

Session 1:

Digital tools for refurbishment planning based on facts and choice of pipe system based on Total Cost of Ownership and CO2 emission

Powered by



kamstrup

LOGSTOR



Vestas

ENGINEERING
TOMORROW



Peter Jorsal

Product & Academy Manager

Presenting



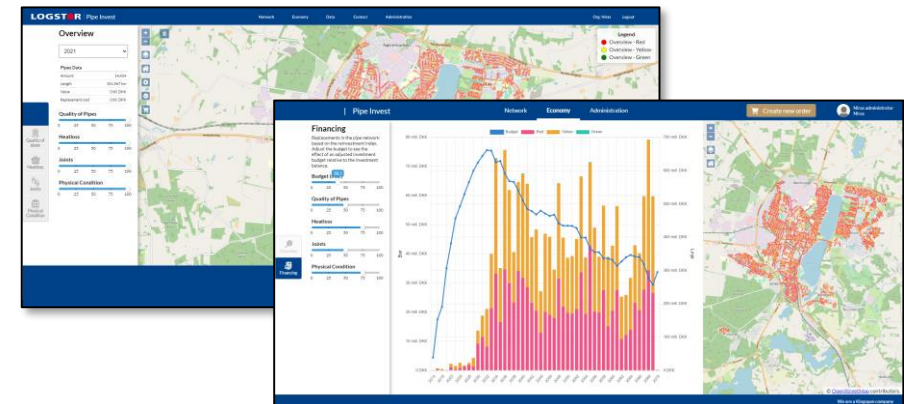
Total Cost of Ownership (TCO) tool

A tool that will find the best choice of pipe system based on Total Cost of Ownership

Martin Lindgaard Pedersen

Senior Director - Digitalization

Presenting



Pipe Invest

A ONE-CLICK solution that brings you aggregated overview of utility networks. It shows **current** status, but can also predict **future** refurbishment in utility assets (grids) and allows Utilities to optimize OPEX and CAPEX levels.

Global presence

LOGSTOR Group

- Headquarters in Denmark
- 1,260 employees
- Annual turnover > 240 MEUR

Facts:

- 7 plants and 2 mobile production units
- 13 Sales Units
- Serving more than 40 countries
- More than 5,000 km pre-insulated pipes every year
- More than 300,000 km LOGSTOR pipes supplied to data



