Libraries and Collections in times of climate crisis

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CERL Summerschool, Vienna

Consortium of European Research Libraries

KB national library of the netherlands

- Introduction
- What is our challenge?
- Our solution
  - Climate simulation study

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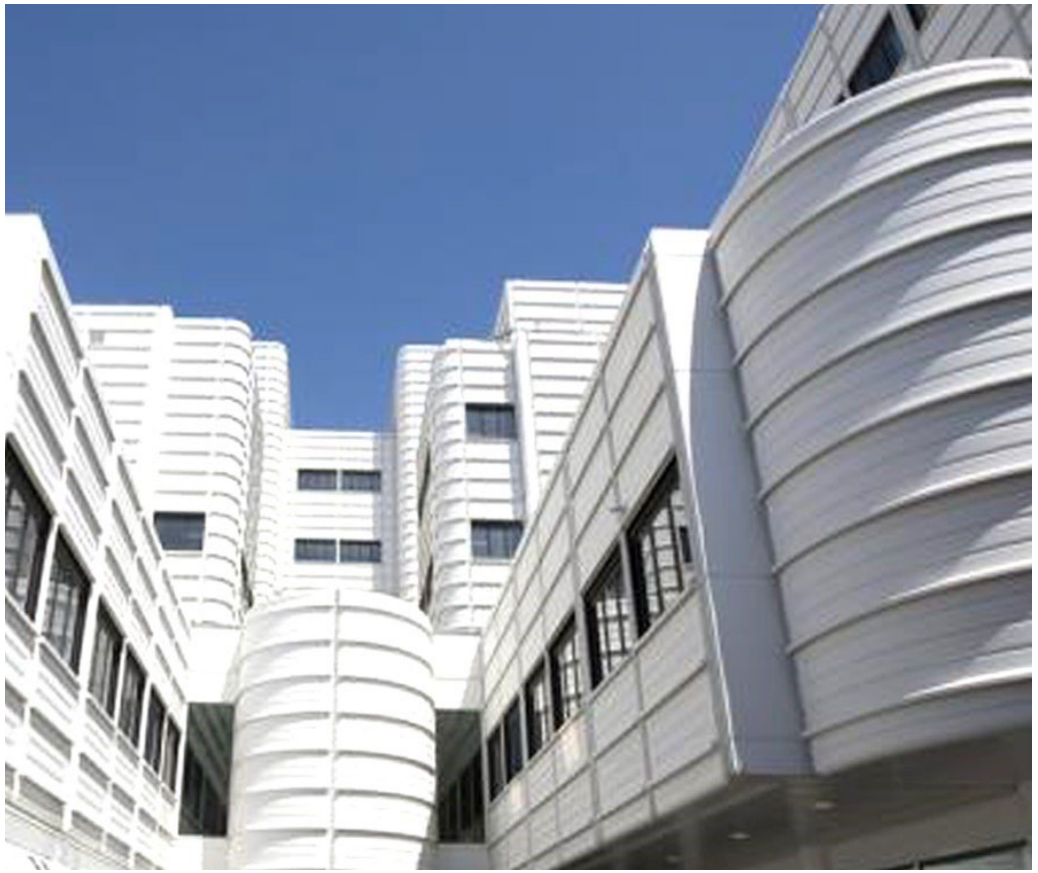
KB national library of the Netherlands, The Hague



1982 main building, reading rooms
and (underground) storage

2007 additional storage

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Physical collections

Books	3.500.000
Periodicals	700.000
Newspaper	100.000
Special collections	575.000

