

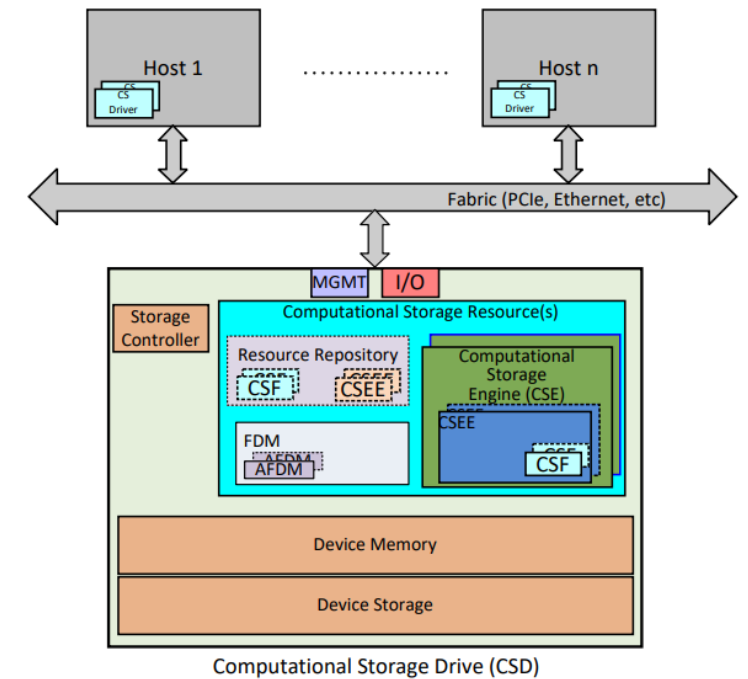
What is the carbon footprint benefit of computational storage?

Presented by Jérôme Gaysse

Computational storage

- Computational storage = moving compute close to data
 - Better performance and lower power consumption
- Low power consumption benefits:
 - Lower cost
 - Smaller infrastructure

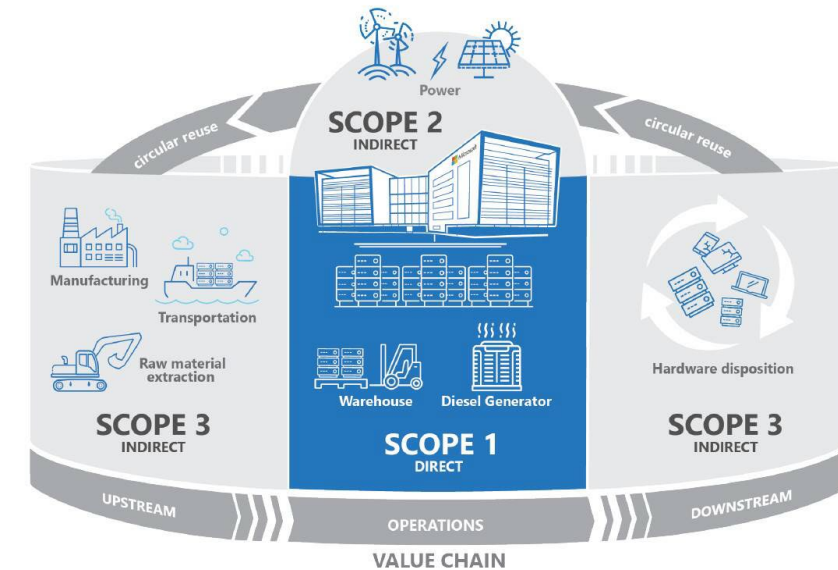
What is the real environmental benefit in term of carbon footprint?



Source : SNIA

Carbon footprint : what is it?

- Estimation of the green house gas (GHG) emission during the full life cycle of a system
 - Scope 1 : Direct emission
 - Scope 2 : Electricity use x PUE x Emission coef
 - Very dependend on the location
 - Scope 3 : manufacturing/transportation/recycling
- Unit : ton or kg CO2e



Source : Microsoft Azure

Carbon footprint : what to consider?

