# NEEDs FROM STAKEHOLDERS

The Capital Region of Denmark
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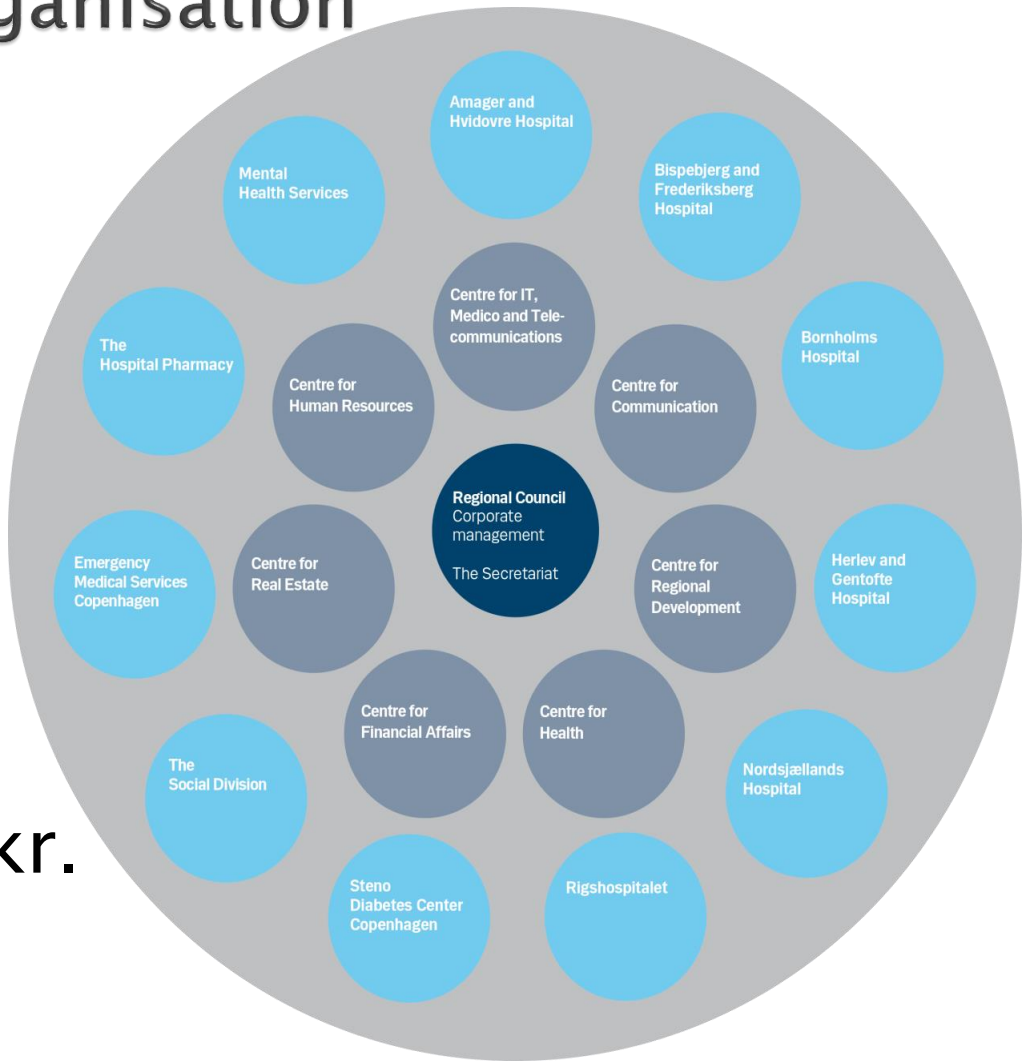
Water DTU 3rd Partner Seminar, Technical University of Denmark
May 23th -24th 2017

# The Capital Region of Denmark –a big healthcare organisation

- 40,400 employees
- 1.7 million. citizens
- 29 municipalities




- Budget ca.40 billion kr.