Total > 4,4 million items
125 linear kilometres

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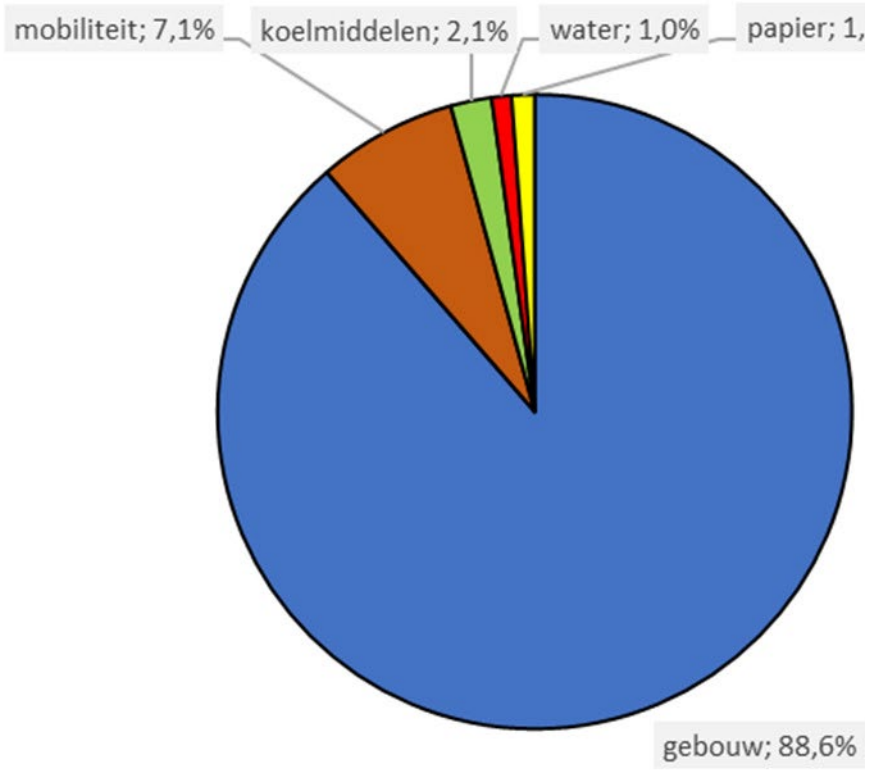
Challenge

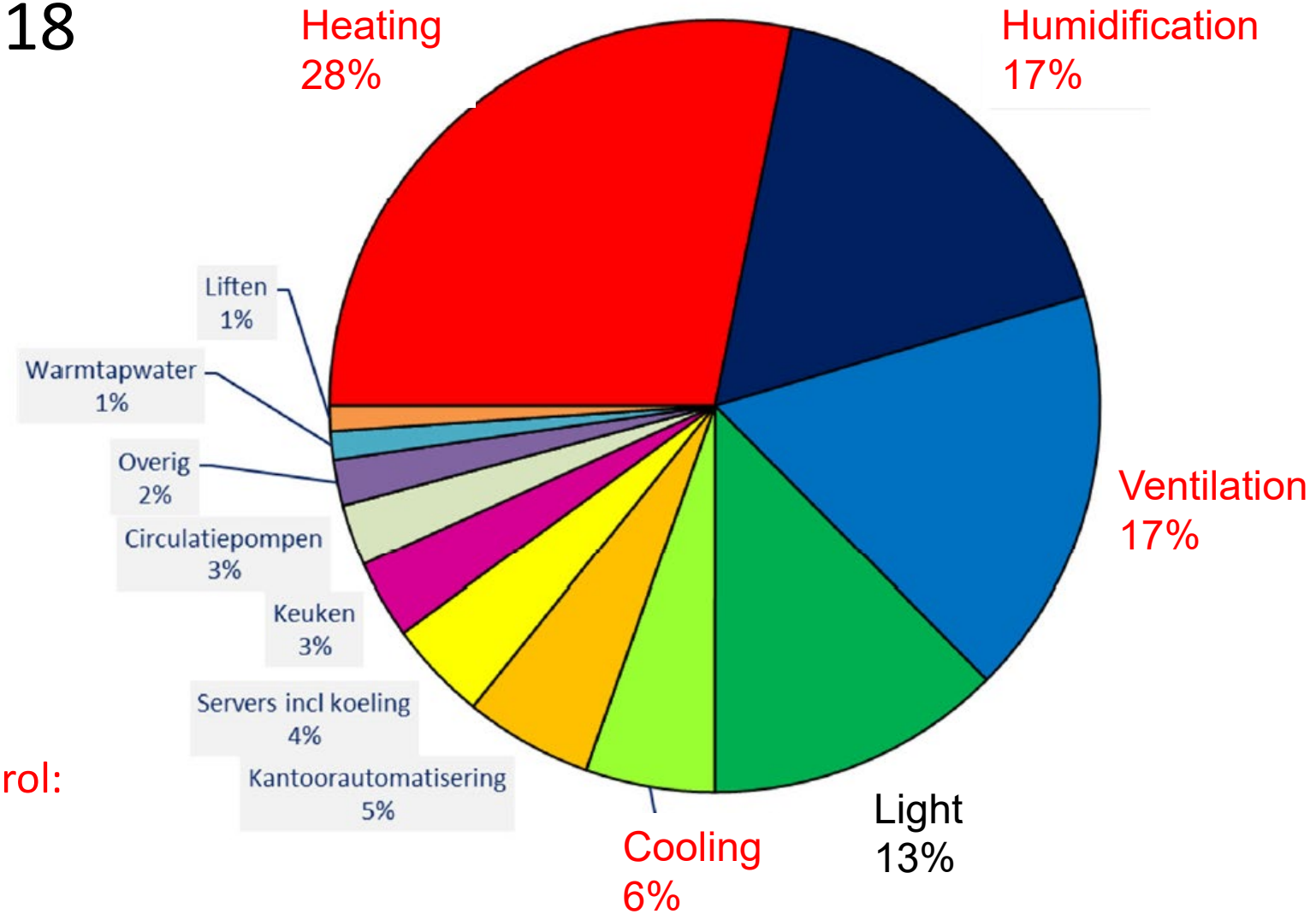
Current location is not ‘future-proof’

