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CopenCloud Rapport

Intelligent data storage can optimize organizations' costs and lower their climate footprint.

17 May 2023

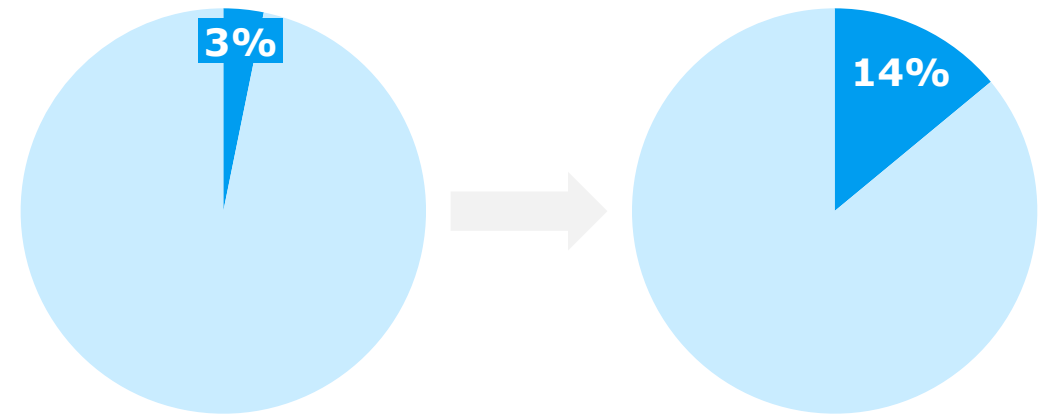
This report has been prepared in connection with a competence development and counseling course, supported by the Beyond Beta program.

The purpose of the report is to demonstrate what effect Intelligent data storage has on optimization of organizations' costs and reduction of their climate footprint.

Greenhouse gas emissions from data storage are a growing global challenge, which creates a great demand for solutions



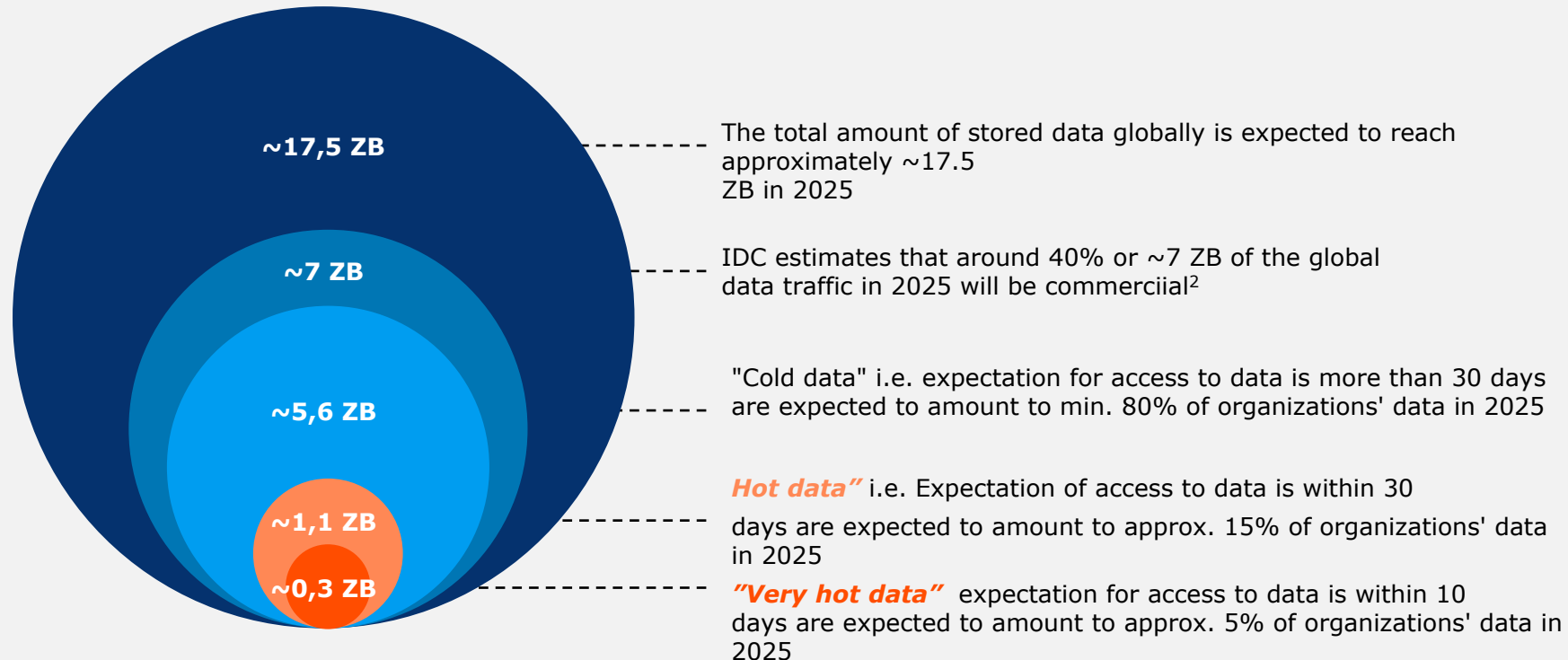
Global data traffic is expected to reach approximately 175 ZB i 2025 of which 10% or ~17.5 ZB data is expected to be stored