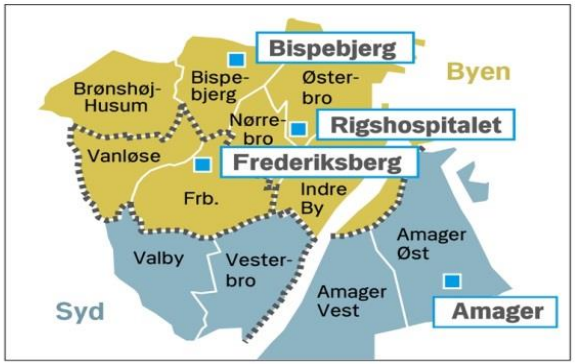
Region Hovedstaden

# 11 hospitals–(7 adm. units)

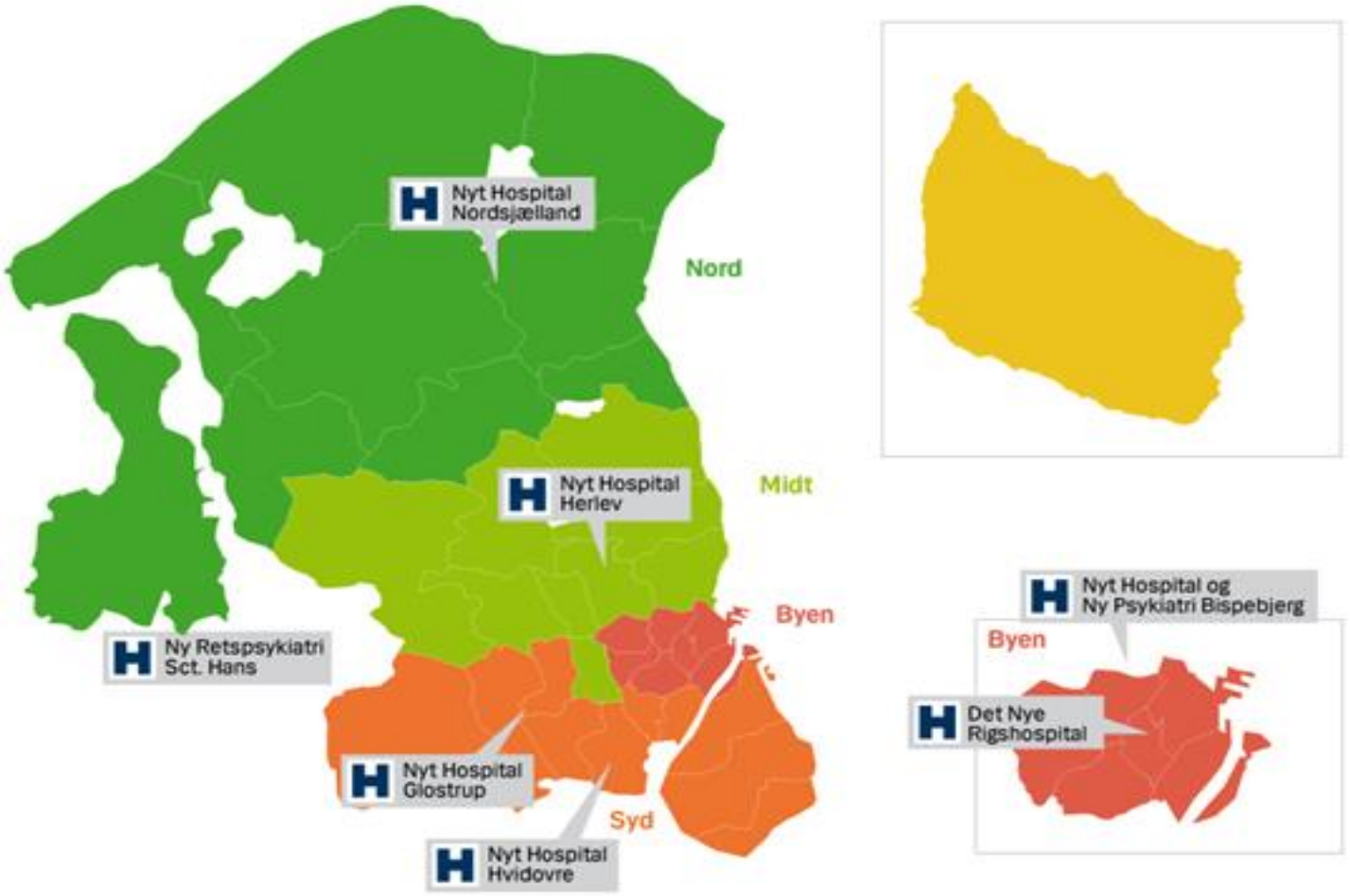
- Building Mass 1.9 mio.m2
- Bed days ca. 2 mio.
- Outpatient visits ca. 5 mio