- Limited space for collection growth
- Renovation is too costly
- Storage in a top location
- Long term exploitation is not sustainable:
  - Active climate control (HVAC)
  - Systems out of date
  - Huge replacement costs
  - Increasing energy costs

Challenge

Energy consumption 2018





c. 70% of this energy is used for climate control:

- Heating 28%
- Humidification 17%
- Ventilation 17%
- Cooling 6% - also for de-humification

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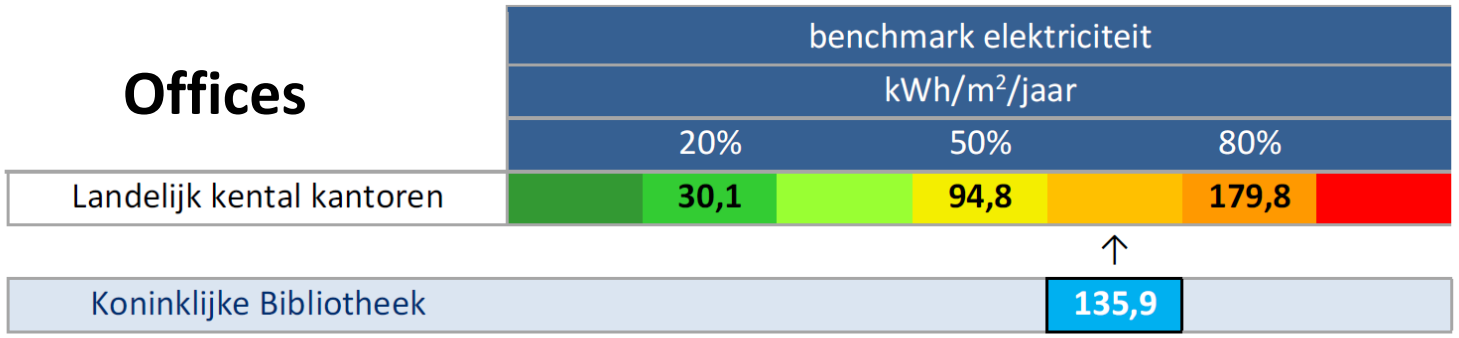
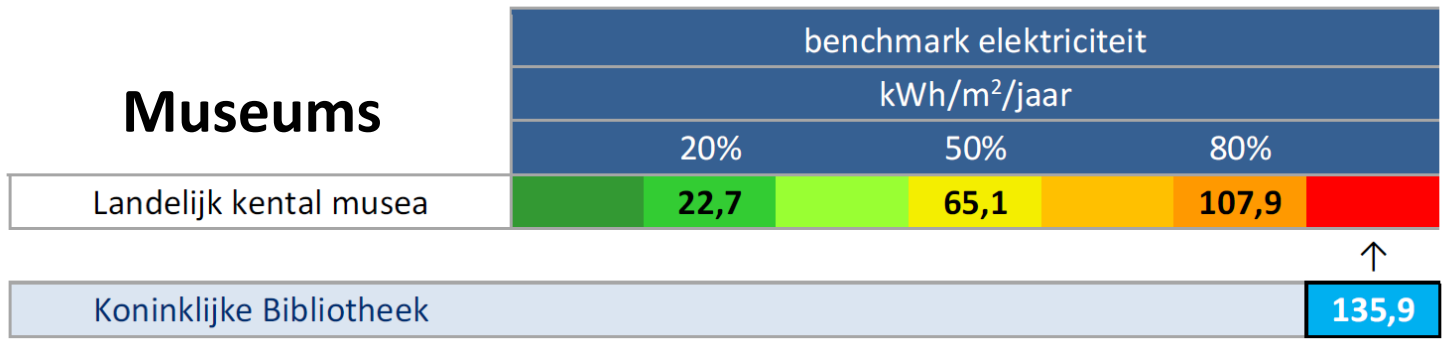
Challenge

