

Aarhus Vand A/S

Non-Revenue Water, Pipeline Asset Management, Tariffs

Webinar, February 11th 2021

Marmara Union of Municipalities, Royal Danish Consulate General and Turkish Union of Municipalities

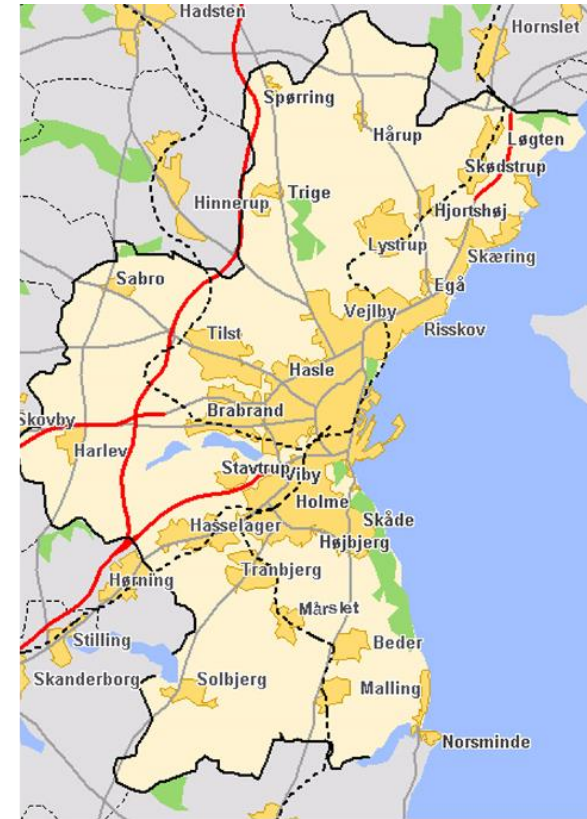
Flemming Fogh Pedersen, Director, Operations

Aarhus Vand A/S

Settings of Aarhus



Area	43.000 km ²
Population	5.5 mio
Population density	127 /km ²



Area	468 km ²
Population	0.3 mio
Population density	629 /km ²

Introduction



Our purpose is to create health through the supply of clean water – for people and the planet

Our vision is to create a national platform as a driver for local and global solutions for a healthier water cycle

Our mission is to offer and develop resource-efficient services throughout the entire water cycle, creating a climate-adapted, sound environment, growth and export, all of which will be of benefit to customers and stakeholders

We adopt water knowledge by

- A holistic approach to the entire water cycle
- Forming innovation partnerships
- Forming international alliances that support knowledge exchange around intelligent, sustainable and efficient water solutions
- Operating and developing state of the art resource recovery plants that recover resources and produce energy from wastewater
- Protecting groundwater to ensure future high quality and safe water supplies
- Automating and digitalizing in order to achieve an intelligent efficient water system
- Separating storm water from wastewater

Key figures



230

competent and
dedicated employees



15

mio. m³ of drinking
water a year



30

mio. m³ of purified
wastewater a year



1,500

kilometres of
pipeline network



2,800

kilometres of
mains network



350,000

citizens in Aarhus
Municipality

SDG in everything we do



The first water company in the world to be certified according to the UN's Global Goals for Sustainable Development.

The global goals are met in a number of areas that are central to us. This includes:

- SDG 6 Clean water and sanitation
- SDG 11 Sustainable cities and communities
- SDG 13 Climate action
- SDG 17 Partnerships for the goals

Compliance with international ISO standards

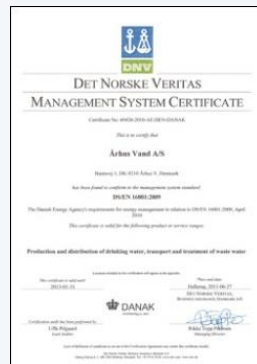
CSR (DS 49001)

DRINKING WATER QUALITY (ISO 22000)

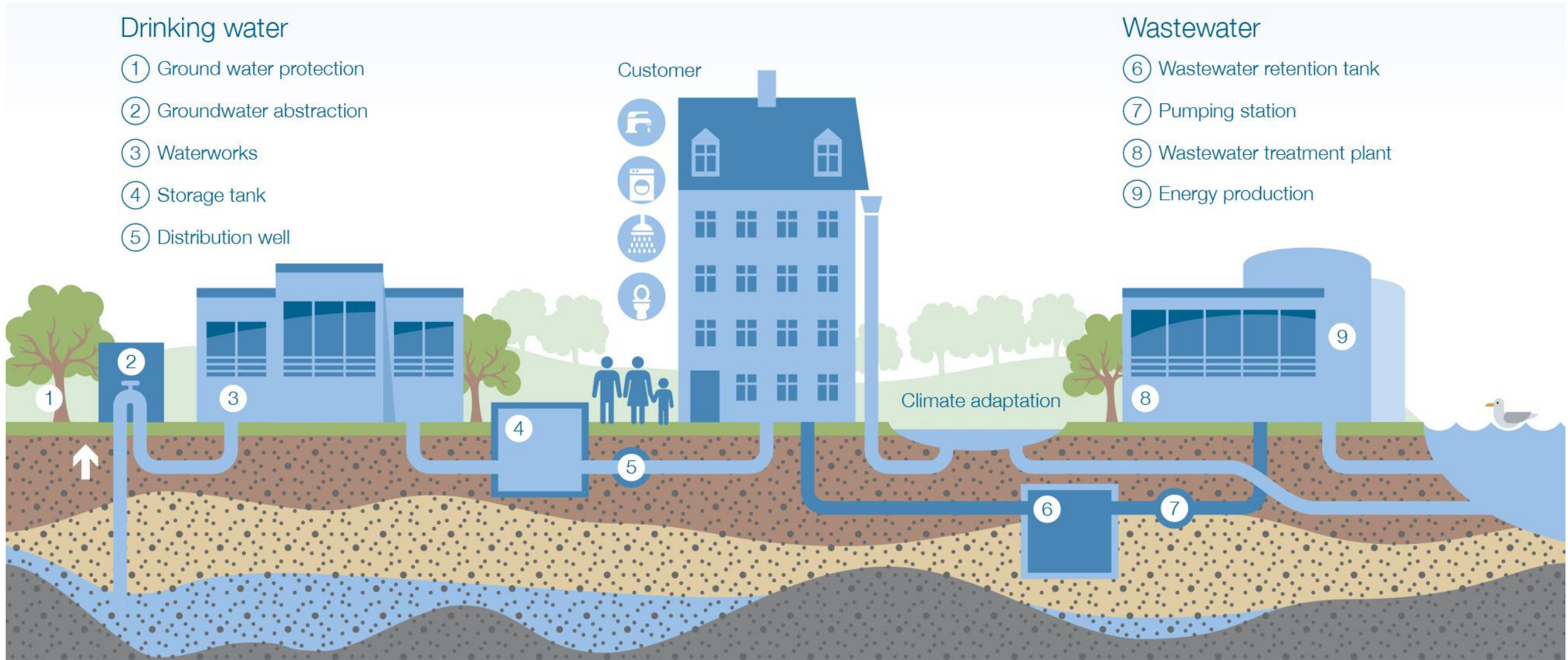
ENERGY MANAGEMENT (ISO 50001)

