# Cradle-to-gate of AI compute

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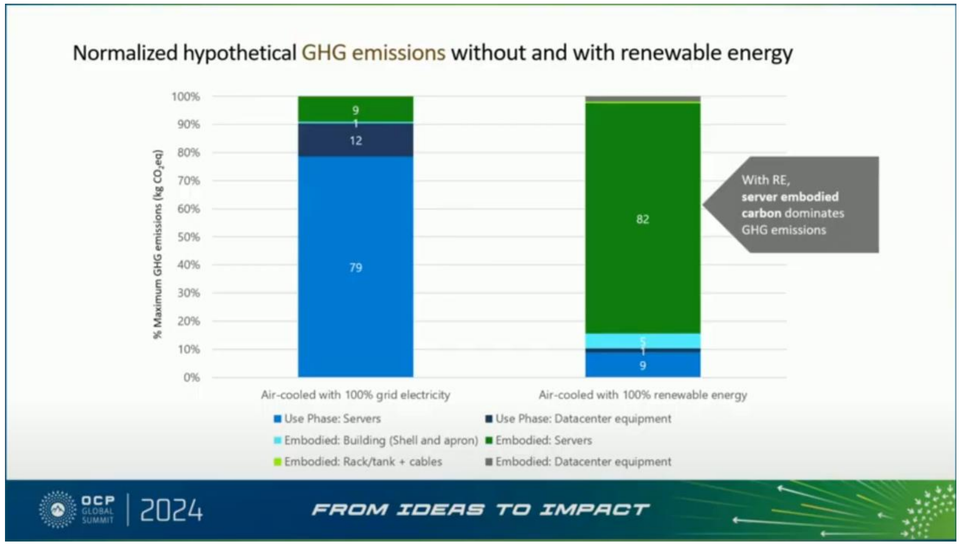
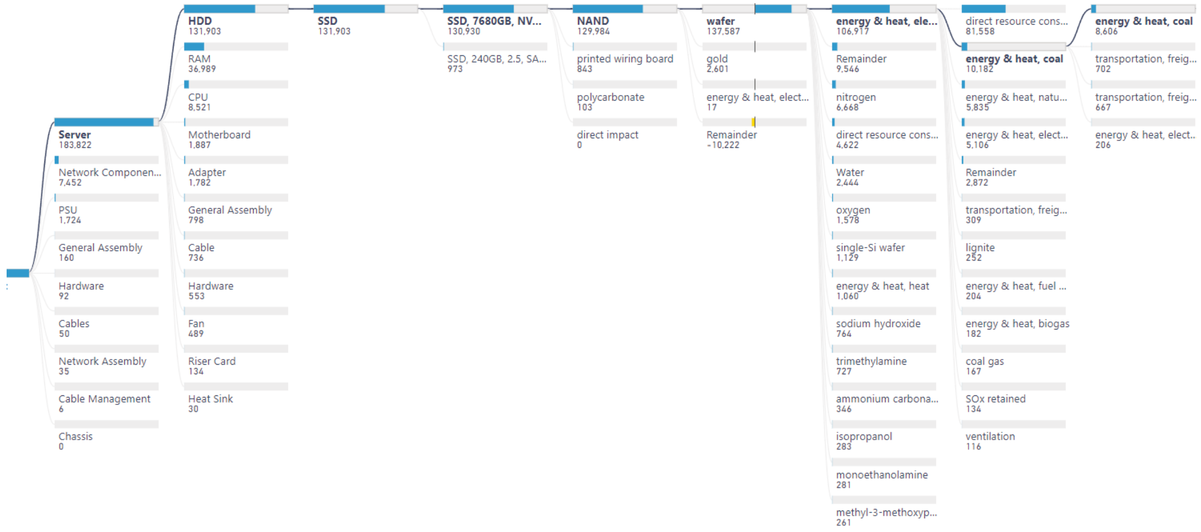
# Datacenter Embodied Emissions




## Open Compute Project (OCP) LCA of a datacenter

Results with and without renewable energy (RE) in operation phase

RE case shows the relative **dominance of the server compute** vs datacenter building, rack, cabling and other equipment.

## Carbon map of a server value chain

Multiple supply chain steps between hyperscaler and sources of GHG emissions **upstream**