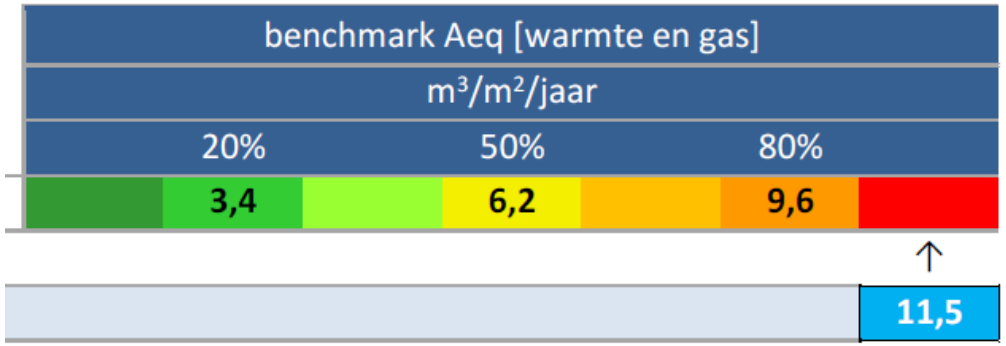
Energy consumption 2018

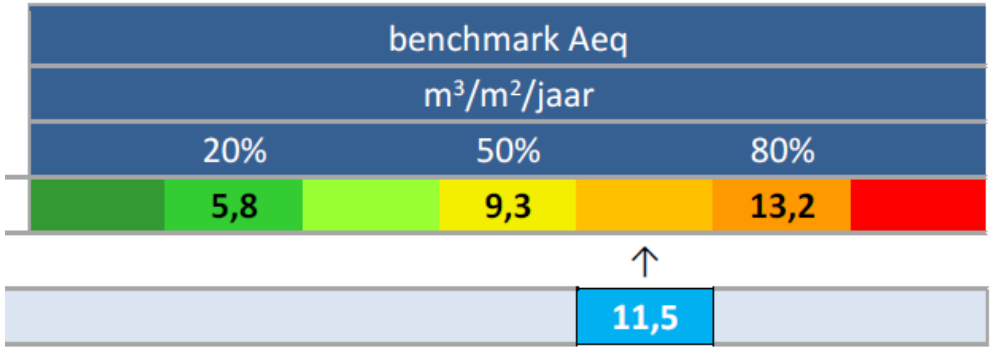
Electricity





Gas





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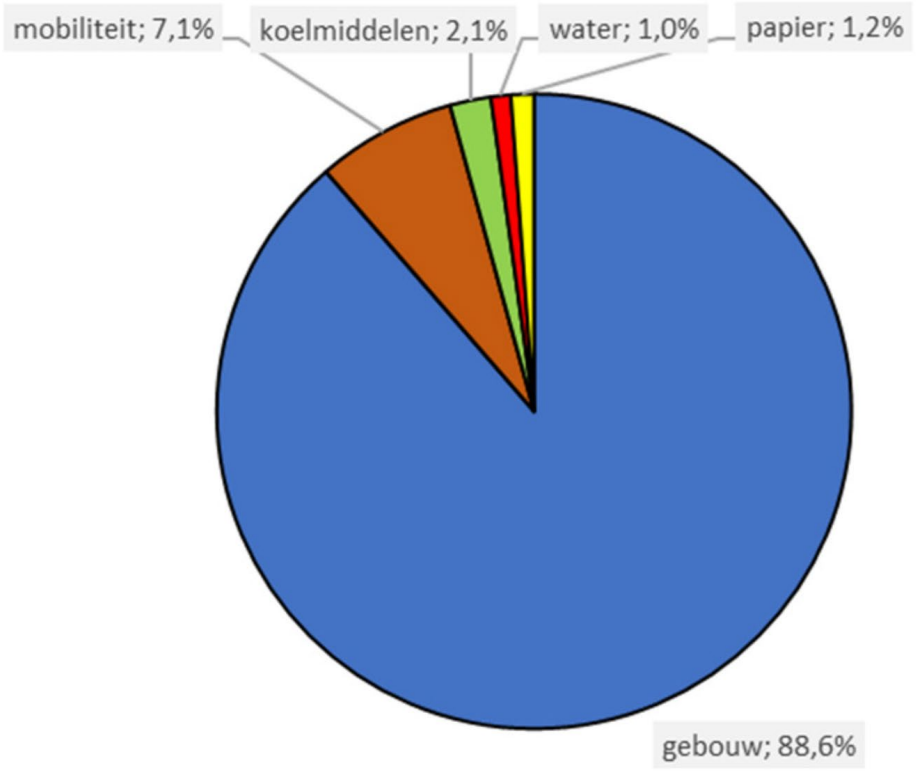
Challenge