- **Water–1,06 mio.m3/år**
- **Wastewater1,06 mio.m3 /år**

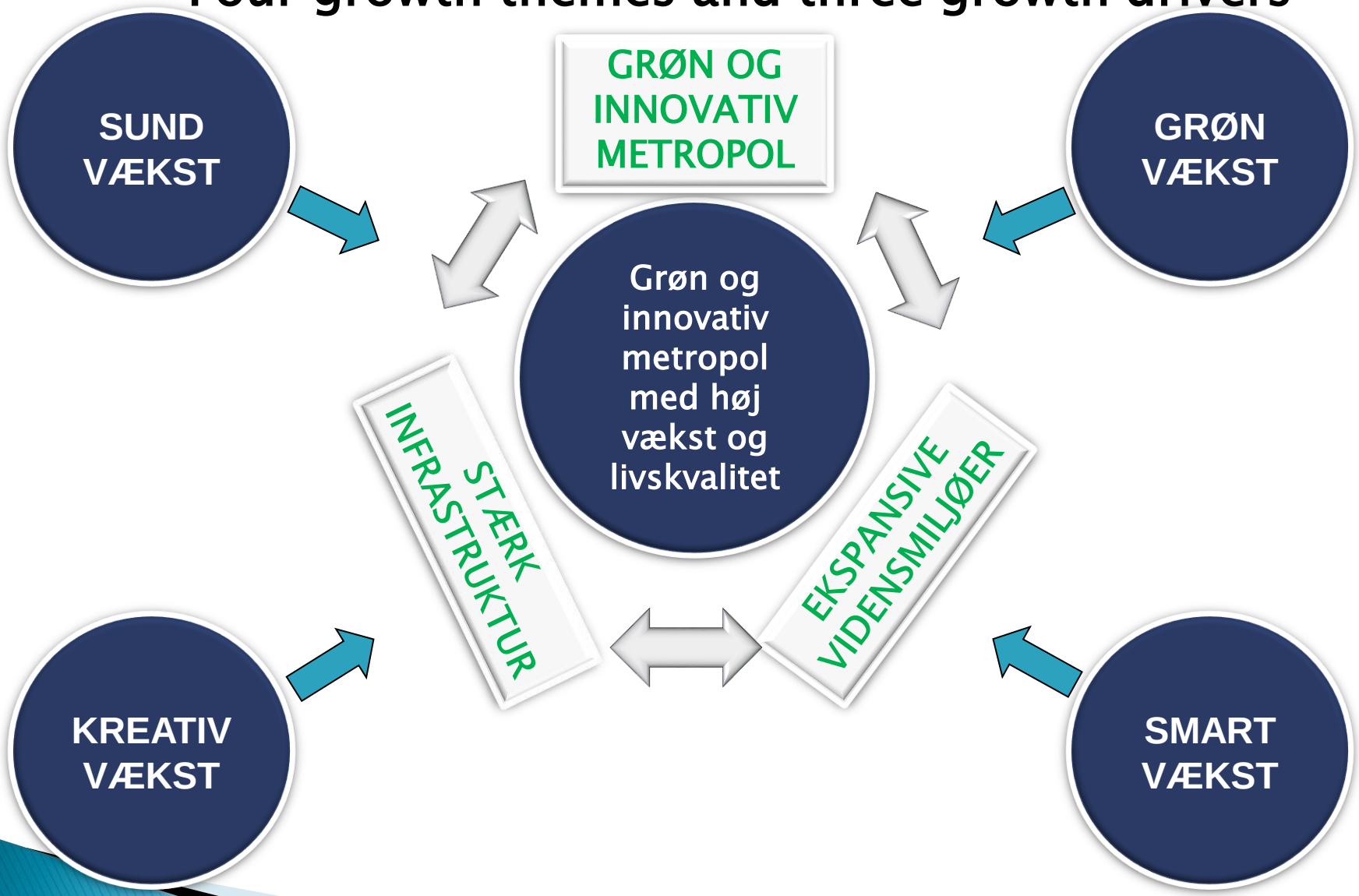



# New construction 16 billion DK.KR



# Green growth
## Four growth themes and three growth drivers



# Selected green growth areas in Greater Copenhagen

- Wind
- Water
- Energy efficiency
- Bioenergy/ and biofuels

- The region promotes growth in the water sector by connecting own operations with development

# Water
# Jobs og turnover

**2014 Status**

- 3.056 jobs (Year's work)
- 14 mia.kr

**2035 Growth potential**

- 3,100 -5,700 new jobs can be created by 2035
- 7-10.00 jobs / yearly, ca. total in 2035
- 20 billion in revenue for Greater Copenhagen's water cluster 2035
- DKK 34 billion in 2035, the **total turnover** in Greater Copenhagen -it's a challenge

"Sustania, Damvad analytics, 2017"