Data centers are expected to make up 3.2% of global greenhouse gas emissions in 2025. And in 2040 it is expected this proportion to rise to 14%, which is why there is a great need for effective data storage solutions

Cold/inactive data constitutes the fastest growing data segment and expected to account for ~5.6 ZB of commercial data by 2025^{1,2}

Total amount of stored data globally in 2025

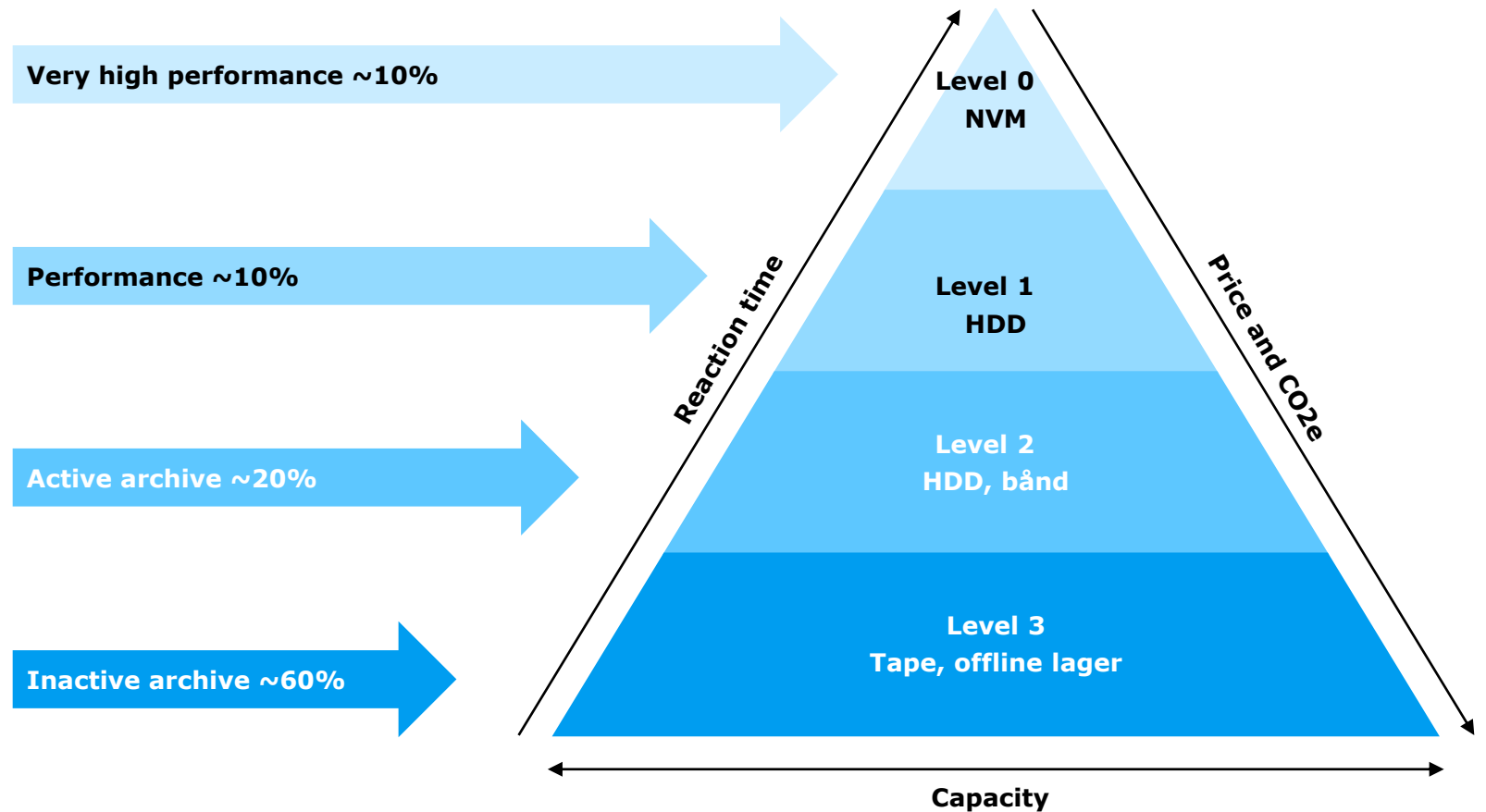


- IDC expects that commercial data, i.e. data belonging to organisations, amounts to approx. 40% of the total amount of stored data globally
- The total amount of stored commercial data can be further segmented as hot/cold, depending on when the data is expected to be accessed by the user
- Horison Information Strategies estimates that 60% of data today can be classified as cold/inactive data, i.e. data that a user rarely or never accesses or changes, and that this proportion may rise to 80% in 2025¹
- **Kold/inaktiv data** thus constitutes the largest and fastest growing data segment
- Thus, there is a great need for solutions that can be stored cold/inactive data in an energy- and cost-efficient manner

Today, many organizations store their inactive/cold data on energy-intensive solutions, which is inefficient¹

- As organizations' volume of data and therefore storage needs grow, correct segmentation and storage of data becomes more important^{1,2}