- For a carbon footprint analysis, you need:
 - To well define the system to analyze
 - Tools to measure the usage data
 - Carbon database related mainly to the manufacturing
 - Tools to calculate the carbon footprint
- In the case of computational storage
 - A full running system at the server level (not just the CS device)
 - Carbon database and calculator adapted to CS (*)

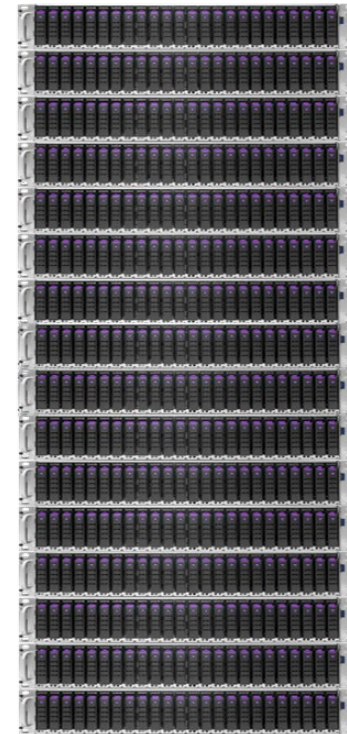
* More details to be presented at the SNIA SDC EMEA on June 14



Use case example : computational storage

- Application : database engine running in a virtual environment
- Standard architecture
 - Server Configuration (x16)
 - 2 CPU, 16 cores per CPU
 - 512 GB RAM
 - 16 HDD per server
 - 500W power consumption
 - 5 years life time
- Computational storage-based solution
 - Server Configuration (x2)
 - 2 CPU, 16 cores per CPU
 - 512 GB RAM
 - 15 CSD per server, 32 TB each
 - 400W power consumption
 - 5 years life time