# Green and Innovative Metropole


## Growth Driver:

1. The region as a business
2. The region as area

# Water

## Growth drivers

**Region as a business (the hospitals etc.)**

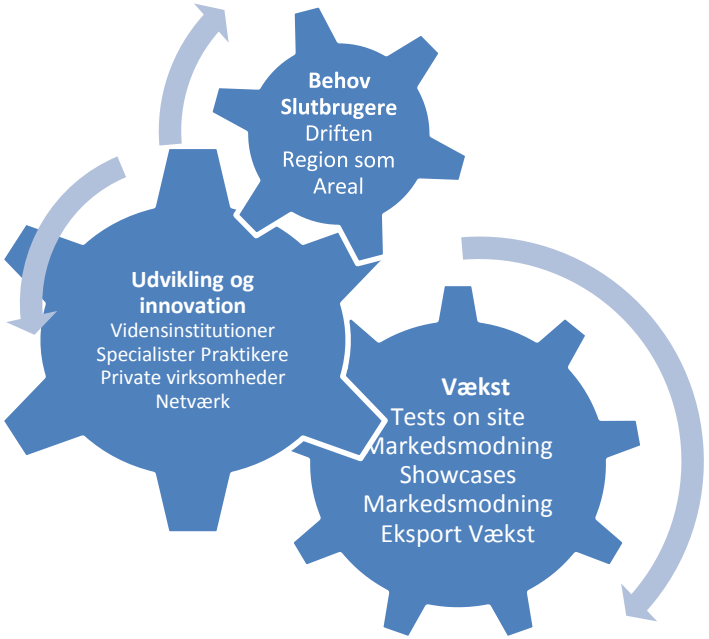
- Identify needs, test and demonstrate sustainable water solutions – unique and sought after worldwide
- Showcases and supporting export (ex. OPI Herlev wastewater treatment plant)

**Region as area**

- Initiate and support projects, networks in the region
- Facilitate the development of new solutions for water/sewage, climate adaptation (ex. VIS project)
- Make it attractive for companies to locate in the region to buy into this green knowledge environment.

# Sådan kombinerer man drift, udvikling og vækst
# Behovsdrevet innovation
## Vandeffektivitet, cirkulær vandressourceanvendelse, vandteknologi, klimatilpasningsløsninger,

**Regionen som areal** → Udfordringer Behov Netværk → Ideer Innovation Matchmaking Udvikling → Løsninger Big scale tests → Vækst Markedsmodning Showcases Export




**Drift Hospitaler** → Udfordring Behov Netværk → Ideer Innovation Matchmaking Udvikling → Løsninger Big Scale tests → Vækst Markedsmodning Showcases Export

# Suistanible water solutions
## Hospitals as a green growth driver – creating knowledge and new jobs

**Overall goal**

- Innovation, Green Growth, jobs
- Sustainable and efficient use of waterressources
- Eksport new water solutions

**Objectives**

- Minimimize health and environmental risk
- Efficient use of water resources – circular water resource utilization
- Energy efficient and CO2 optimal water and wastewater solutions
- Create a create green and blue region

Smart use of:

1. Potable water – without bacteria and virus
2. Waterressources – efficeint use of water at the hospitals
   a. Groundwater–Use good quality water only where you need it
   b. Wastewater. Reuse treated wastewater–without chemicals, pharmaceuticals, resistente bacteria – as technical water, cooling water etc.
   c. Drain water ( use it as tecknical water )
3. Water for rekreation (treated wastewater and drainage water)

# How do we do in practice at the hospitals

**Needs**

- The region:
- Identifies the biggest problems / potentials
- New technologies on the way / businesses