THE WORKING ENVIROMENT (DS/OHSAS 18001)

ENVIROMENTAL MANAGEMENT (ISO 14001)

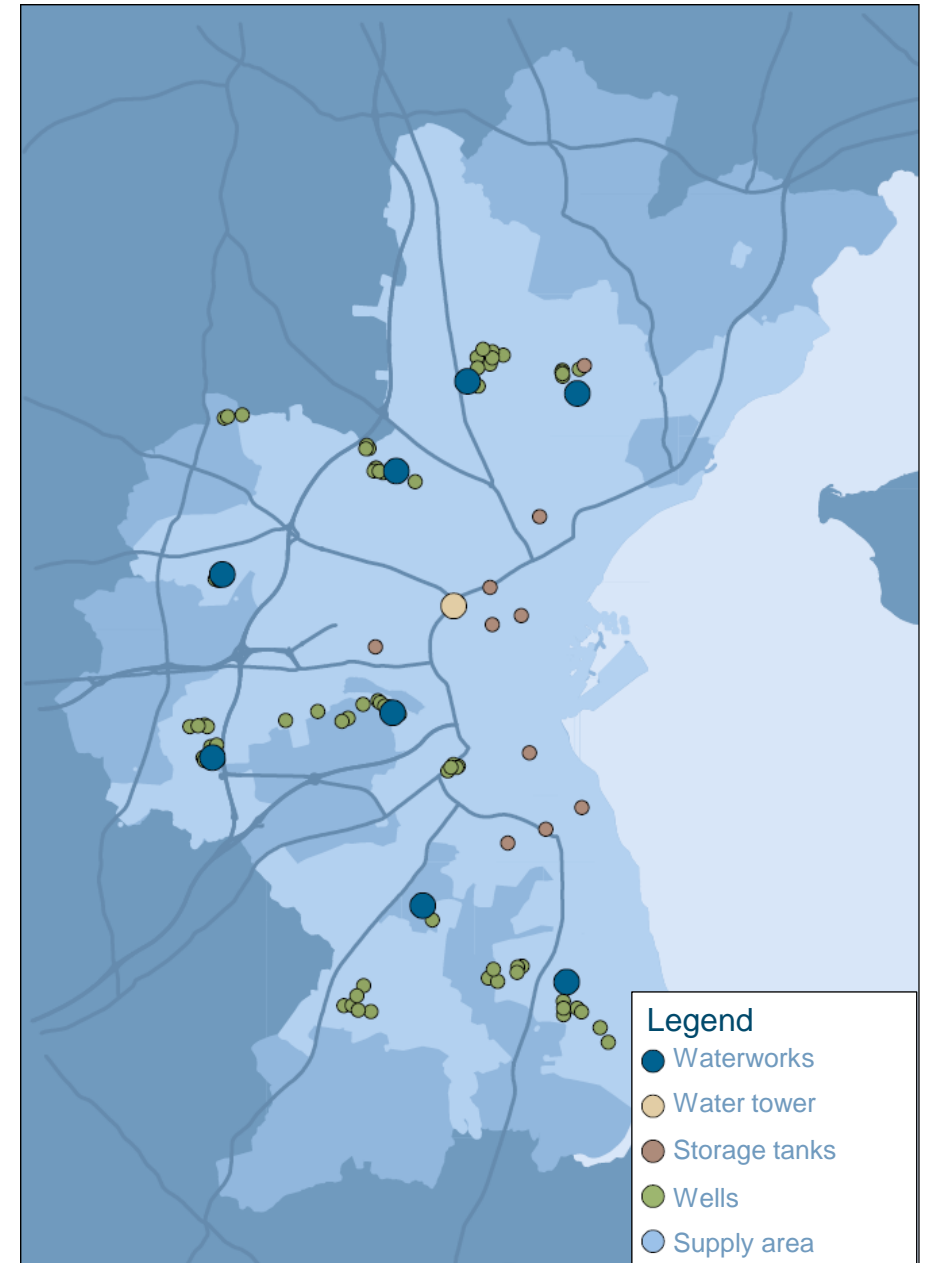


Operator of the water cycle



Drinking water

- 85% of inhabitants in Aarhus Municipality
- 275.000 customers
- 15.000.000 m³/year
- 1.500 km supply lines
- 90 production wells
- 8 waterworks
- 11 elevated storage tanks/pumping stations
- 1 water tower
- 62.000 water meters



Water tariffs 2020

Elements of the water tariffs	DKK/m ³	EUR/m ³	TRY/m ³
Production of drinking water	8,14	1,09	10,42
Wastewater treatment	22,62	3,03	28,94
Government water tax	6,37	0,85	8,15
VAT	9,28	1,24	11,87
Total water price per m3 incl. VAT	46,41	6,21	55,39

- Average per capita consumption 99 l/pers/day
- Complete cost recovery by the tariffs, including operations, investments (depreciation) and re-investments
- All larger Danish water utilities are subject to benchmarking and annual savings on OPEX/CAPEX of around 2%

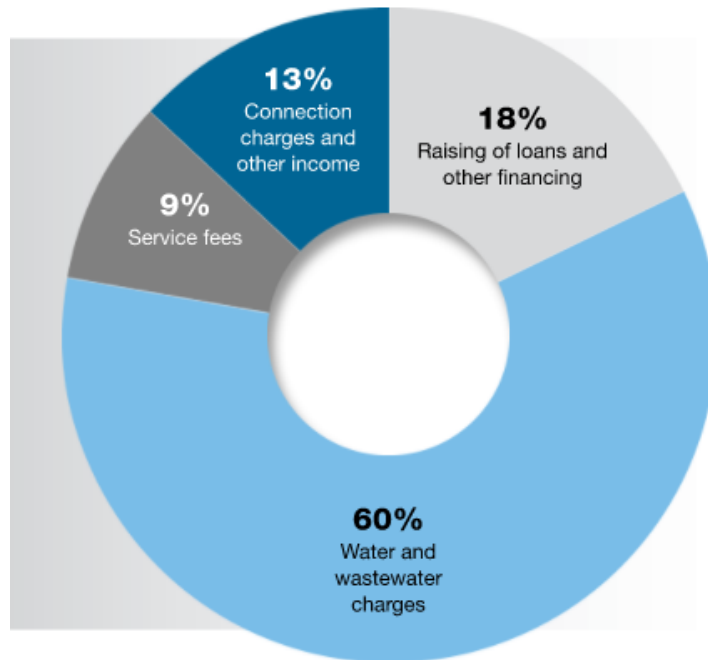
Operating and cash budgets

Operating and cash budgets for 2021:

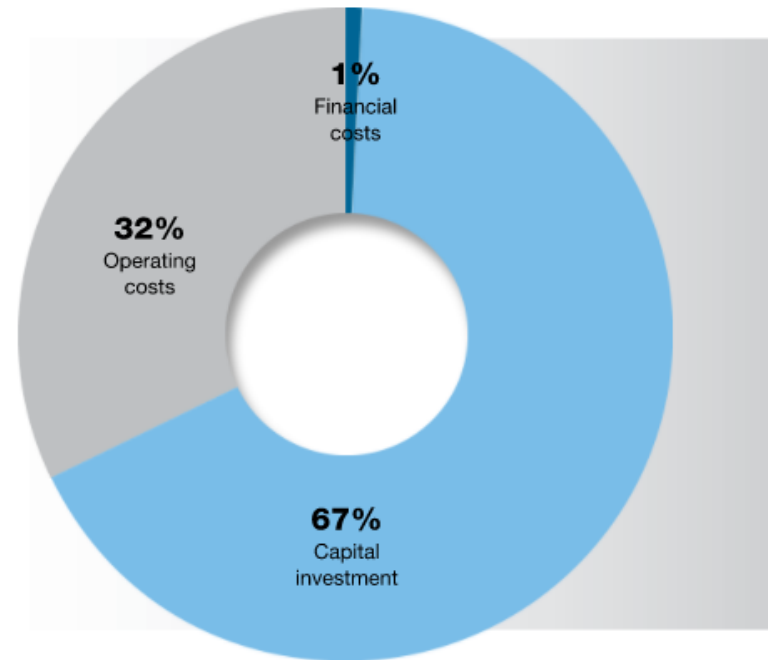
DKK 1,000	OPERATION	LIQUIDITY
Water and wastewater charges	468,300	468,300
Service fees	70,200	70,200
Connection fees and other income	105,600	105,600
Total income	644,100	644,100
Operating costs	-228,930	-248,500
Depreciation	-314,000	0
Profit/Loss before financial income and expenses	101,170	395,600
Other operating items	0	0
Financial items	-9,500	-10,500
Operating profit/loss for the year	91,670	385,100
Investments		-524,300
Repayment		0
Positive/negative cash flow for the year (borrowing requirement for the year)		-139,200