Policy solutions need to **translate incentives and drivers across value chain**

Source: Julie Sinistore, Teresa Nick, Husam Alissa, Comparison of GHG emissions, blue water consumption and energy demand of advanced liquid cool, OCP Global Summit, October 2024
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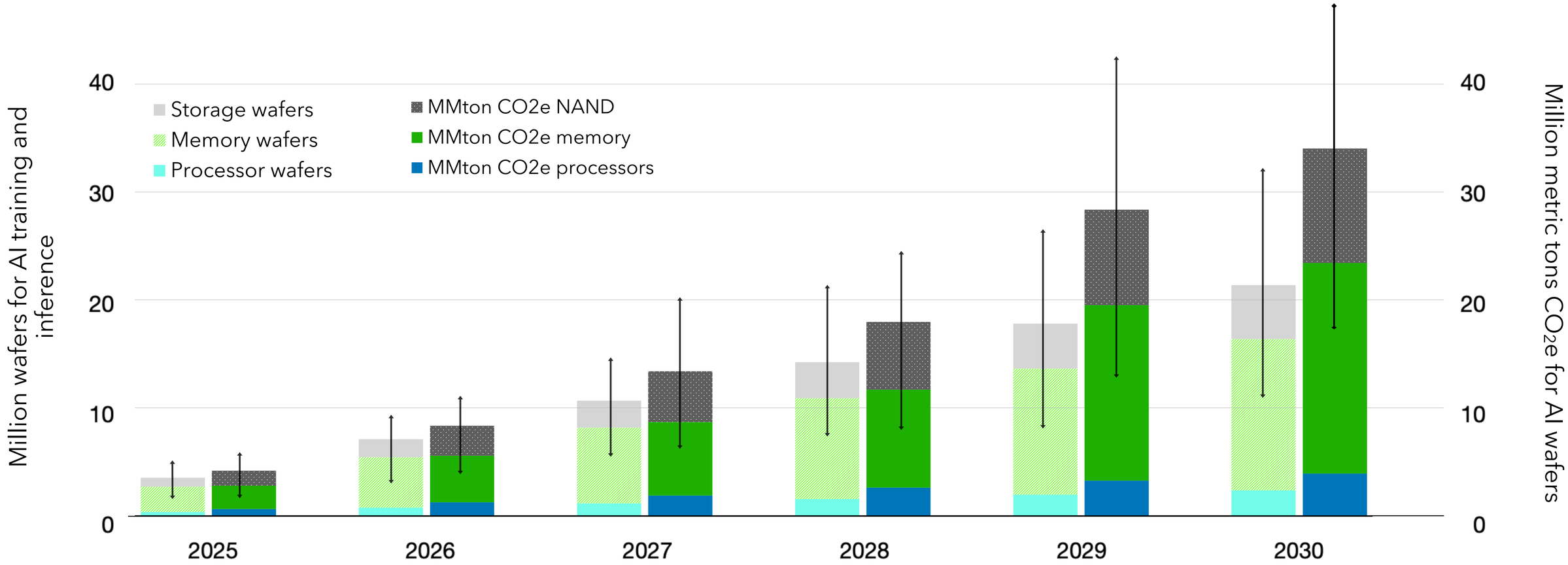
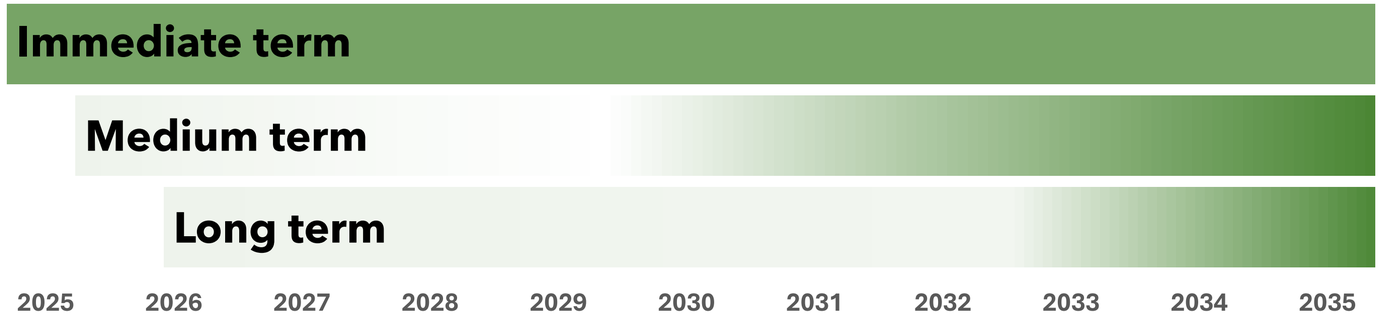
# Growth curve for cradle-to-gate of AI compute

## Business-as-Usual results in additional 20-50 MMton $CO_2e$ by 2030




Wafer volumes from
Ondrej Burkacky, Klaus Pototzky, Diana Tang, Rutger Vrijen, Wendy Zhu, Stefan Burghardt, Orhan Celiker, Sebastian Göke, Yang Han, Demi Liu, Lorenzo Mambrini, and Paul Wittmer
*Generative AI: The next S-curve for the semiconductor industry?*, McKinsey, March 29, 2024

# Technical solutions to the Cradle-to-gate AI challenge

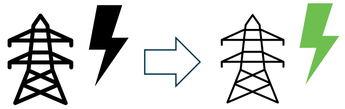



## Immediate term

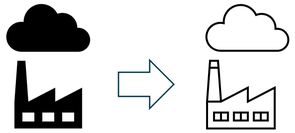
Renewable energy capacity development to meet fab demands in leading node producing countries

Effective fluorinated GHG abatement (tuning, monitoring)

Renewables capacity



F-GHG abatement



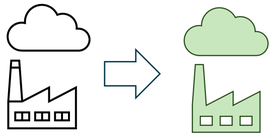
## Medium term

Alternative process chemistries

More advanced abatement of fluorinated GHG process gases

Process gas substitution

Advanced F-GHG abatement



## Long term

Carbon alongside Power, Performance, Area and Cost in semiconductor roadmapping

Optimization for carbon in system-level compute architectures

Lower life-cycle carbon architectures

# Policy solutions to the Cradle-to-gate challenge

**Corporate Sustainability Due Diligence Directive (CSDDD)**

- Ensuring that companies have climate transition plans, addressing value chain (Scope 1, 2 and 3)
- Detailed action plan, setting targets at 5-year increments
- Raising visibility of climate strategy to leadership: Executive compensation tied to target achievement
- Penalties (fines) and civil liability when there is failure to comply

**Ecodesign for Sustainable Products (ESPR) Directive**

- Methods to calculate and track carbon (and other sustainability attributes) for products
- Sets incentives and drives action across value chain through market activity


# Thank you.