LOGSTOR Pipe Invest

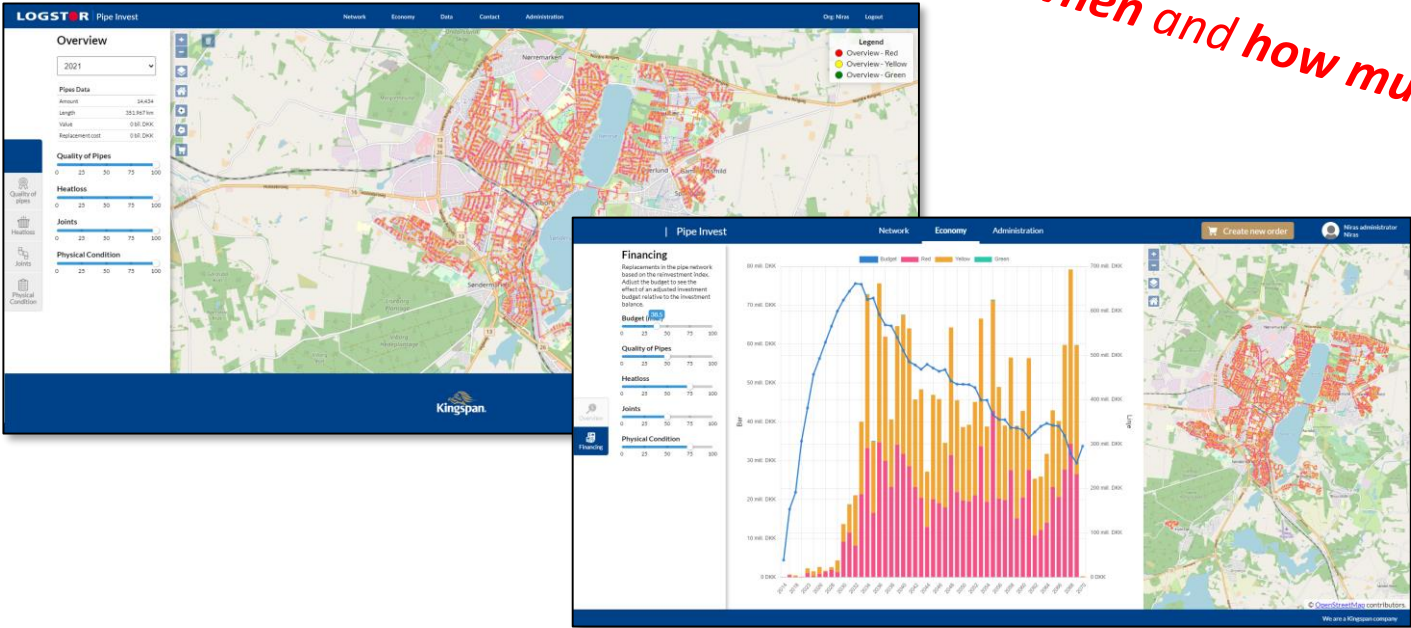
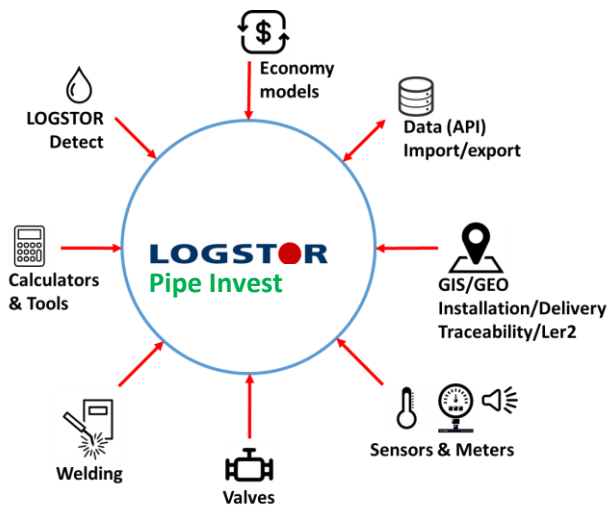
Disclaimer!

The Pipe Invest tool is currently under development. We are looking for utilities, who are willing to test the system. Expected launch late 2021.