- Today, many organizations store their cold/inactive data on energy-intensive solutions such as HDD*, resulting in high costs and a high climate footprint²
- Organizations can thus achieve savings in costs and climate footprint by moving their cold/inactive data to storage solutions such as tape storage, which have a lower energy consumption
- Archive storage is suitable for cold/inactive data that an organization does not need to use every day
- The benefits of archival storage include lower costs and climate footprint due to lower energy consumption compared to SSD** and HDD¹
- The primary disadvantage associated with archive storage is the longer response time, which means that data that needs to be accessed immediately or very quickly is not suitable for this type of data storage
- On the right, Horizon Information Strategies' proposal for how an organization's data is optimally stored in various storage solutions can be seen

Optimal % data allocation per tier for an average organization¹



Data should be stored according to how often it is accessed and where valuable it is to the organization^{1,2}

- The challenge for many organizations is to understand which data is hot/active and which data is cold/inactive, and thus which can be moved to long-term storage^{1,2}

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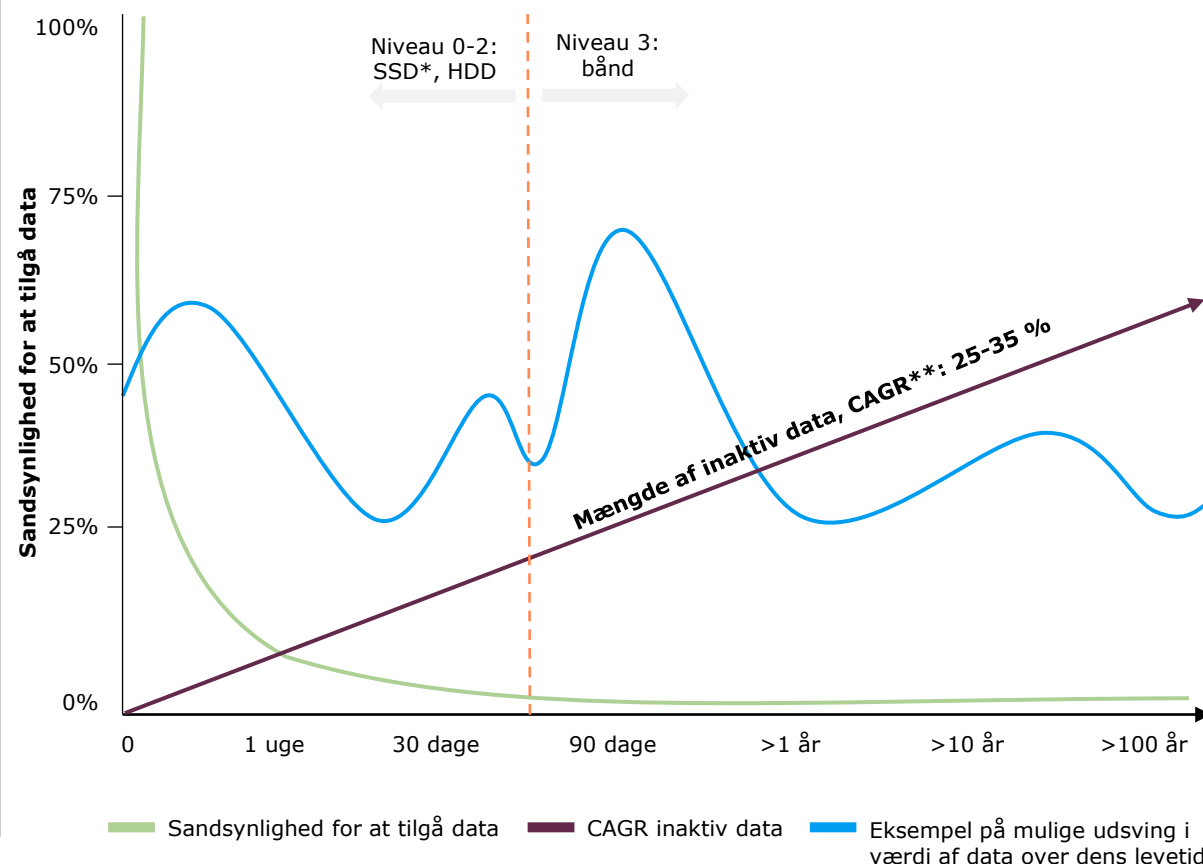
2. H\Y'j Ui Y'cZgdYVWZ]WXUHJ'hc'Ub'cf[Ub]nUH]cb'a Umj Ufmicj Yf'h]a Y