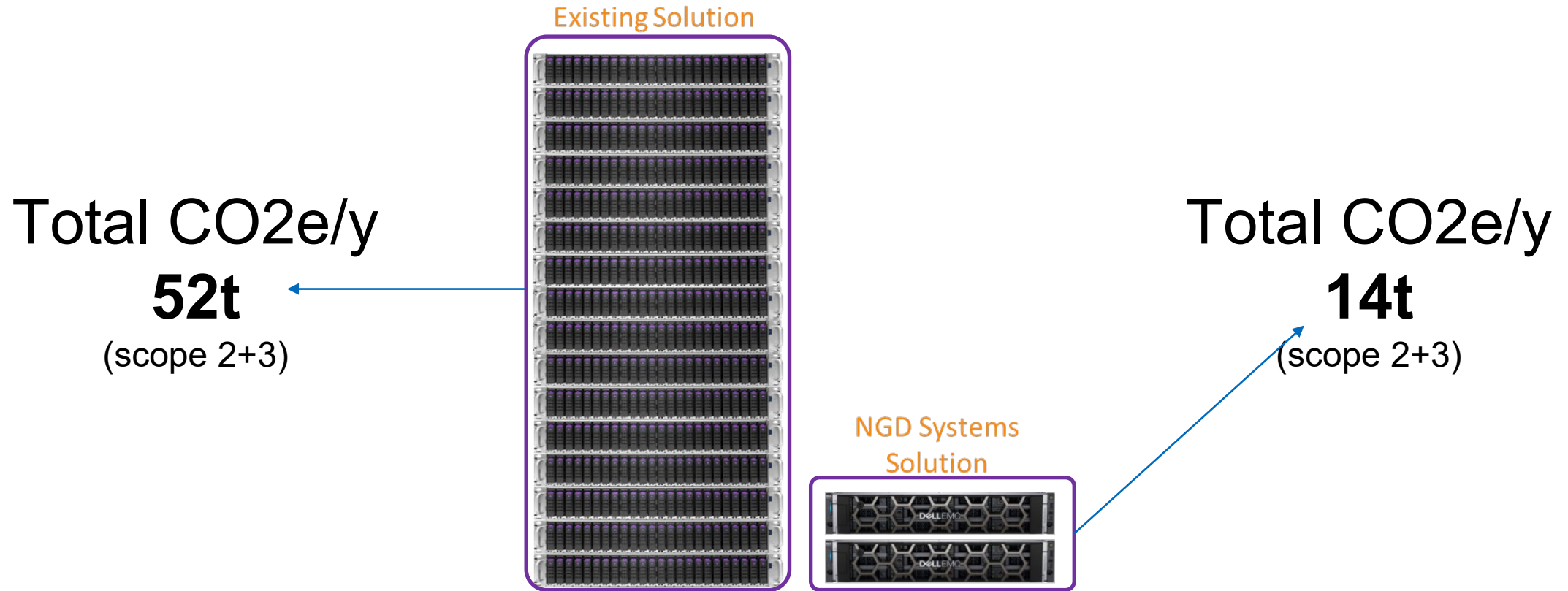
Existing Solution



NGD Systems
Solution



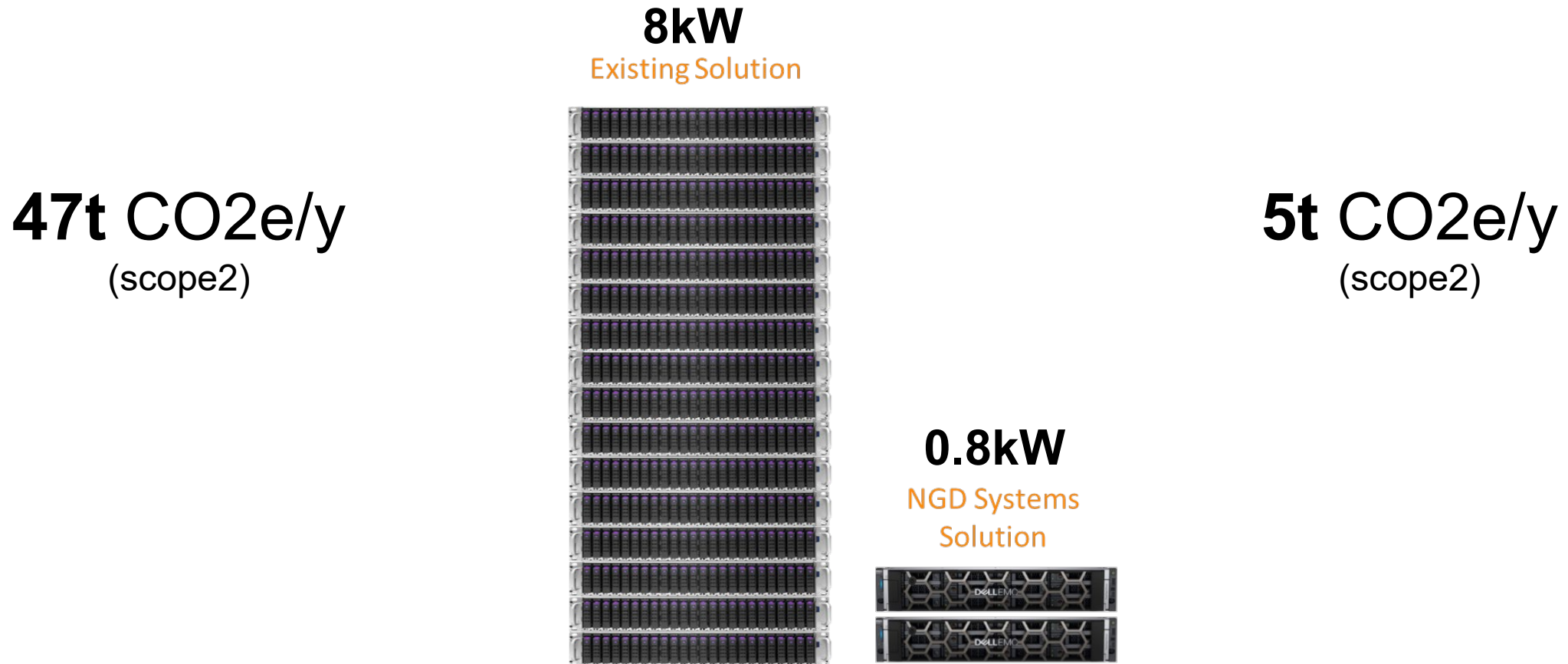
Carbon footprint estimation



Carbon footprint divided by 3.7 at the infrastructure level

Parameters : PUE = 1.3 / Emission factor : 0,522 kg CO2e/kWh (USA average)

Focus on Scope 2 (usage)

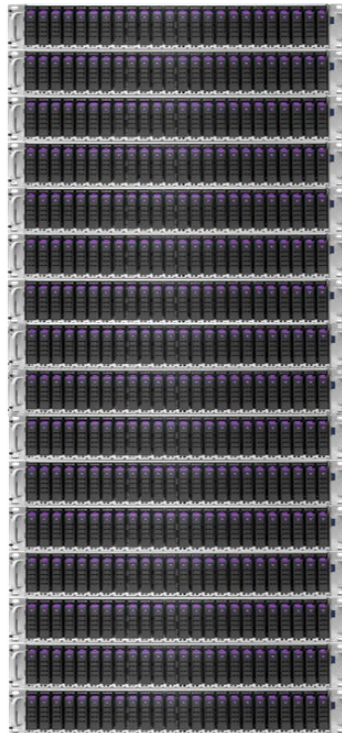


10x lower carbon footprint on scope 2
Due to the 10x lower power consumption

Focus on Scope 3 (manufacturing...)

5t CO2e/y
(scope3)

Existing Solution



9t CO2e/y
(scope3)

NGD Systems
Solution



Carbon footprint increase on scope 3
Due to the semiconductor process

Comments and conclusion

- Computational Storage brings real and great carbon footprint benefits
 - Upt to 4x reduction
- The scope 3 increase may be limited in the future
 - Semiconductor manufacturing plants to move to renewable energy
- CSD based solutions consumes less space
 - There is an related carbon footprint reduction
- Note:
 - Unfortunatly, at this time, carbon database are still not very accurate
 - A carbon footprint analysis is really dependent on the location

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