Energy consumption 2018



2018: CO_2-footprint 1.132 ton CO_2

(= 19,9 kg CO_2/m^2)

Use of renewable electricity from wind =

reduction of CO_2-footprint by 5.010 ton CO_2

Sustainable Development Goals for the KB

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Sustainability goals for the care of collections

*those commissioning new and refurbished spaces to specify the use of low tech and **low energy methods** to create reasonably stable environmental conditions.*

Mark Jones, Director of the V&A
2008 Nov - Museums and Climate Change

*Care of our art collections should therefore be expressed in a way that **does not assume air-conditioning** or any other current solutions.*

Nicholas Serota, director of Tate
2008 May - Museum Environmental Conditions in an Era of Energy Constraint – Paper to the Bizot Group Meeting

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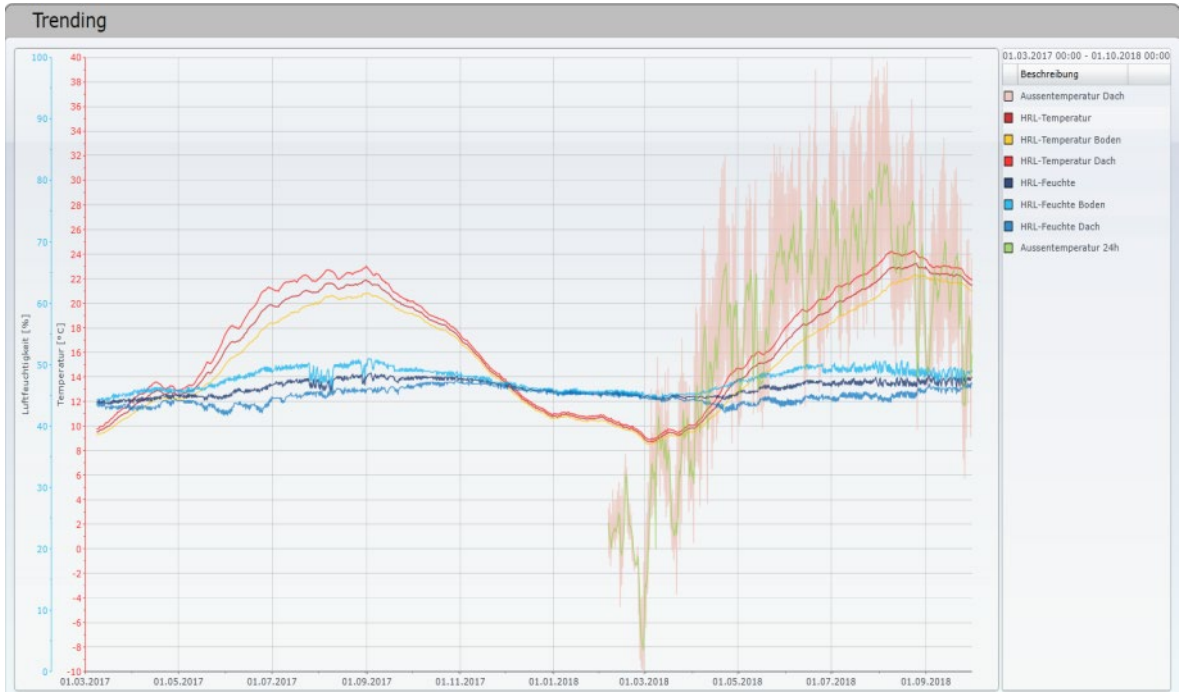
Sustainable climate control strategy

Realisation of a new storage facility:

- Optimal preservation conditions
- As little dependency on technical climate control installations as possible:
  - RV has to be stable and within safe boundaries
  - T is allowed to follow seasonal changes
- Energy neutral

Sustainable climate control strategy – passive building

Speicherbibliothek, Büron
Super high density robotized storage



Climate data 2017-2018 (copyright: Mike Märki, CSLS)

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Sustainable climate control strategy – mitigation of risks

- Super high density storage
- Thick walls, water proofed
- Exclusion of water carrying systems
- Building above sea level/flood planes
- Robotized storage – exclusion of people working in the stacks