Financial operations

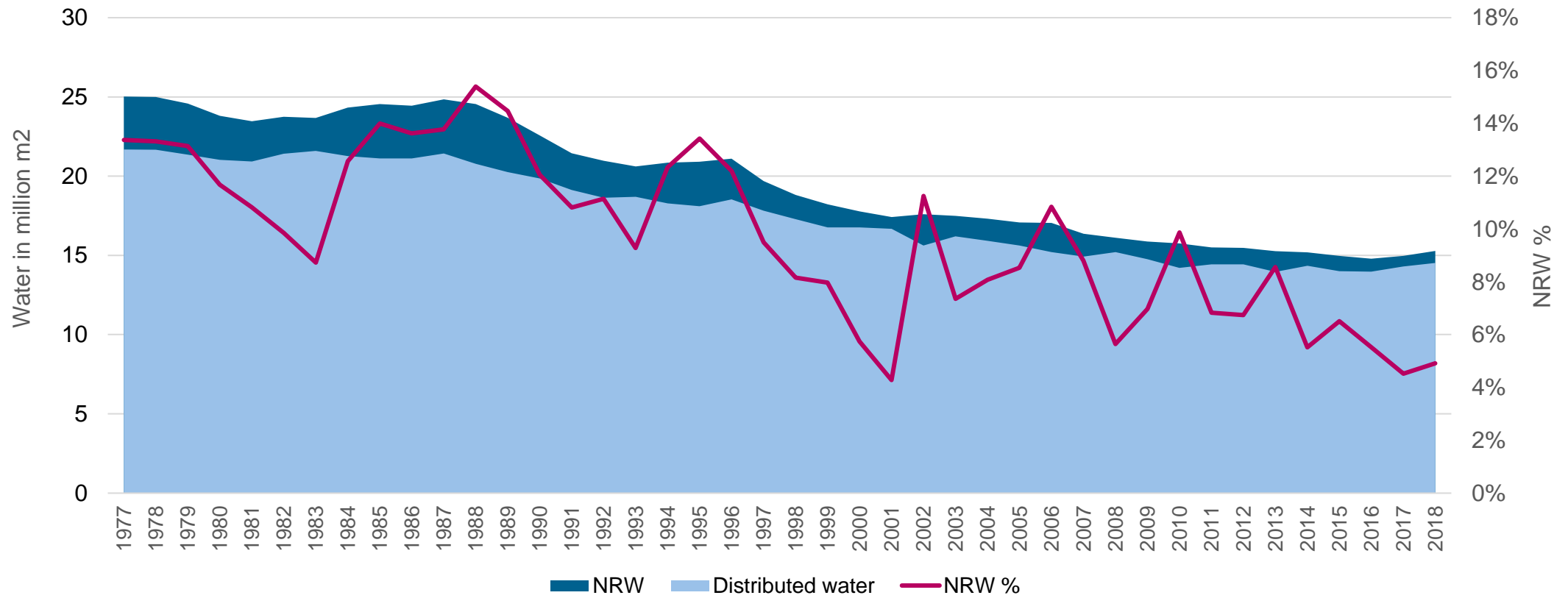
**WHERE DOES THE MONEY
COME FROM?**



**WHAT IS THE MONEY
SPENT ON?**



Non-Revenue Water in Aarhus



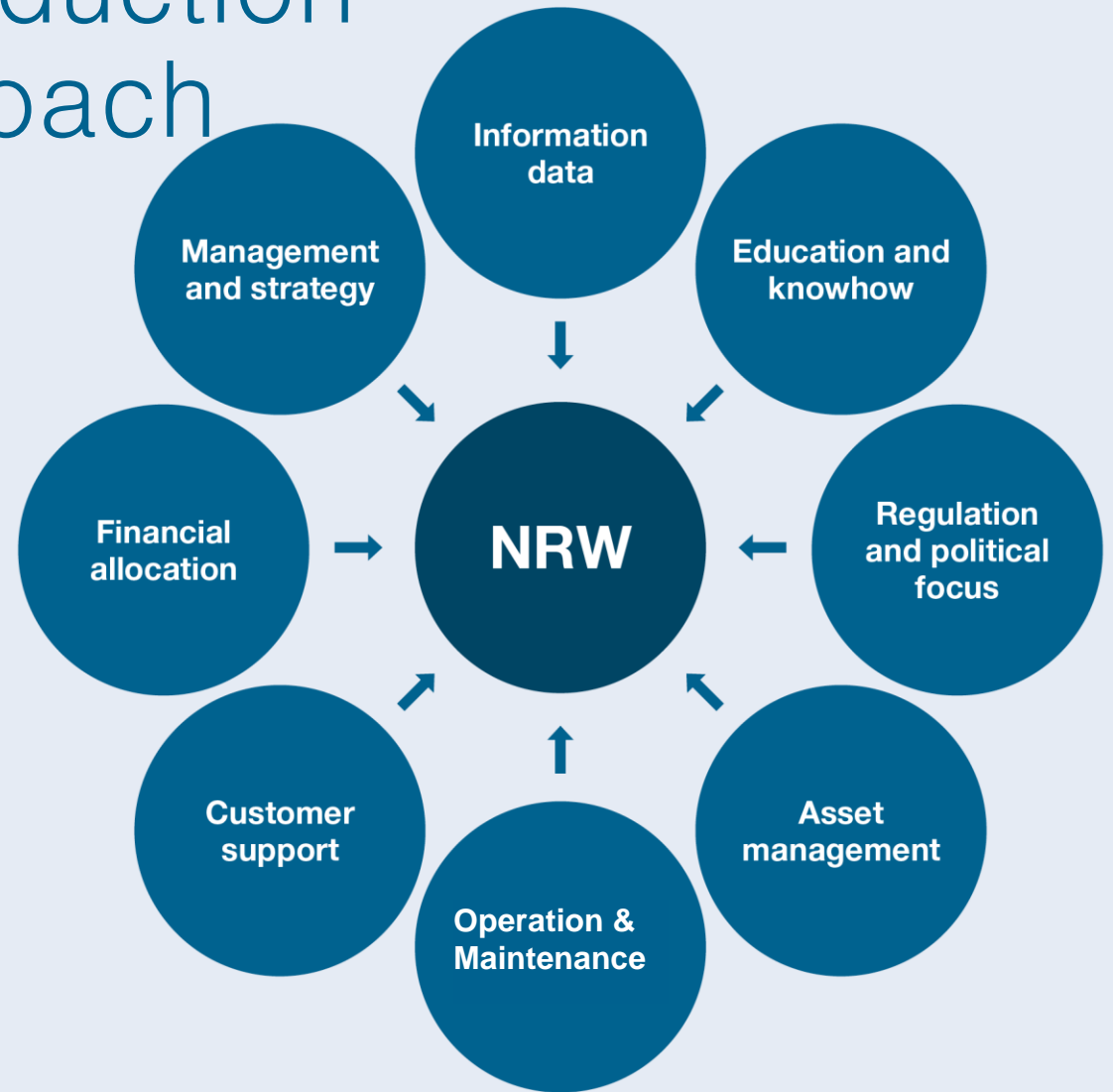
IWA Water Balance – Aarhus Vand 2018

System Input Volume 15.27 mio. m³	Authorized Consumption 14.53 mio. m³	Billed Authorized Consumption 14.52 mio. m³	Billed Metered Consumption 14,52 mio. m³	Revenue Water 95.09 %	
			Billed Unmetered Consumption 0 m³		
	Water Losses 0.74 mio. m³	Unbilled Authorized Consumption 8,520 m³		Unbilled Metered Consumption 0 m³	NRW (Non Revenue Water) 4.91 %
				Unbilled Unmetered Consumption 8,520 m³	
		Apparent Losses 0 m³		Unauthorized Consumption (+/-) 0 m³	
				Customer Meter Inaccuracies (+/-) 0 m³	
		Real Losses 0,74 mio. m³		Leakage on Transmission and/or Distribution Mains 0.68 mio. m³	
				Leakage and Overflows at Utility's Storage Tanks 4,050 m³	
				Leakage on Service Connections up to point of Customer metering 61,992 m³	

Non-Revenue Water reduction through a holistic approach

Several aspects need to be addressed to reach low NRW levels and ensure continuous success

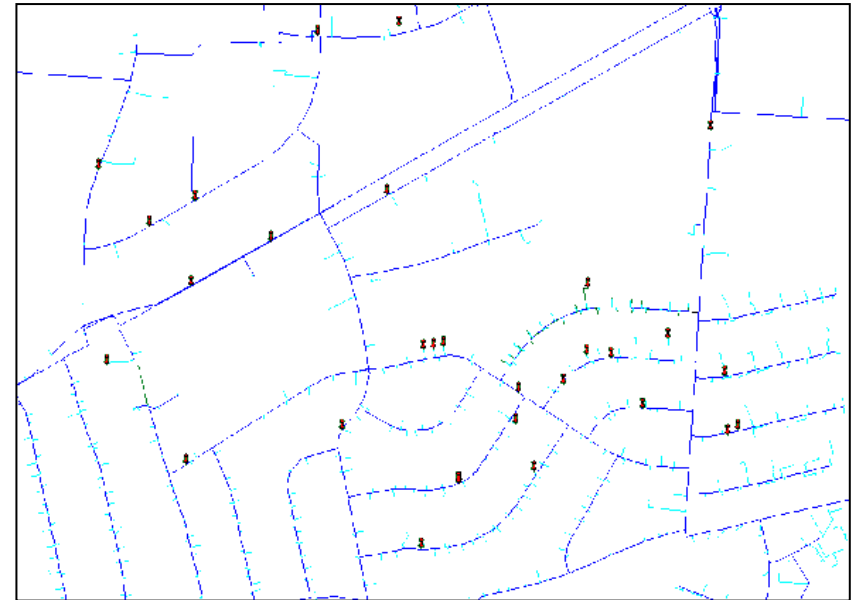
– from the initial planning phase to the day to day operations, the use of high quality installations, good workmanship and etc.