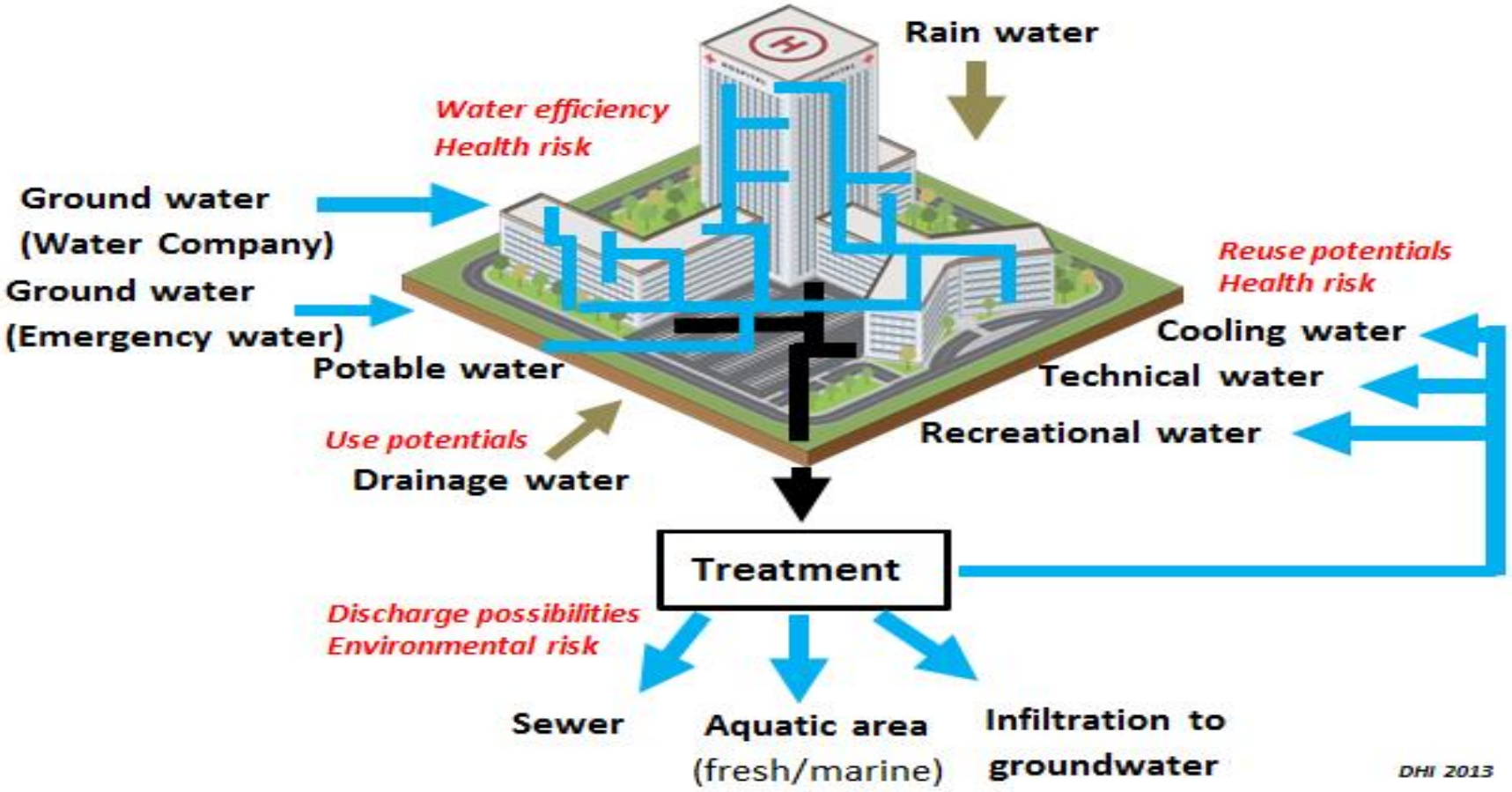
**Development and testning**

- New technologies or solutions are being developed in dialogue between research institutions, private companies – and hospital technicians or health professionals
- Prototypes are tested on site in large scale, adjusted and marketed ex. OPI, OPP
- TOC, operating costs, reliability

**Implantation Demonstration Marketing**

- New technologies are being used at existing hospitals and new hospitals
- Showcases, professional tourism and export

# The hospitals need new innovative water solutions – efficient use of waterressources, better environment and health and economy



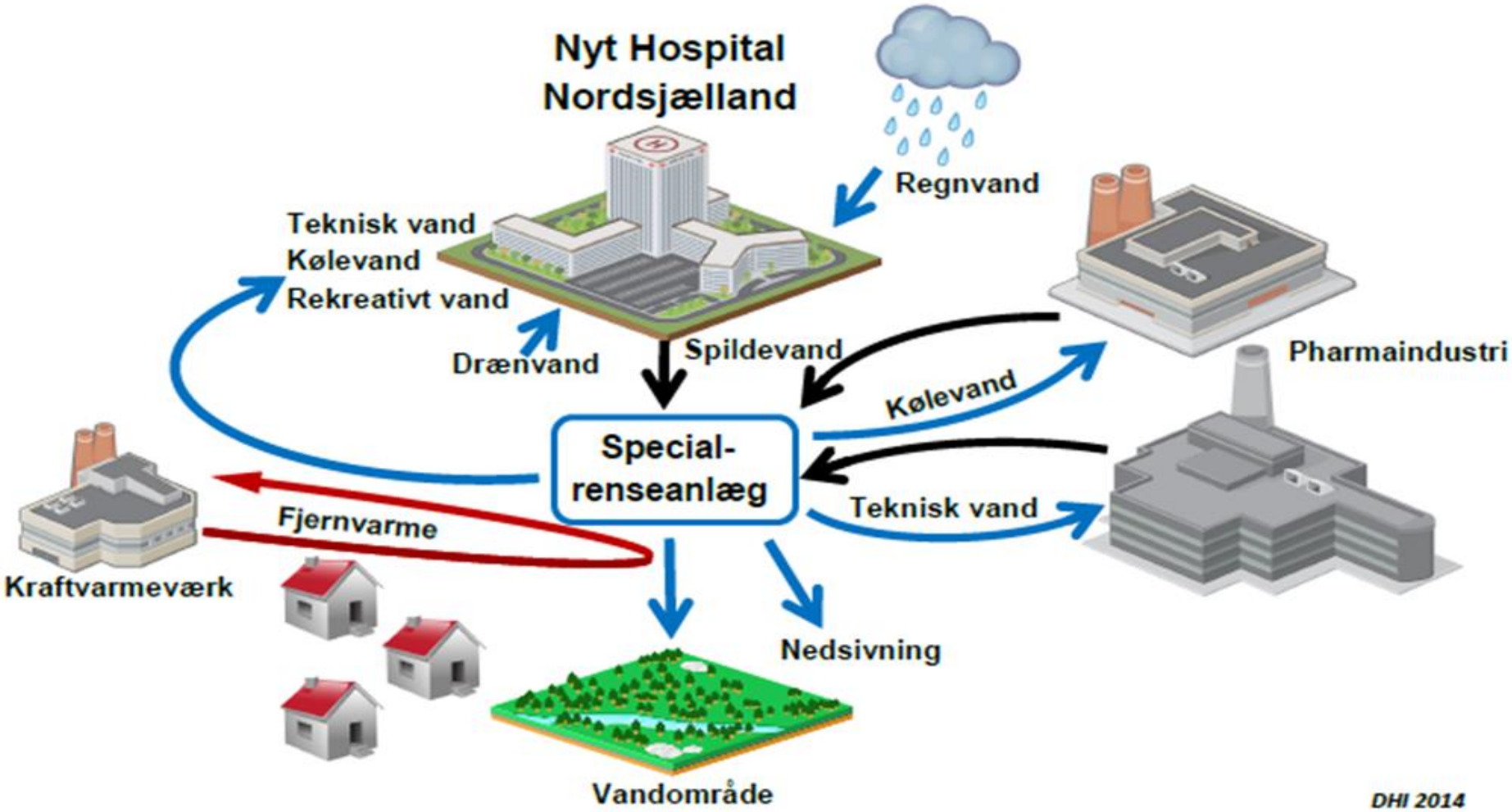
# Hospitals NEEDS
# -from institutions and researchers and private companies