Improved preservation quality

increased risk of fire

Low O_2

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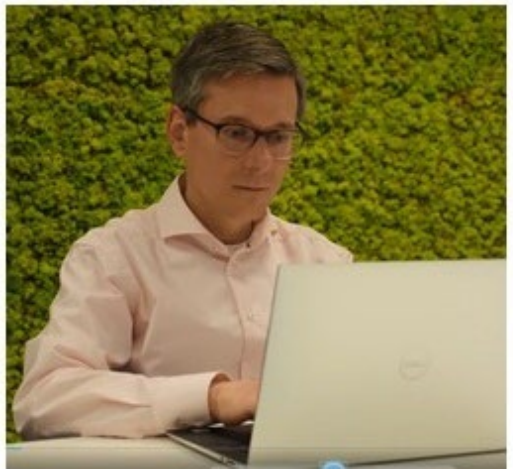
Climate simulation



Project team:
Foekje Boersma - KB national library of the Netherlands
Marco Martens - Helicon conservation support, Dyseco
Bart Ankersmit - Cultural Heritage Agency
Marc Stappers - Cultural Heritage Agency
Seojin Kim- Cultural Heritage Agency

HELICON CONSERVATION SUPPORT

Cultural Heritage Agency
Ministry of Education, Culture and Science

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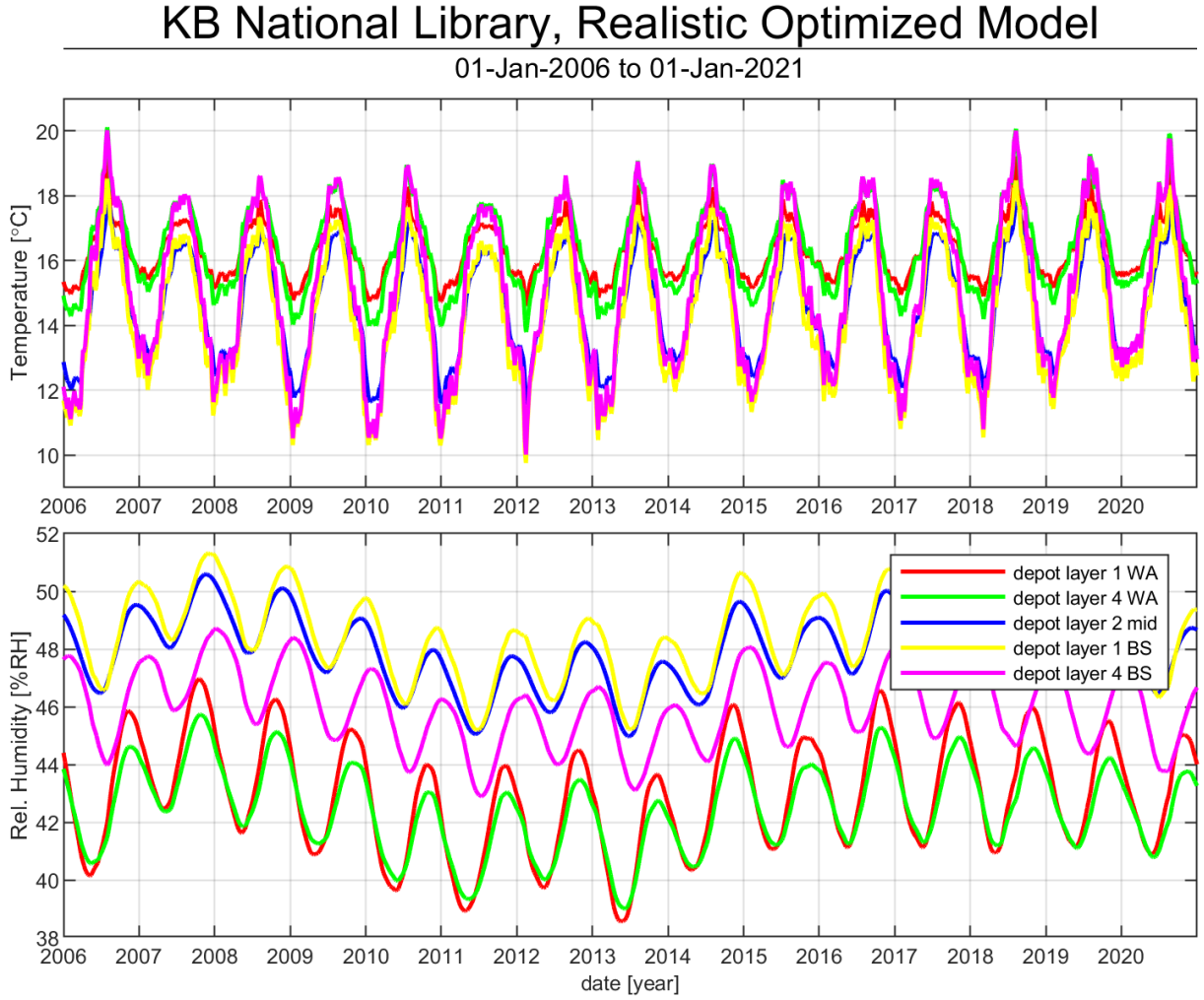
Climate simulatior