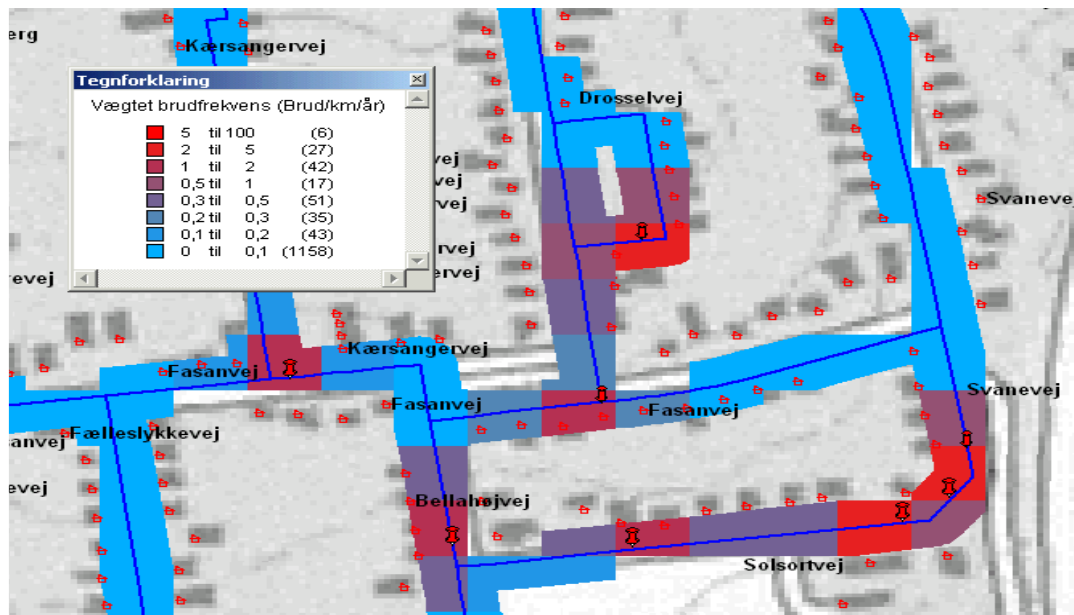
Use of burst registration

- GIS-visualisation of bursts and information
- Spatial evaluation of hot spots
- Calculation of spatial burst ratios
- Statistical analysis by material, year laid etc.

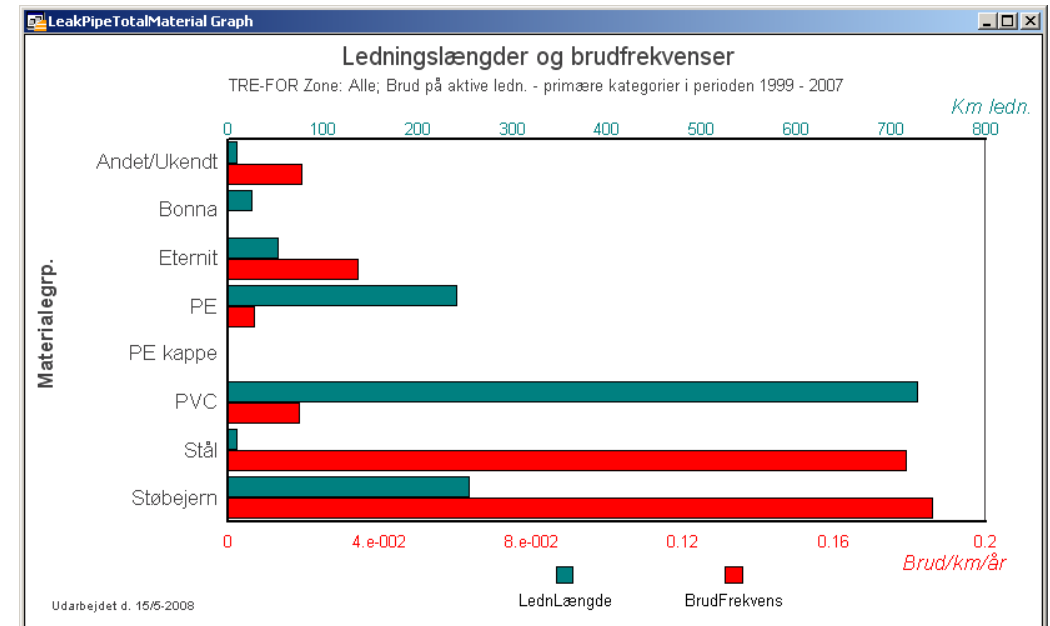
Burst report registration



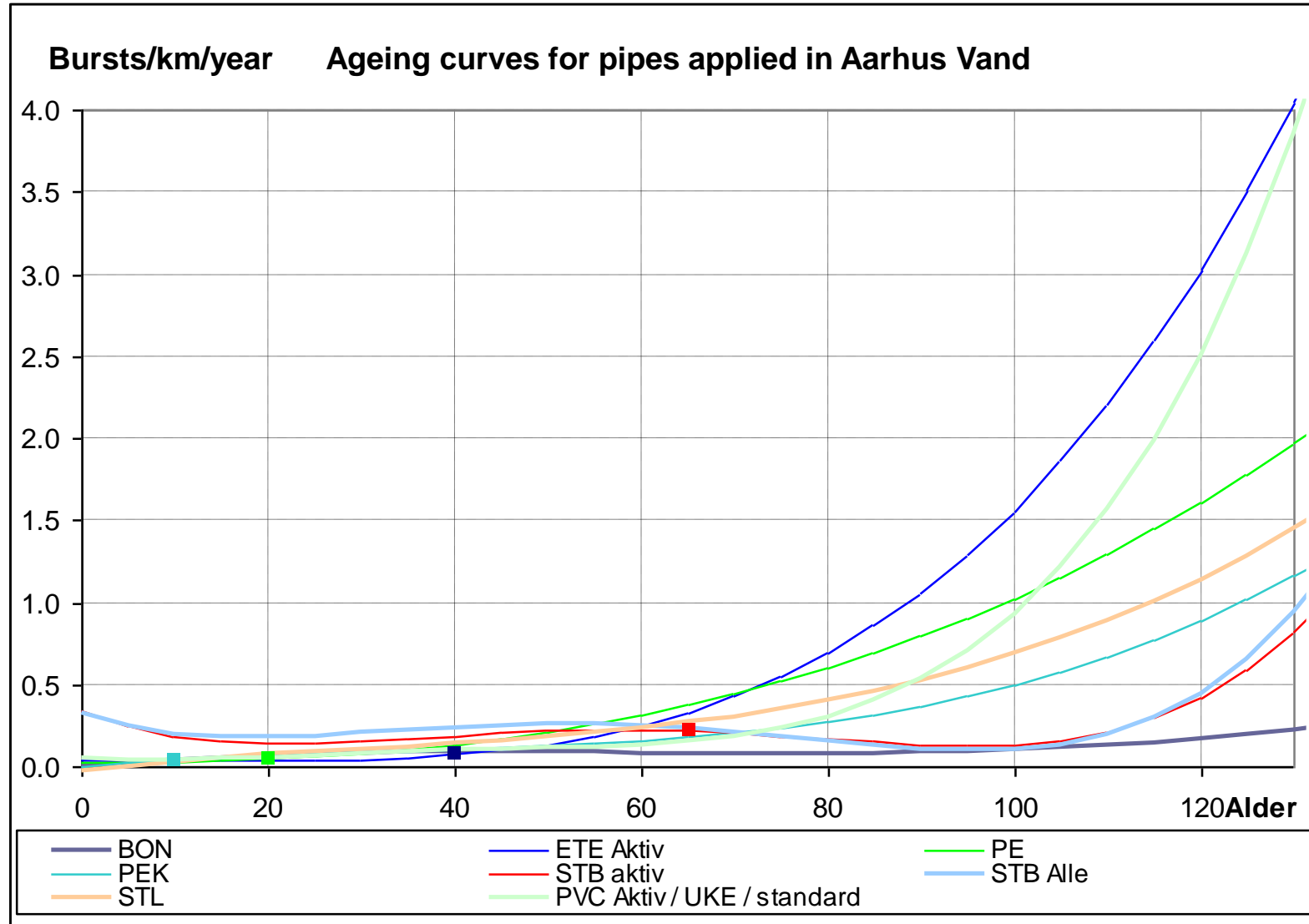
Burst ratio – hot-spots



Burst ratio by material



Ageing curves



Reports in WaterRehab

Renovand rapport

Rapport for renovand model: Model_2

Rapporten sammenfatter oplysninger om modellen i form af datagrundlag og grundlag. Der kan være taget hensyn til projekter og renoveringsår defineret i modeloplysninger.