3. H\Y'Ua ci bh'cZgh'cfYX'XUHJ'g'ghYUX']m]bWYUg]b['Ug'a cfY'XUHJ'g' [YbYfUH'YX'UbX'XUHJ'g' [YbYfU'm'gh'cfYX'Zcf'U'cb[Yf'dYf]cX'cZ]h'a Yz']"Y"'U'cb[']'ZY'WVWY'g' VYVta]b['a cfY'bcfa U'k]h' gh'cfU[Y'dYf]cXg'YI WYX]b['%\$'mYUfg"'H\g'U'gc']bWYUgYg'h\Y'Ua ci bh'cZ XUHU'h\UH'g\ci 'X'VY'gh'cfYX']b'Y'j Y''

- Software der automatisk og intelligent flytter data** baseret på hyppigheden af tilgang til data **bliver derfor attraktiv**, dvs.

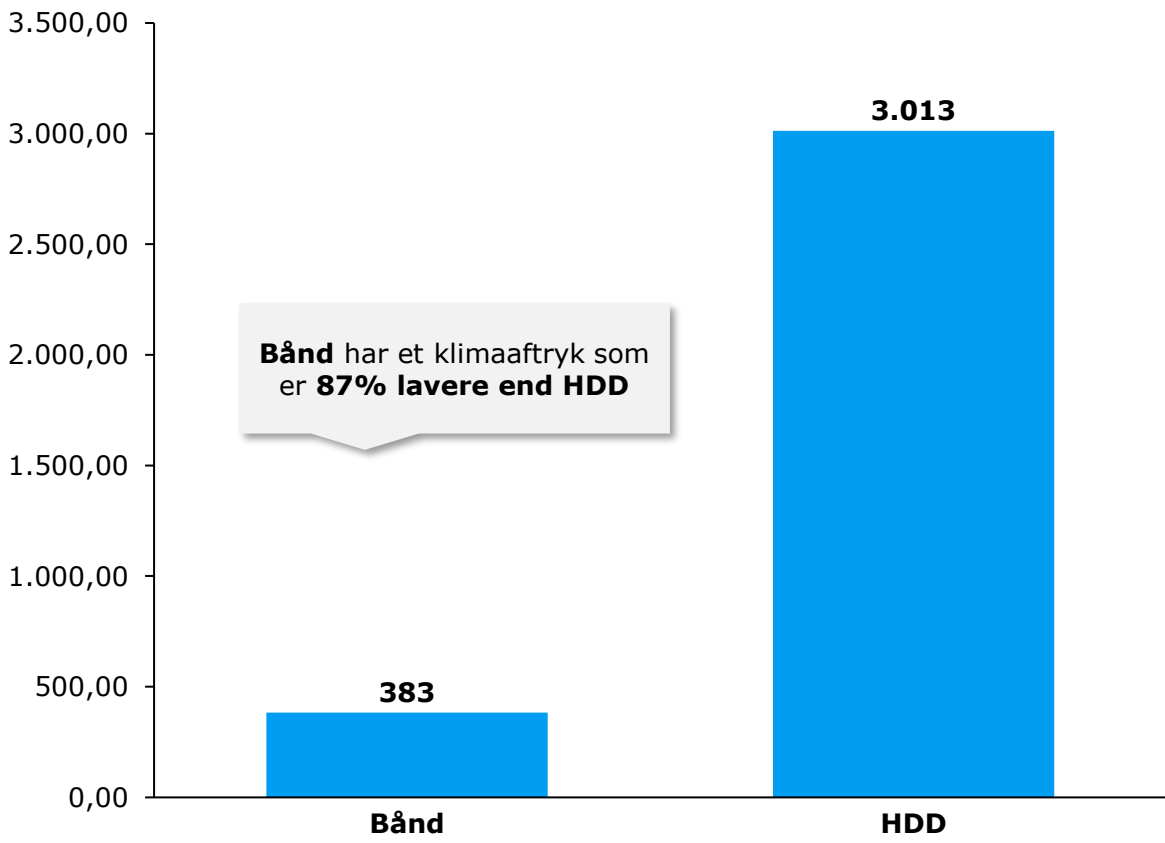
- ✓ **Data der sjældent tilgås og bliver inaktive bliver automatisk flyttet** til arkivlagring
- ✓ Hvis **hyppigheden af datatilgangen øges, flyttes** data fra arkivlagring **til et højere lagringsniveau** (0, 1 eller 2), mens data **hvis hyppighed af tilgang falder** over en periode **flyttes til et lavere niveau**