New technologies and methods within:

- Reduction of health risks
- Water efficiency – the right water for the right purpose
- Wastewater treatment for hospital waste water
- Water recycling – Recycling of wastewater in the operation of technical water, etc. cleaned wastewater-use of drainage water
- Energy efficient water and wastewater solutions

# The hospitals can deleope new solutions together with other stakeholders in the area

– efficient use of waterressources, synergies and rekreative areas creating better environment and health, and economy



# Innovation, Green Growth and Ressourceeffektiv – Lets do it together

- Growth potential is there
- Regions have ambitions to meet the potential
- Increasing international need for water solutions (UN goal)
- Government requirements for waste water treatment at hospitals
- Hospitals knows the needs, have knowledge and are looking for new solutions – Water, sewage and climate adaptation
- You have new ideas, projects and knowledge – we can develop together
- Waterkonference in 2020

Looking forward to work together with you !

Thank you for your attention !

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# Examples of identified needs on the hospitals

## -reducing the risk for vulnerable patients of being infected by water-borne opportunistic pathogens

**Risk assessment showed::**

- the locations in the water system at hospitals where it is most likely that something goes wrong, allowing opportunistic pathogens to grow
- the routes of transmission which cause the highest incidence of disease by infection with *Legionella* or *P. aeruginosa*

**The mapping of places where opportunistic pathogens are likely to grow, pointed out the following areas:**

- Main pipeline system for tap cold water
- Main pipeline system for tap hot water
- Water faucets and the last few meters before tapping point
- Sinks, drains, showers and toilets
- New analytical and mapping methods

# Examples of needs for new technology reducing the health risk

- Design of **sinks (**including faucet and drain/water trap
- Development of affordable **point-of-use filters** for faucets and showers.
- Development of temperature-controlled piping and fittings.
- Development of simple faucets with metal pipings.
- Design of wards/therapy rooms in a way that rarely used and redundant taps are removed and that redundant water supply tubes are being removed to where they meet one of the main pipes with a regular consumption/circulation in order to avoid the occurrence of dead ends.
- **A efficient method to keep the temperature above 50 °C** anywhere in the hot water system.
- A simple and cost-efficient method to map the temperature and/or flow of the water in the different parts of the pipeline system.
- Securing the cold water temperature becomes further relevant as temperatures are rising due to climate change. Development of analytical methods for determination of specific pathogens.

# Examples of needs of water efficiency and water saving tecknolody – and use of secondary guality water

The need for development and testing of new technologies
organized after 7 principles
according to the size of investment and the expected water savings:

1. Changes in behavior and optimization of existing equipment
2. Small investments in new equipment
3. Major investments in new equipment
4. Investment in new ”dry technology”
5. Direct reuse of secondary quality water without any treatment
6. Use of secondary quality water after simple treatment
7. Use of secondary quality water after advanced treatment