Rapporten afspejler modellens status på tidspunktet for rapportens udarbejdelse. Rapporten er udarbejdet d. 24-09-2014.

Indhold

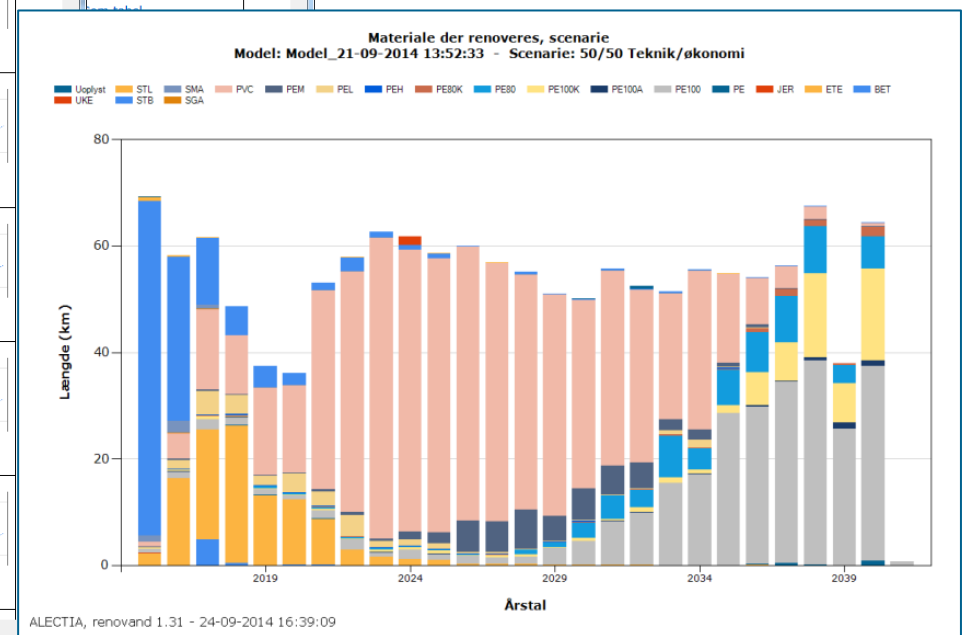
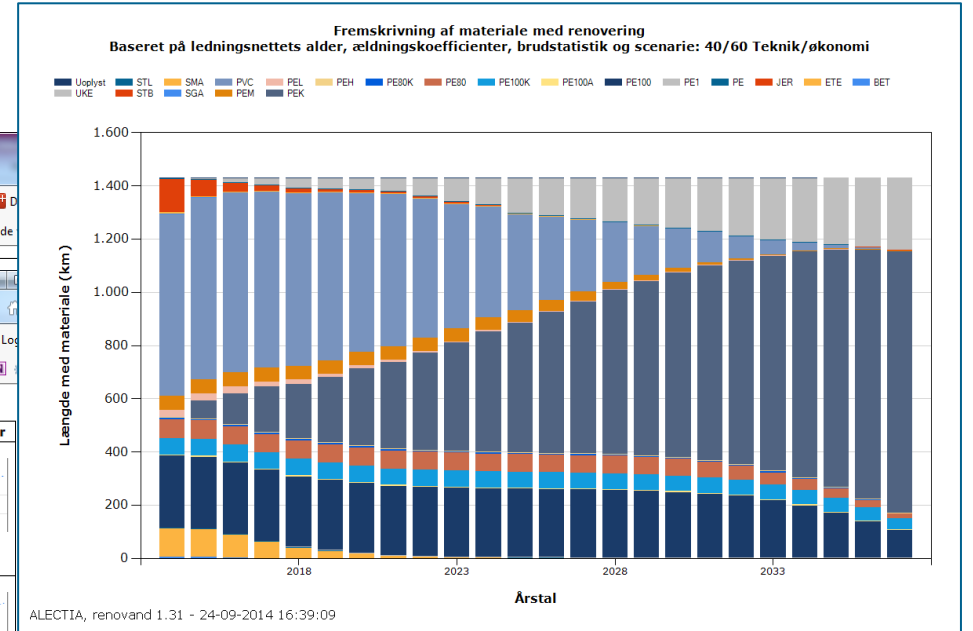
1. Modeloplysninger
2. Scenarier og renoveringsplan
 - Budgetter og vægte
 - Renovering baseret på scenariets prioritering
 - Fremskrivninger med renovering i henhold til scenariets prioritering
3. Anvendte parametre
 - Fordeling og pointtildeling
 - Aldningskurver
4. Renoveringsplanens projekter
 1. Tabeller med data til grafer