Eksempler på faktorer som påvirker hvordan data bør lagres^{1,2}

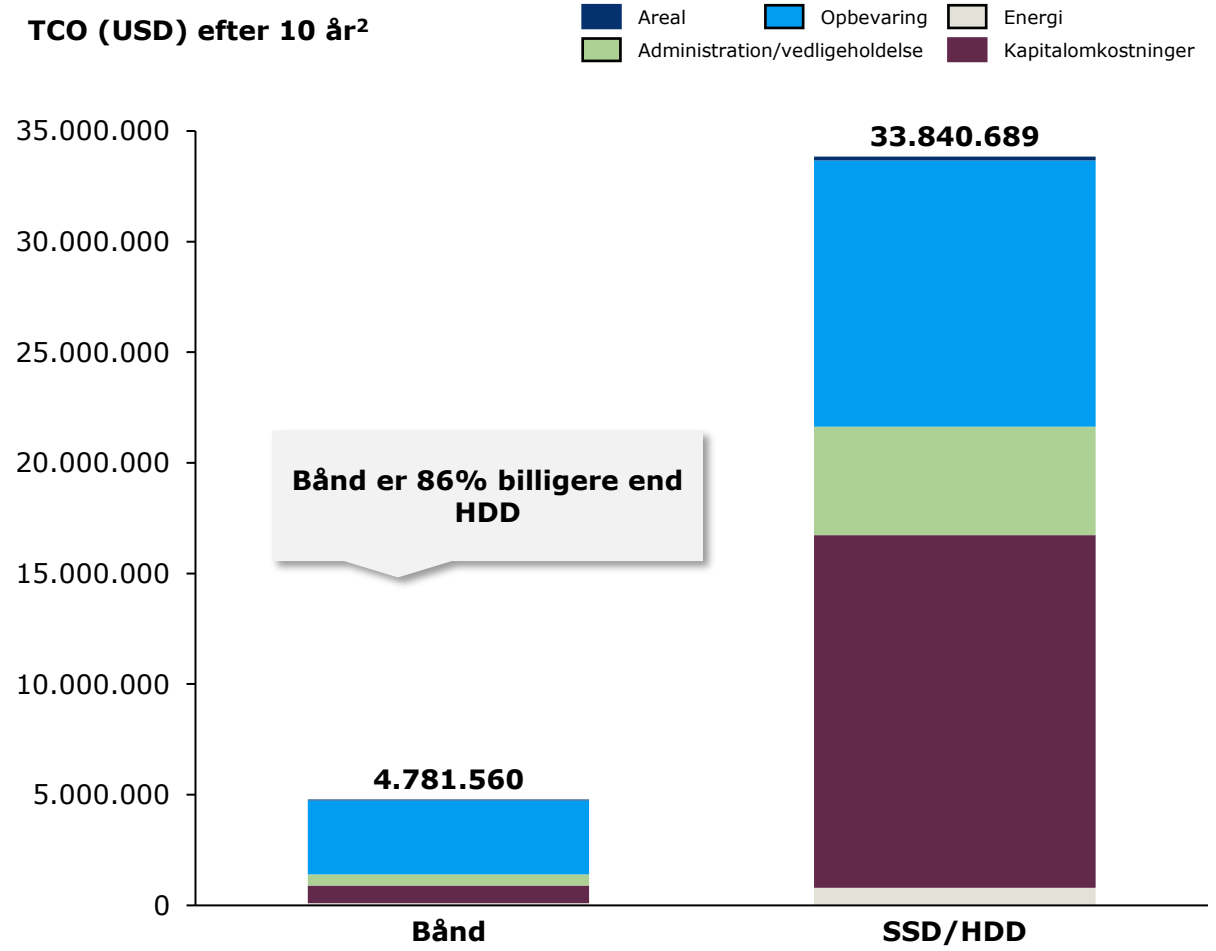


Båndlagring fremstår som den mest omkostnings- og energieffektive løsning sammenlignet med SSD og HDD¹