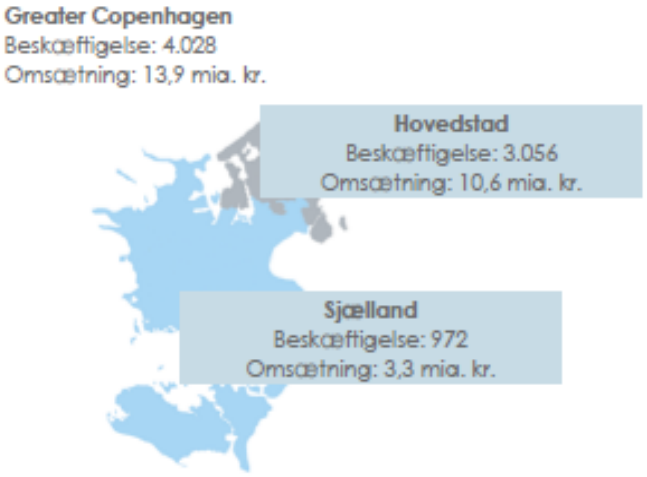
| The 7 principles | Need for development and testing of new water technology |
|---|---|
| **1. Changes in behavior and optimization of equipment** | • Testing and disseminating data collection systems for monitoring of water consumption which can be integrated in the existing ICS system<br>• Development of affordable water meters and adapters<br>• Benchmarking and exchange of experience on water-saving solutions within knowledge sharing groups |
| **2. Small investments** | • Determination of the specific water consumption for taps, showers and toilets<br>• Development of non colonizable aerators, affordable point-of-use filters with longer durability (that are not contaminated on the outside) and automatic rinsing regimens for taps that are used infrequently<br>• Increased use of secondary quality water for toilet flushing |
| **3. Major investments** | • Further development of automated washing systems able to wash efficiently at lower temperatures (45-60º C) ensuring that wear and tear on equipment is reduced and at the same time that the hygienic quality requirements are met<br>• Determination of the water consumption for the sprinkler system<br>• Development of more flexible water mist systems that can more easily be rebuilt<br>• Facilitation of the development by formulating requirements to suppliers in connection with major purchases |
| **4. New ”dry technology”** | • Need for development of suitable disposables in terms of bedpans/bed bottles for immobile patients – furthermore a constant need for disposables for better working procedures<br>• Need for development of appropriate waste disposal systems for disposables |
| **5. Secondary quality water without any treatment** | • Need for testing the recycling of concentrate from RO-treatment for various end usings (e.g. toilet flushing, critical and less critical washing machines and cleaning) |
| **6. Secondary quality water after simple treatment** | • No need for further development of the simple purification (aeration/precipitation> sand filtration>RO/ion exchange). However, a need for demonstration proving that it is applicable in practice, e.g. in RO plants<br>• Need for documentation of the microbiological quality before, after and between technologies. |
| **7. Secondary quality water after advanced treatment** | • Development and testing of the online measurement of microbiological water quality in secondary quality water<br>• Development and testing of disinfection technology for protection against microbiological regrowth in secondary quality water |

## Figur 7.1: Nøgletal for vand, 2014

| | |
|---|---|
| Beskæftigelse (Årsværk) | 13.890 |
| Omsætning (mia. kr.) | 48,0 |
| Andel af grøn omsætning | - |
| Omsætningsvækst (2012-2014) | -0,2% |
| Gennemsnitlige årlige vækst i omsætning (2012-2014) | -0,1% |
| Eksport (mia. kr.) | 15,9 |
| Eksportandel af grøn eksport | - |
| Eksportintensitet | 34,1% |
| Eksport vækst (2012-2014) | 4,3% |

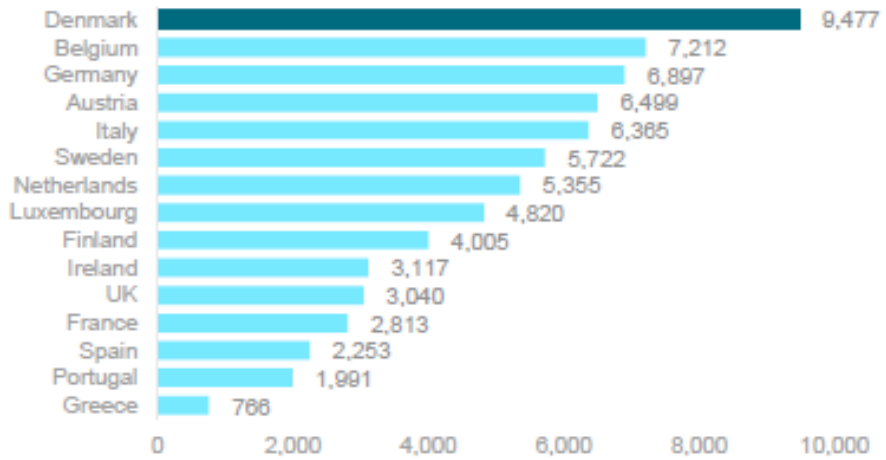
Kilde: DAMVAD Analytics for DANVA, 2016
Note: Bemærk at en stor del, men ikke al omsætning fra vandklyngen er grøn omsætning (spildevandsbranchen klassificeres som 100 pct. grøn, mens omsætningen i virksomheder i den øvrige vandsektor kun vil være delvist grøn).