- What is the most optimal building construction?
  - o Insulation thickness of walls and roof
  - o Color (absorption factor) of the roof covering
- What is the effect of internal air flow within the
  - o Effect of ingest of containers
  - o Effect of stratification and reduction measures
- What is the influence of the local environment?
  - o Effect of climate change over a longer period
- What is the effect of a low oxygen system?
  - o Inflow of very dry air
- What is the effect of collections on indoor envirc
  - o Effect of an empty versus a full building
  - o Effect of a steady ingest of collections over 2 years
  - o Effect of the outdoor weather conditions during ingest period



Dynamic hygrothermal simulation model by Marco Martens

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Climate simulation

Variant	Description	Effect	Impact
1	Soil settling	Minimal	Minimal
2	Lower roof absorption	Positive, if RH compensated for	Small
3	More insulation walls and roof	Positive	Fair
4	Less insulation walls and roof	Negative	Fair
5	Additional heating workspace	Positive, but 27 % extra energy use	Fair
6	Empty repository	Negative	Large
7	Low-oxygen system on	Positive, if well adjusted and mixed	Huge
8	Airflow by ingest	Negative but not avoidable	Fair
9	Raised soil temperature	Positive for RH	Small
10	Lowered soil temperature	Negative for RH	Small
11	Extra mixing for stratification	Positive	Fair
12	Extra internal air mixing	Negative	Small
13	Reduced air tightness	Negative	Large
14	Extra heat production robot	Negative for T, but RH seems better	Huge

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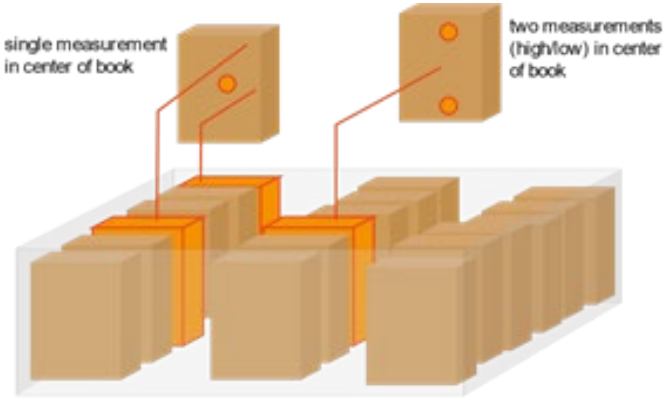
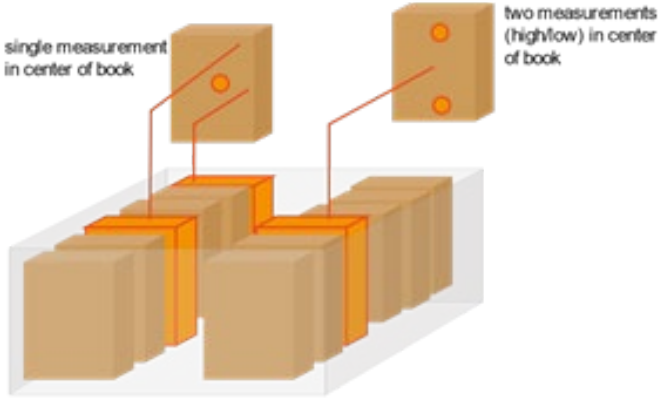
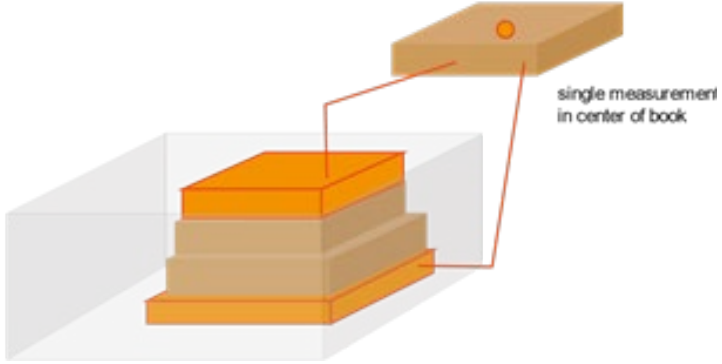
Climate simulation – impact of collections