Tons CO₂æ efter 10 år²



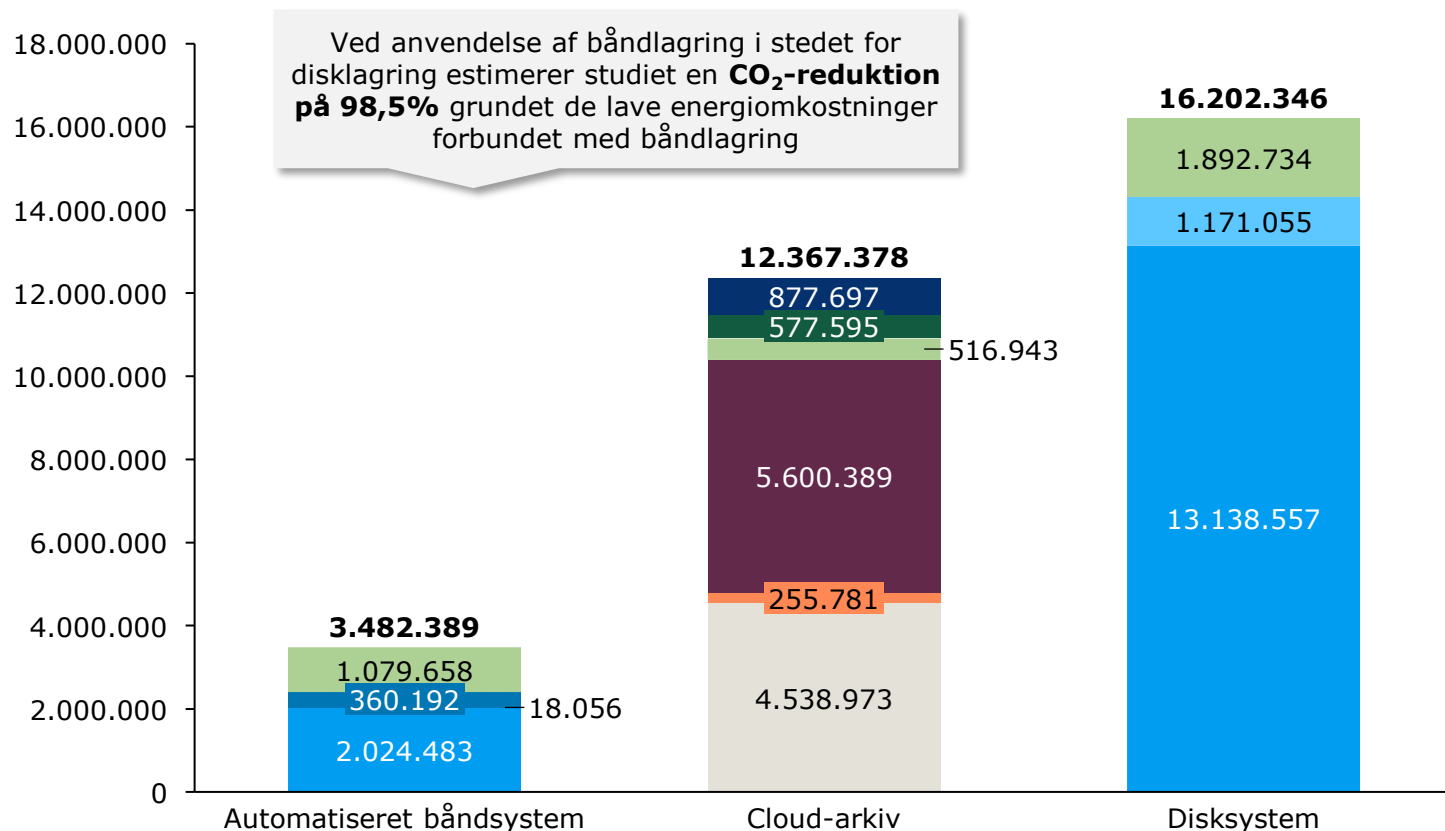
TCO (USD) efter 10 år²



¹Reducing Data Center Energy Consumption and Carbon Emissions with Modern Tape Storage, Brad Johns Consulting LLC (2020); ²10PB med en årlig vækst på 35% over en 10-årig periode. Studiet antager at elektriciteten til datalagring kommer fra gas. TCO = Total Cost of Ownership

Båndlagring fremstår som den mest omkostningseffektive løsning sammenlignet med disk og cloud-arkiv¹

Sammenligning af TCO* for forskellige lagringsløsninger (total efter 10 år i USD)¹