Modeloplysninger

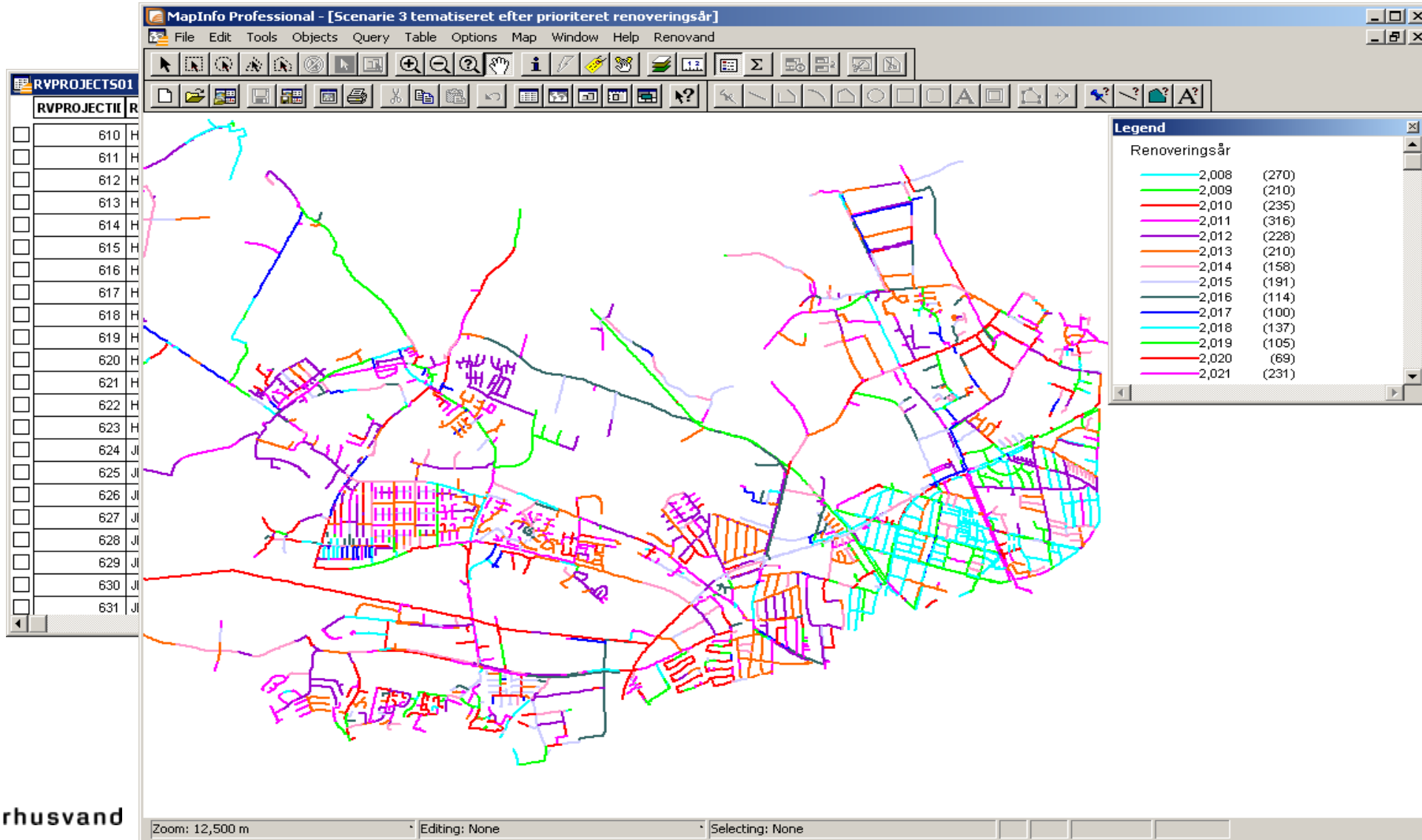
Modellens navn	Model_21-09-2014 13:52:33
Beskrivelse	T,D,F-Model_21-09-2014 Plan
Oprettelsesdato og -bruger	21-09-2014/jkj
Datakilde for ledningsoplysninger	NetUP
Udvælgelsesmetode	Planlagt ledningskategori og -status
Udvalgte ledningskategori(er)	Transmission, Distribution, Forsyning
Længde af udvalgte ledninger	1.433.941 m
Brudanalyse baseret på perioden	1978 - 2014
Tages der hensyn til allerede definerede projekters geografi	Nej
Ideallængde for ledningsstykker	50 m