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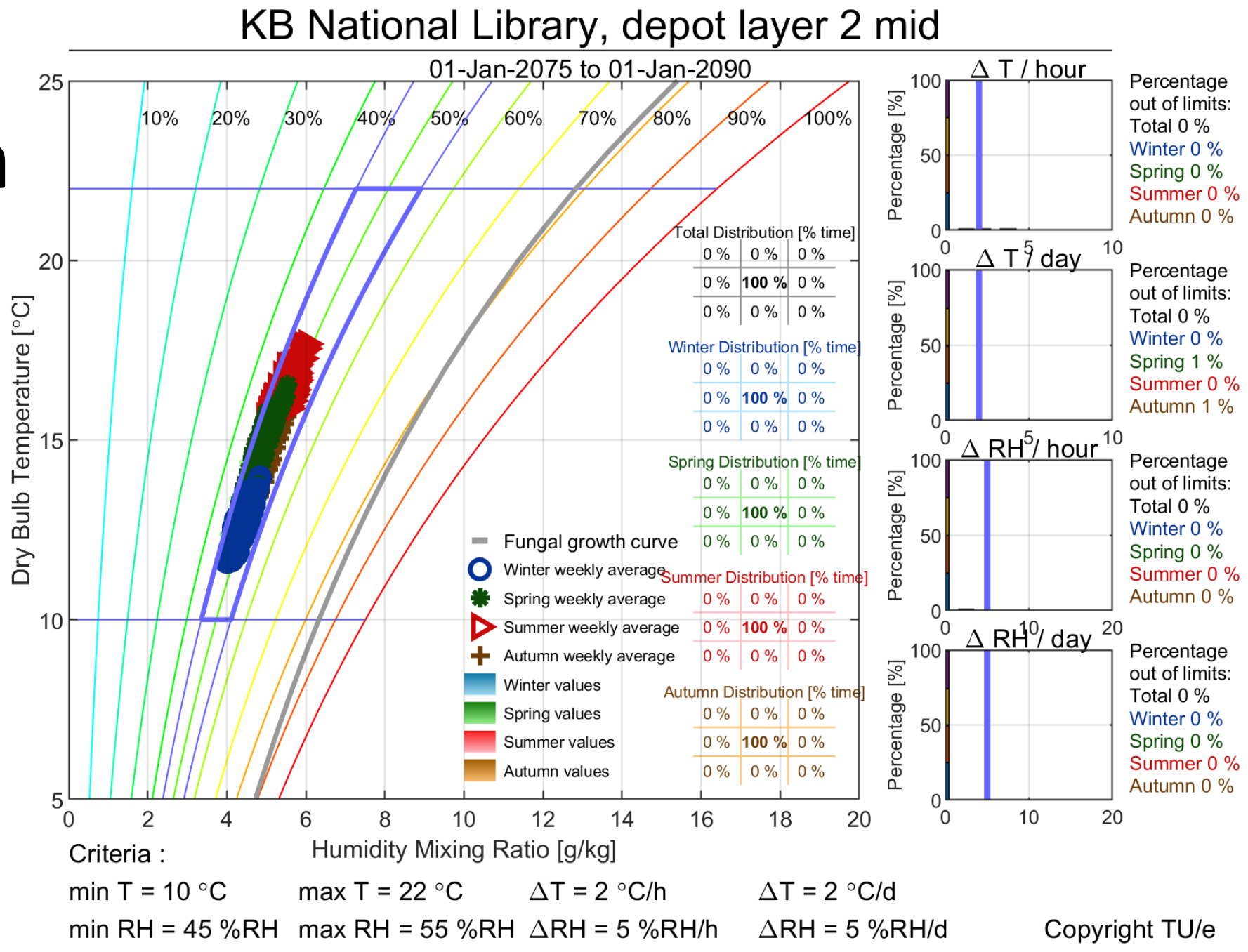

More information:

Foekje Boersma, Marco Martens, Bart Ankersmit & Marc Stappers (2022)
A Robotic Storage Facility for the Dutch National Library Collections
In: Studies in Conservation
DOI: 10.1080/00393630.2022.2045420

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