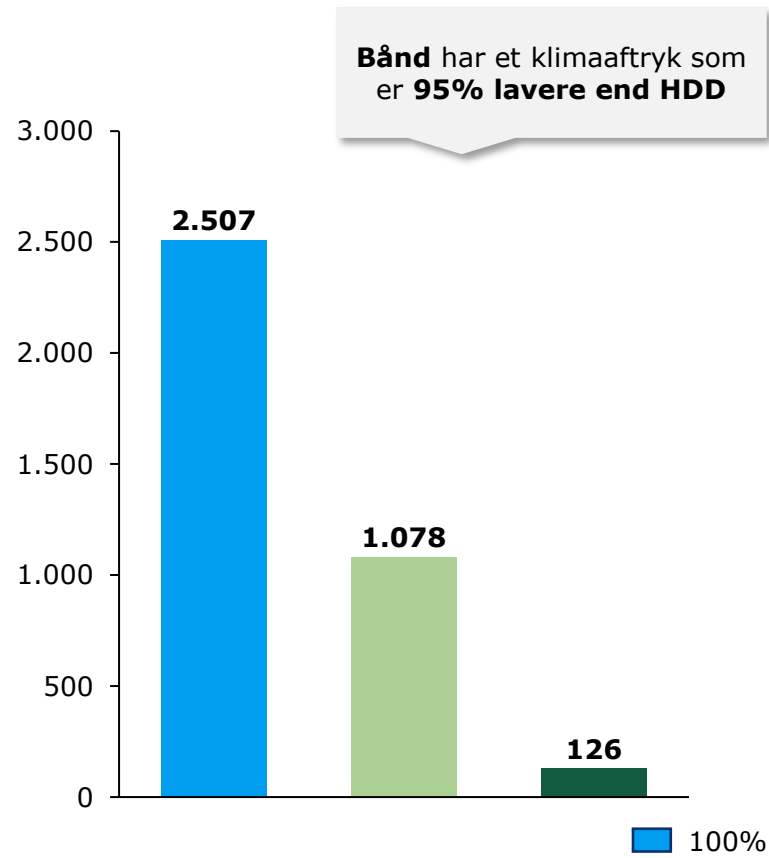
- Bånd er henholdsvis **79% og 72% billigere end disk og cloud-lagring efter en 10-årig periode**
- **Besparselsen ved at anvende båndlagring** fremfor lagring på disks og Cloud er **mere udpræget efter en 10-årig end en 5-årig periode**
- Dette skyldes at **bånd har en længere levetid (>30 år) end disksystemer**, som i gennemsnit skal udskiftes hvert 5. år
- Samtidig er **båndlagring billigere end Cloud-lagring grundet sidstnævntes løbende årlige omkostning** forbundet med opbevaring, flytning og hentning af data

	Automatiseret båndsystem	Cloud-arkiv	Disksystem
TCO efter 5 år (USD)	1.508.715	3.594.966	5.285.564
TCO efter 10 år (USD)	3.482.389	12.367.378	16.202.346

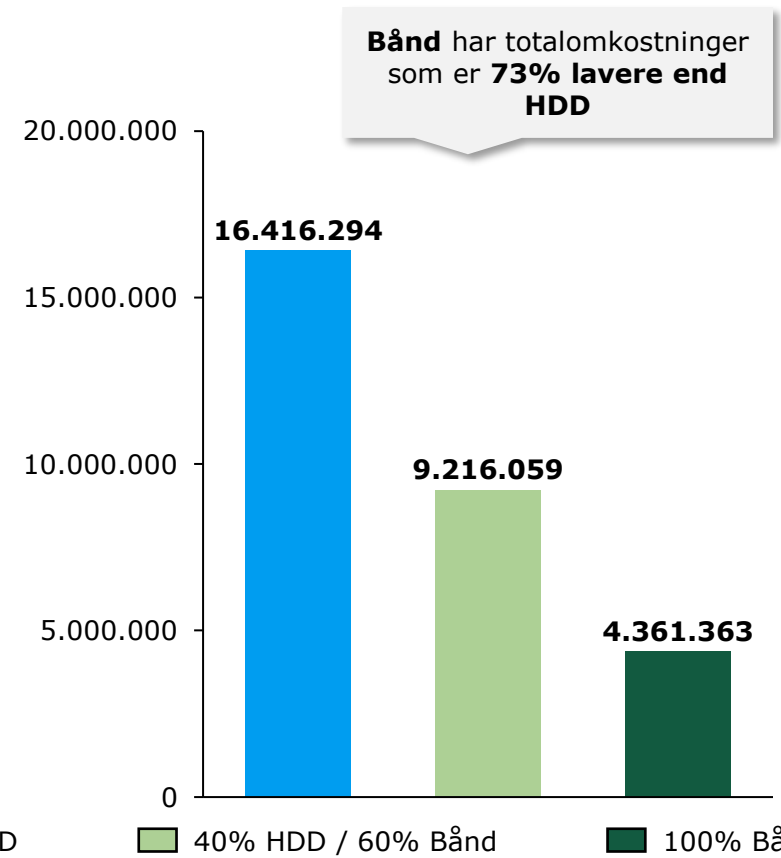
- Anskaffelse, inkl. produktgaranti
- Båndbredde
- Energiomkostninger
- Leverandør gebyr for opbevaringsydelse
- Leverandørgebyr for flytning af data
- Leverandørgebyr for hentning af data
- Leverandørsupport
- Styring af opbevaring
- Vedligeholdelse