## Figur 7.2: Greater Copenhagen, 2014




Kilde: Beregninger baseret på DAMVAD Analytics for DANVA, 2016
Note: Regionalt skøn regnet med udgangspunkt i den regionale fordeling af

## Figur 7.3: Eksport i kr. pr mia. BNP i 2015

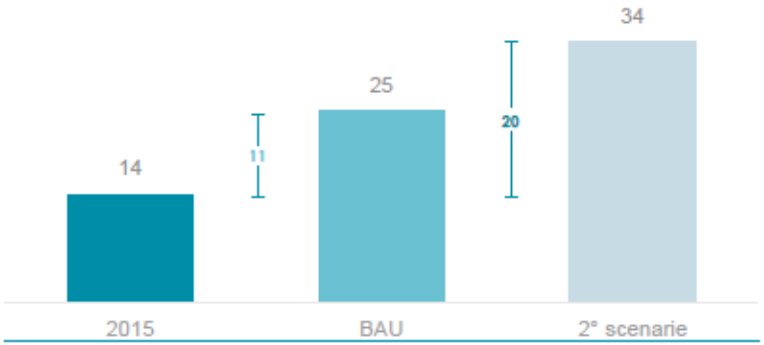



## Figur 7.4: Top DK virksomheder inden for vand

- Grundfos
- Danfoss
- Krüger
- Kamco
- Store rådgivningsvirksomheder som Cowi, Rambøll, Niras, Orbicon, Sweco
- ABB

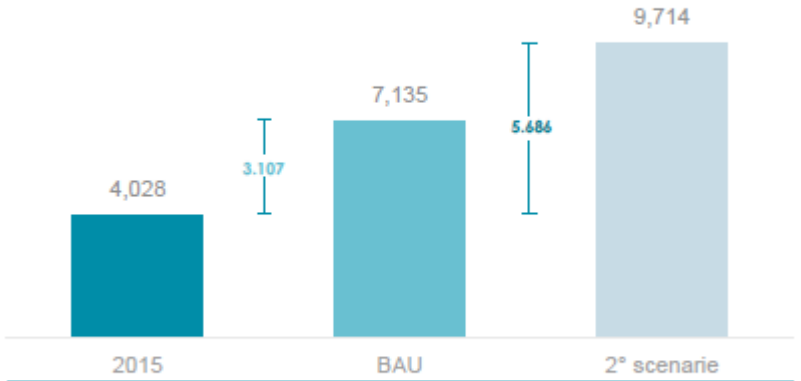
Kilde: DAMVAD Analytics 2017

## Figur 18.1. Greater Copenhagen, potentiel omsætning, 2015-2035, mia. kr. (2015-priser)




Kilde: Beregninger baseret på IEA's World Energy Investment Outlook, 2014 og på DAMVAD Analytics for DANVA, 2016

## Figur 18.2. Greater Copenhagen, potentiel beskæftigelse, 2015-2035 (årsværk)




Kilde: Beregninger baseret på IEA's World Energy Investment Outlook, 2014 og på DAMVAD Analytics for DANVA, 2016

## Tabel 18.1. Danmark, potentiel omsætning og beskæftigelse (2015-priser)

| | 2015 | BAU | | 2° scenarie | |
|---|---|---|---|---|---|
| | | Niveau 2035 | Vækst 2015-2035 | Niveau 2035 | Vækst 2015-2035 |
| Omsætning (mia.kr) | 48 | 85 | 37 | 116 | 68 |
| Beskæftigelse (årsværk) | 13.890 | 24.604 | 10.714 | 33.499 | 19.609 |

Kilde: Beregninger baseret på IEA's World Energy Investment Outlook, 2014 og på DAMVAD Analytics for DANVA, 2016

## Tabel 18.2. Regioner, potentiel omsætning og beskæftigelse (2015-priser)

| | 2015 | BAU | | 2° scenarie | |
|---|---|---|---|---|---|
| | | Niveau 2035 | Vækst 2015-2035 | Niveau 2035 | Vækst 2015-2035 |
| **Hovedstaden** | | | | | |
| Omsætning (mia.kr) | 11 | 19 | 8 | 26 | 15 |
| Beskæftigelse (årsværk) | 3.056 | 5.413 | 2.357 | 7.370 | 4.314 |
| **Sjælland** | | | | | |
| Omsætning (mia.kr) | 3 | 6 | 3 | 8 | 5 |
| Beskæftigelse (årsværk) | 972 | 1.722 | 750 | 2.344 | 1.372 |

Kilde: Beregninger baseret på IEA's World Energy Investment Outlook, 2014 og på DAMVAD Analytics for DANVA, 2016

Note: Regionalt skøn regnet med udgangspunkt i den regionale fordeling af beskæftigelsen i vandklyngen inkl. underleverandører til vandklyngen.