Fremskrivninger med renovering i henhold til scenariets prioritering

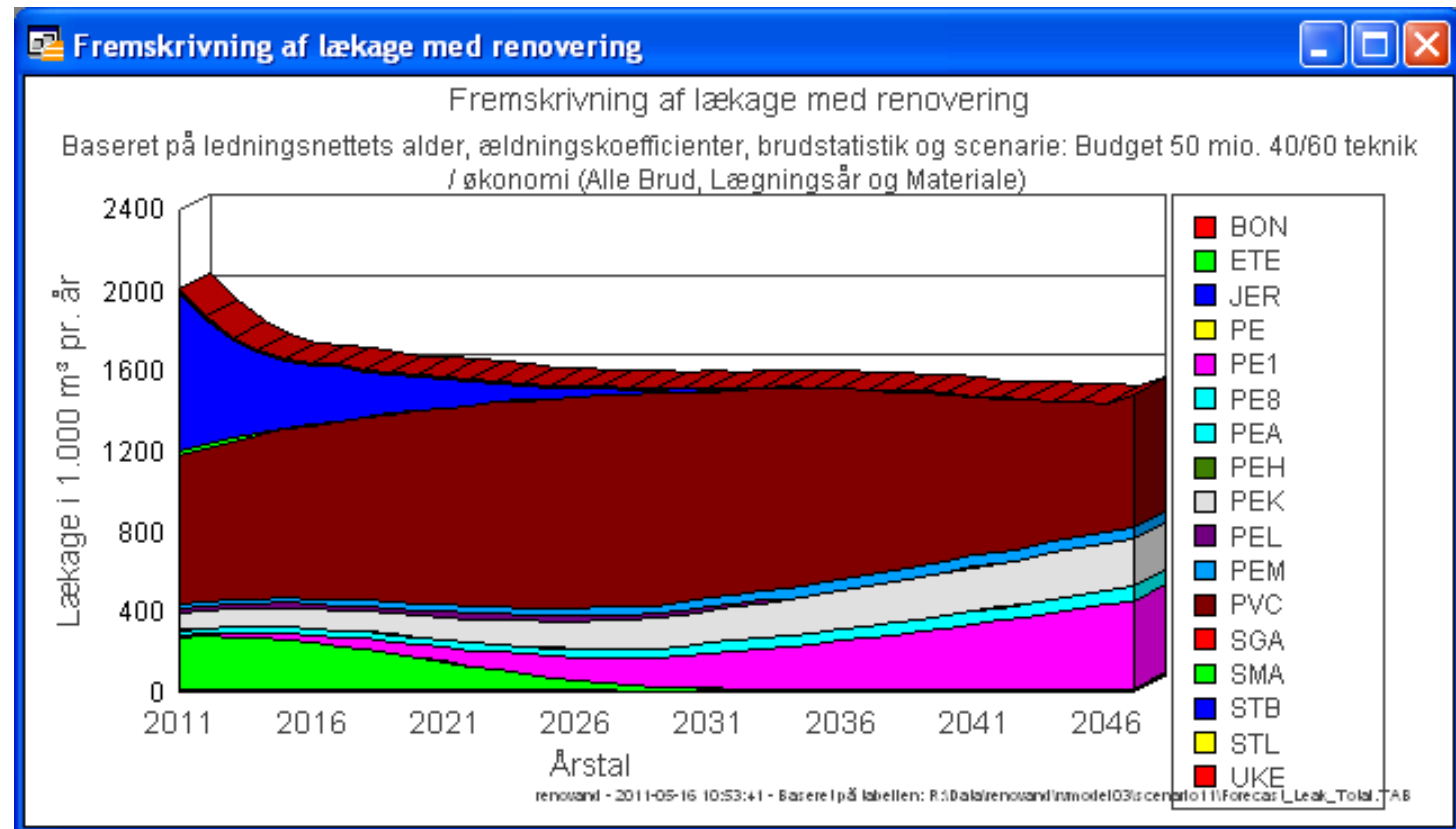
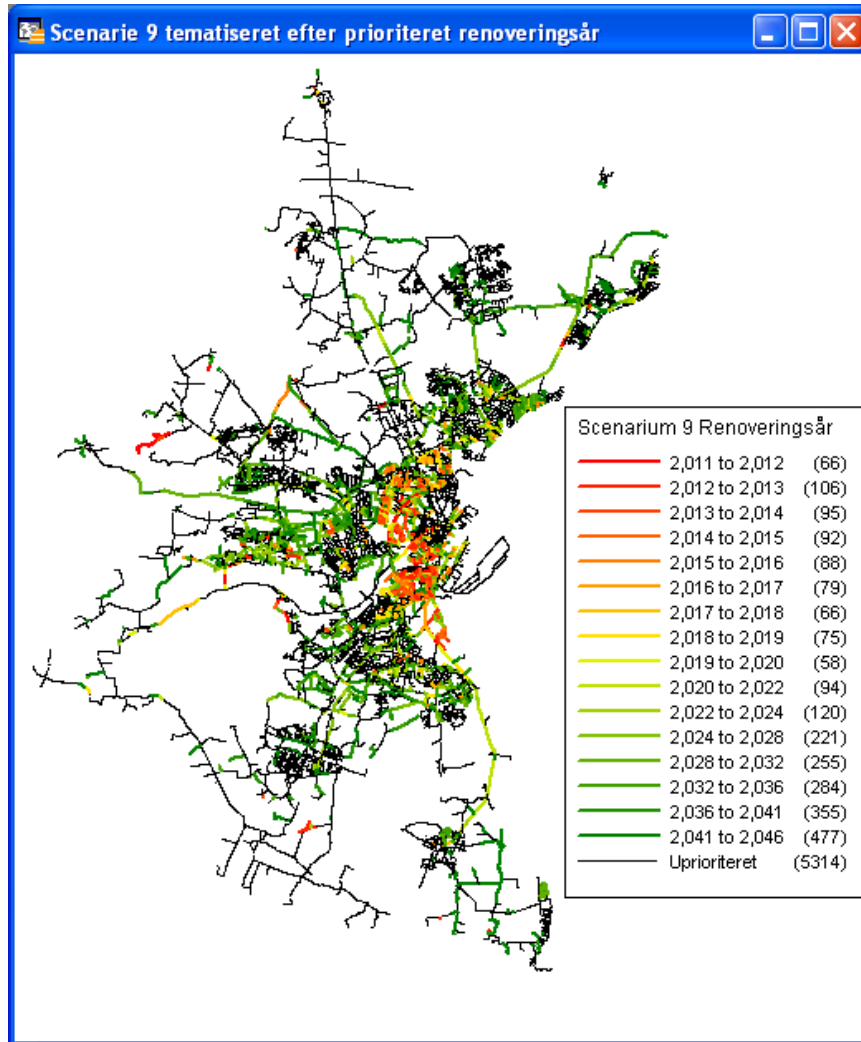
Beskrivelse	Værdi	Materiale	Brudfrekvens	Lækage	Gennemsnitlig alder
Basis scenarie A: Ingen renovering Oprettet 24-09-2014 08:42:23 af jkj					
Basis scenarie B: Cost-Benefit renovering Oprettet 24-09-2014 08:42:30 af jkj					
100% teknik 30 mio./år Oprettet 24-09-2014 11:04:33 af jkj					
60/40 Teknik/økonomi Oprettet 24-09-2014 12:28:57 af jkj					
40/60 Teknik/økonomi Oprettet 24-09-2014 12:59:43 af jkj					
100% teknik 25 mio./år Oprettet 24-09-2014 13:32:39 af jkj					



Planning of rehabilitation investments



Prioritization of rehabilitation



Project-view

The image displays two overlapping screenshots of the Aarhus Vand Project Viewer web application. The left screenshot shows a regional map with a project area highlighted in blue. The right screenshot shows a detailed street-level map of the Aarhus University area, with water infrastructure elements overlaid in purple and blue. A detailed project plan for 'Aldersrovej m.fl.' is shown on the right side of the right screenshot.

Project Viewer Interface Elements:

- Navigation:** Browser tabs for 'VandGIS | Aarhus Vand', search bar, and navigation icons.
- Project Viewer Panel (Left):**
 - Lagkontrol (Layers):** A list of layers including 'Forretnings objekter', 'Adresse motor', 'Ansoeg stik og maeler', 'Byggemodning', 'DAS Drive', 'Driftsaendelser', 'Driftssager', 'Giv et praej', 'Kloakprojekter', 'Kundehenvendelse', 'Projektviewer', 'Hovedprojekt', 'Indsats', 'Supplerende', 'Etape', 'Anlaegsprojekt', 'TV', 'Opmaeling', 'Udvedkommende v', 'Elementer', 'Service Manager', 'Simatech', 'Tømningsordning', 'Vandforurening', 'Arbejds objekter', 'Vand net', 'Vand Ledning', 'Vand Ledning labels', 'Vand komponent', 'Vand stik', 'Vand grænse', 'Sektion', 'Trykzone', 'Forsyningszone', 'Driftsområde', 'Vand øvrige', 'Spildevand net'.
 - Map:** Regional map showing project boundaries and infrastructure.
- Project Viewer Panel (Right):**
 - Projektplaner:** Tabs for 'Projektplaner', 'Anlaegsbruttoliste', 'Upload', 'Analyse'.
 - Search:** Search bar for 'Plan eller element navn...'. Filters for 'Vand', 'dato type', 'type', and 'metode'.
 - Perioder:** Date range selector for '01-01-2016' to '31-12-2016'.
 - Valgte elementer (Selected Elements):**
 - Aldersrovej m.fl.
 - Aldersrovej
 - Finsengade
 - Funch Thomsons Gade
 - Beder Kirkesti - råvand
 - Brammersgade m.fl. (vand fornyelse)
 - Bryggevej
 - Christiansbjerg m.fl. (vand fornyelse)
 - Drikkevandstransmissionsledninger forr
 - Egervej mfl
 - Detaljer (Details):**
 - Etape (Stage):** Identification fields for 'Aldersrovej m.fl.' (Id: 2070 | Planstype: Etape).
 - Tidsplanlægning (Scheduling):** Planlagt gennemførelse (01-01-2017 to 31-12-2017), Gennemførelse.
 - Stamdata (Metadata):** SharePoint link, Beskrivelse, Forsyning (Vand), Katenorikode (Driftbaseret fornyelse).

Thank you for your attention

Flemming Fogh Pedersen

Director, Operations

Flemming.fogh.pedersen@aarhusvand.dk