Båndlagring har både et lavere klimaaftryk og pris samt genererer mindre elektronikaffald sammenlignet med HDD

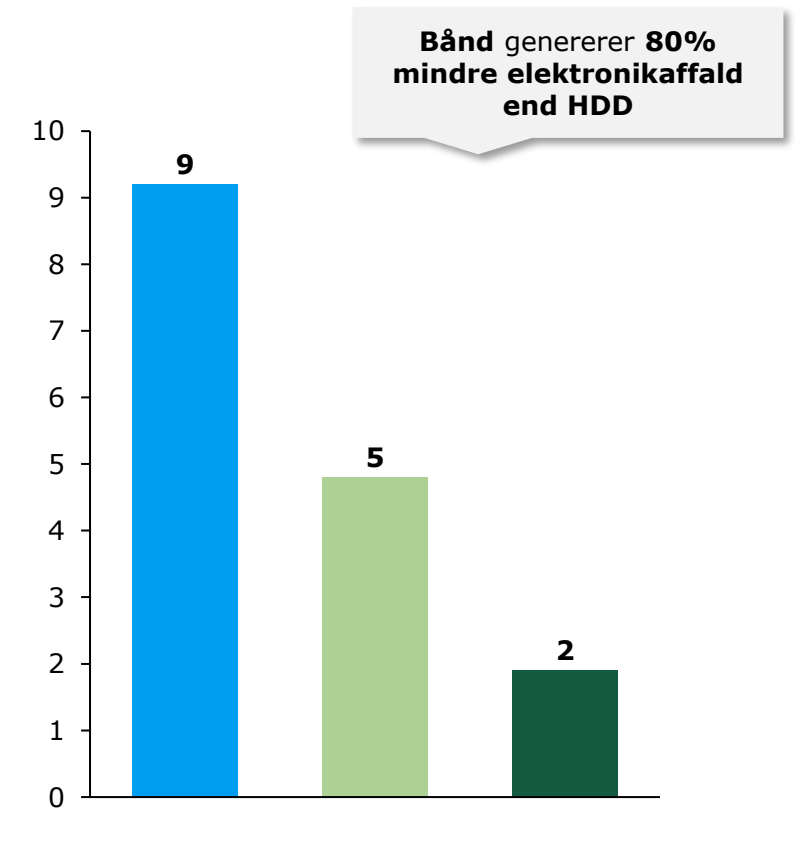
100 PB 10 års CO₂æ (tons)¹



100 PB 10 års TCO (USD)¹



100 PB 10 års elektronikaffald (tons)¹



Vidensressourcer | Intelligent datalagring kan optimere organisationers omkostninger og sænke deres klimaaftryk (2,2)

Titel	Kilde	År
Tape to Play Critical Roles as the Zettabyte Era Takes Off	Tape Storage Council	2022
Accelerating Green Datacenter Progress with Sustainable Storage Strategies	International Data Corporation (IDC)	2021
Tiered Storage – Storage Optimization for the Zettabyte Era	Horison Information Strategies	2021
White Paper – Tape and Cloud: Solving Storage Problems in the Zettabyte Era of Data	Phil Goodwin	2019
Tiered Storage – Building the Optimal Storage Infrastructure	Horison Information Strategies	2020
Reducing Data Center Energy Consumption and Carbon Emissions with Modern Tape Storage	Brad Johns Consulting L.L.C.	2020
TCO Calculator for Data Storage – How much can you save by using tape for enterprise backup/archive storage?	Fujifilm	2023
Improving Information Technology Sustainability with Tape Storage	Brad Johns Consulting L.L.C.	2021
The future of tape – white paper	Fujitsu	2022
Magnetbånd lever i bedste velgående: Nu kan du lagre 580 terabyte på ét bånd	Ingeniøren	2021

Vidensressourcer | Intelligent datalagring kan optimere organisationers omkostninger og sænke deres klimaaftryk (2,2)

Titel	Kilde	År
Effective Data Management Through Active Archives	The Active Archive Alliance	2023
Preservation or Deletion: Archiving and accessing the dataverse	John Monroe, Further Market Research	2023
Tape Becomes a Key Enabler for the Zettabyte Era	Horison Information Strategies	2021
How Tape Technology Delivers Value in Modern Data-driven Businesses	IBM and Fujifilm	2021
A more comprehensive TCO study	Brad Johns Consulting L.L.C.	2019

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