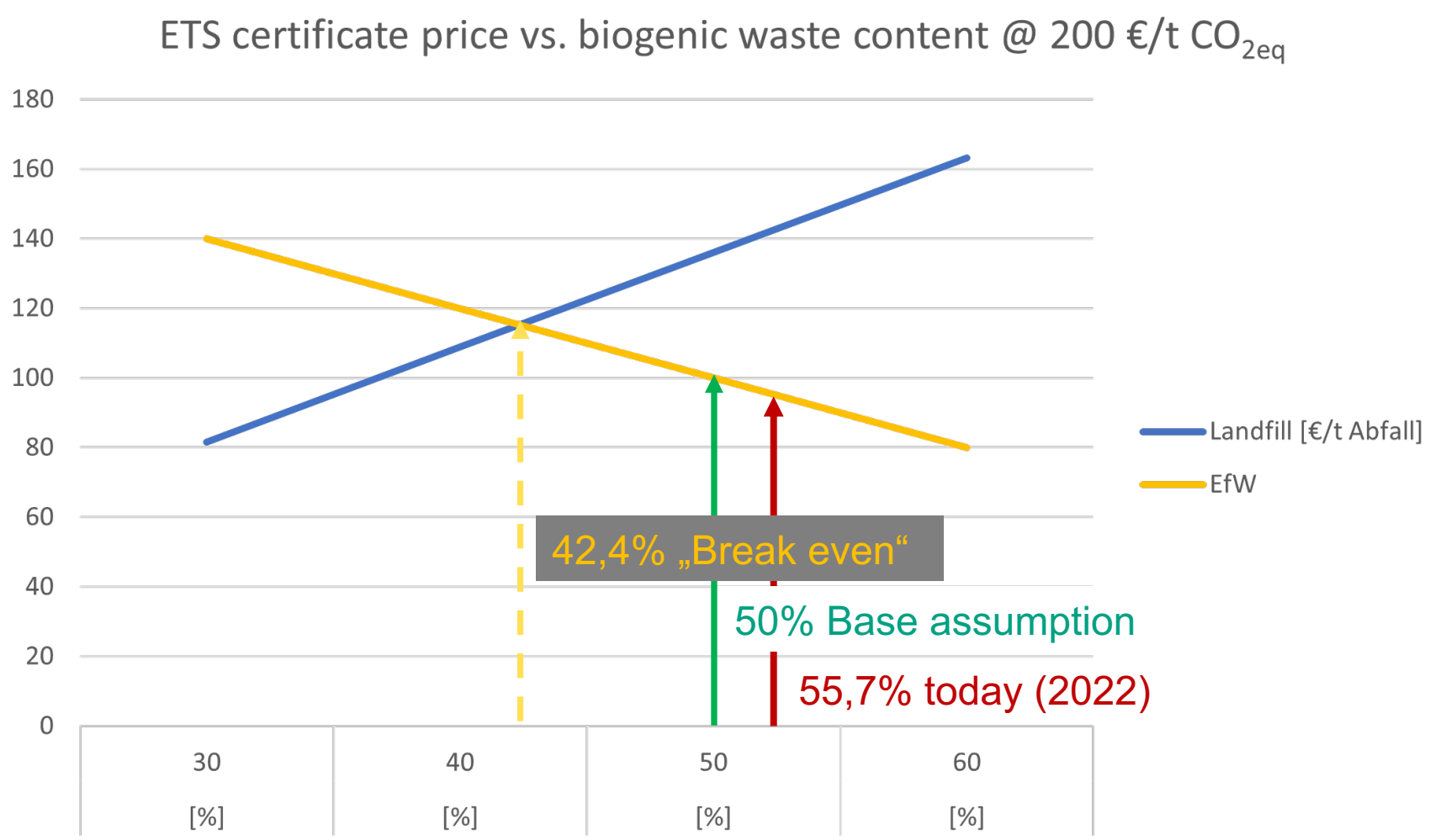
➔ Unavoidable incentive to divert non-recyclable waste, depending on details, in both directions

➔ **Assumptions:** **CO_2 price 200 €/t CO_2**
50% biogenic waste
50% gas capture rate

➔ **WtE:** CO_2 price 100 €/t MSW (@ about 1 t CO_2/t RW)

➔ **Landfill:** CO_2eq price 136 €/t MSW
(1.36 t CO_2eq/t MSW * 200 €/t CO_2eq * 50%)

Sensitivity biogenic content



Based on the above assumptions, the costs for emission certificates per tonne of waste are roughly the same at 42.4% biogenic content.

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Summary

Methane emissions are
as important for climate change as **CO_2**
over a period of 20 years.

Landfills contribute significantly to these GHG emissions.

WtE plants are
a necessary pollutant sink
with secondary benefits (heat, power, hygiene)
whilst reducing GHG emissions.

The steering effect of taxing emissions from WtE is fatal
and would increase GHG emissions.

- If the inclusion of TAB in the EU ETS is indeed unavoidable, the resulting perverse incentives must be offset by the legislators!
- Incentives for shifting waste from WtE to landfills and illegal disposal must be prevented across Europe and across borders!

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Thank you!
Questions?

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