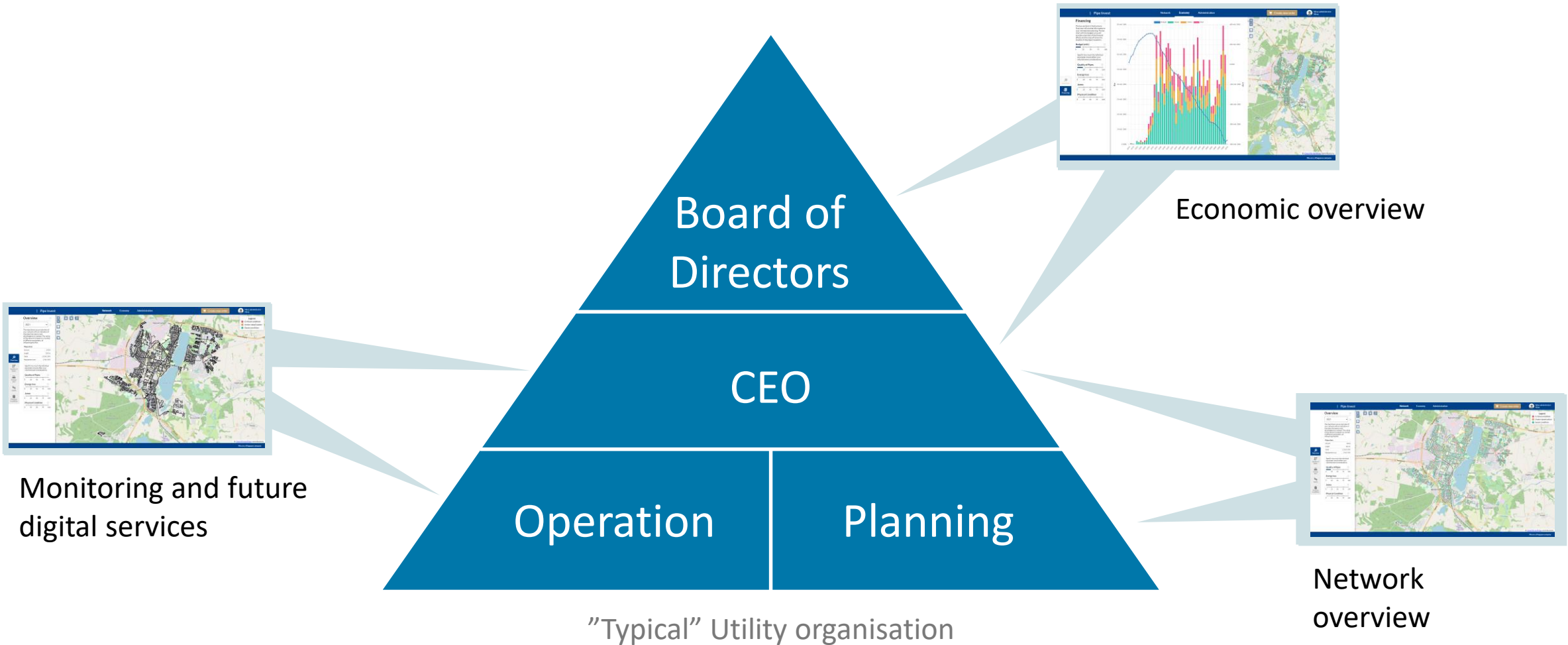
Asset management and network optimization tool

A ONE-CLICK solution that brings you aggregated overview of utility networks. It shows **current** status, but can also predict **future** refurbishment in utility assets (grids) and allows Utilities to optimize OPEX and CAPEX levels. Utilities can reach new levels of confidence in surveillance and investments based on specific network predictions.

Pipe Invest can tell Utilities *where, when and how much* to invest



Different users with different roles and needs



How it works:

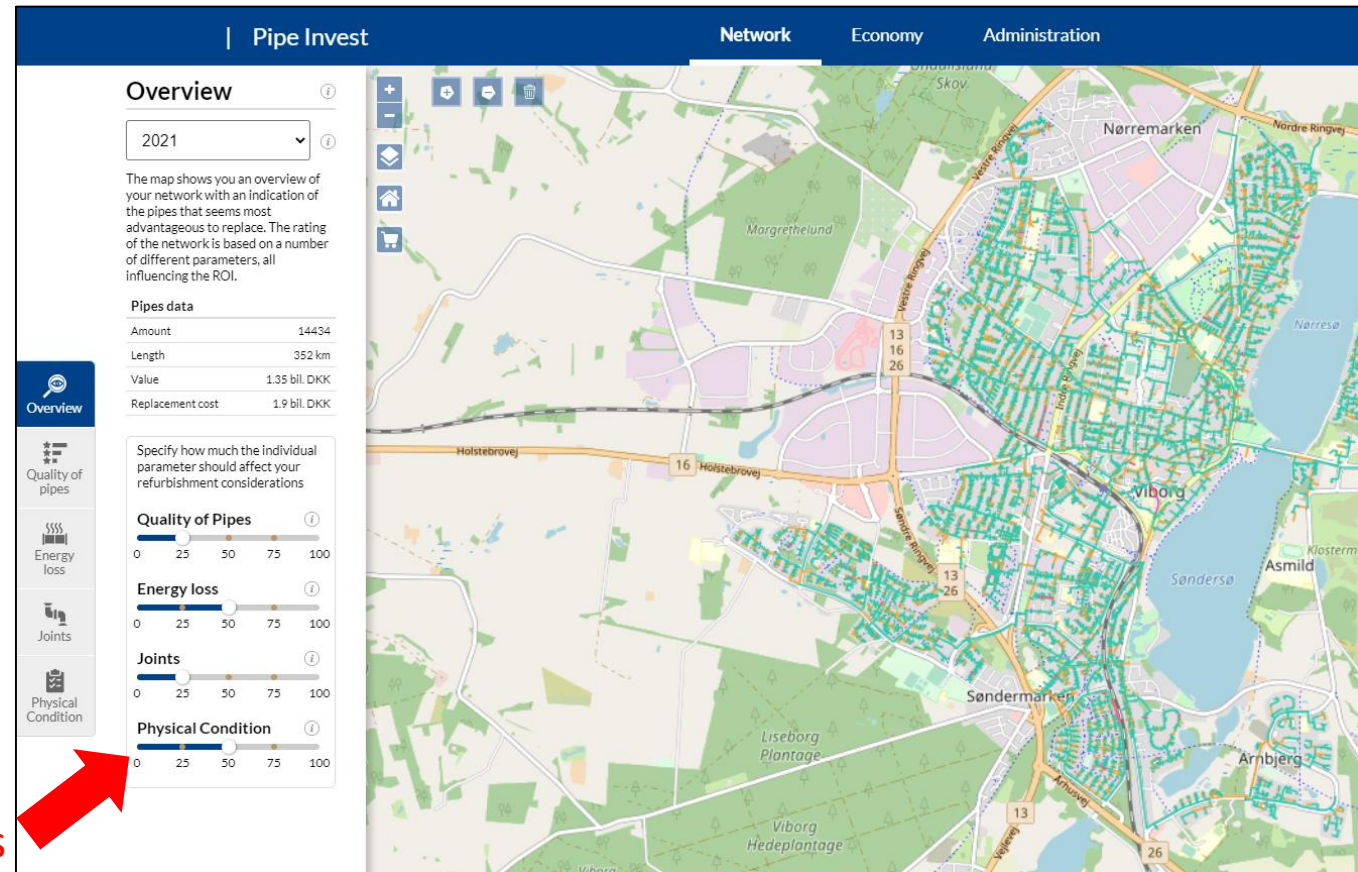
The DH network is imported (via Shape files) in the software.

The Shape files contains information on the District Heating pipes.

In the “Network” view, the utility “adjusts” individual parameters on **sliders**:

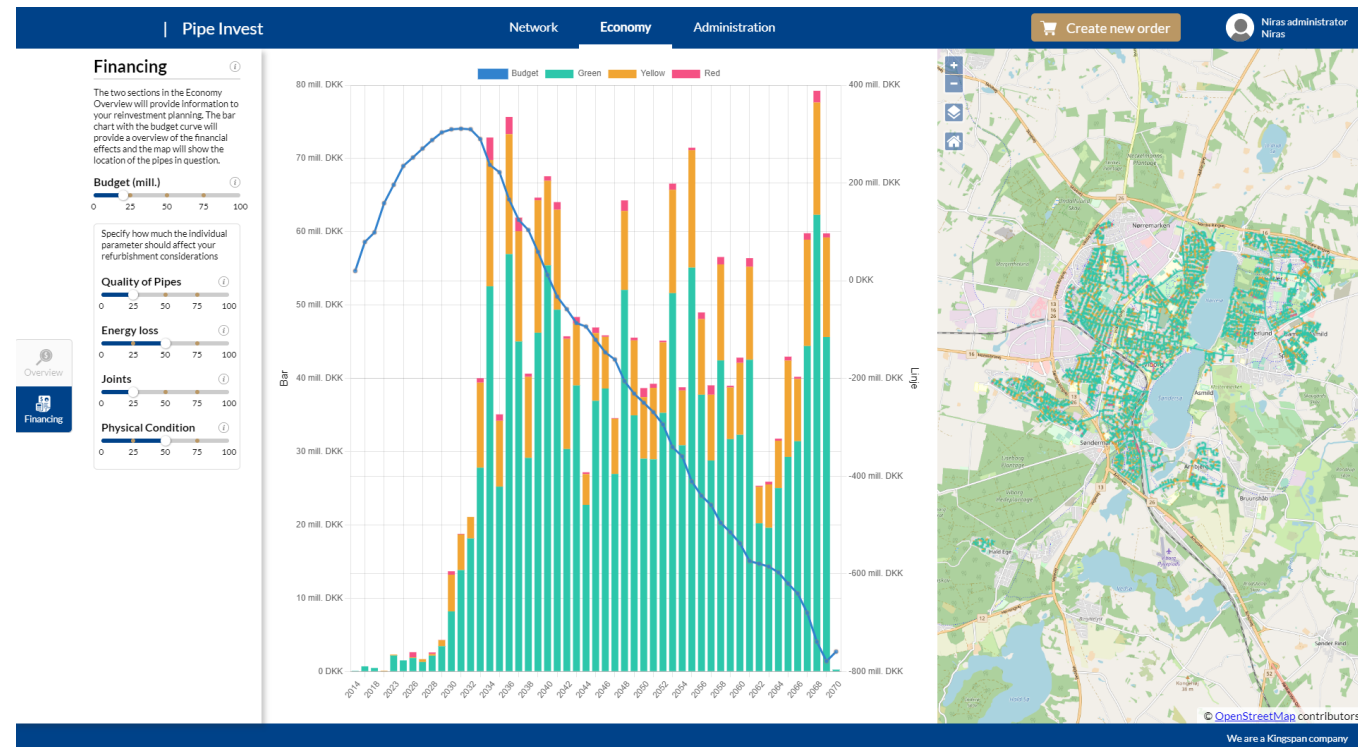
- Quality of Pipes
- Energy Loss
- Joints
- Physical condition

After this an economic view is calculated, using algorithms from the TCO tool (presented later by Peter)



Economy View:

The Economy Overview will provide information to your reinvestment planning. With a given maintenance budget, the bar chart with the budget curve (blue) will provide an overview of the financial effects and the map will show the location of the pipes in question.



TCO tool

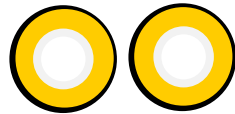
The right choice of pipe system

The challenge – complexity in amount of possibilities

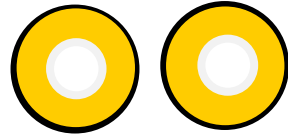
- Available pipe systems

- **Single pipe**

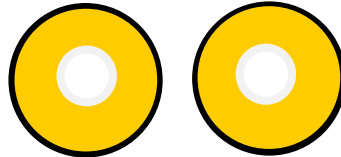
Series 1



Series 2

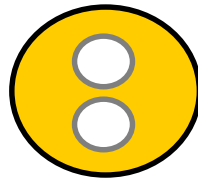


Series 3

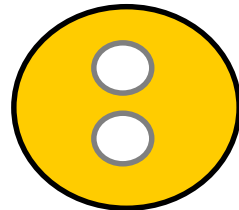


- **TwinPipe**

Series 1



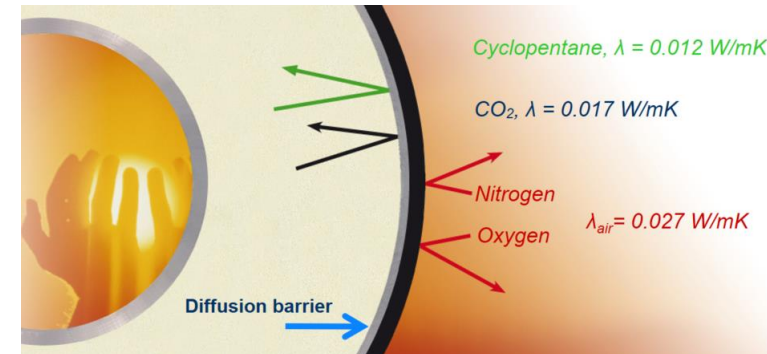
Series 2



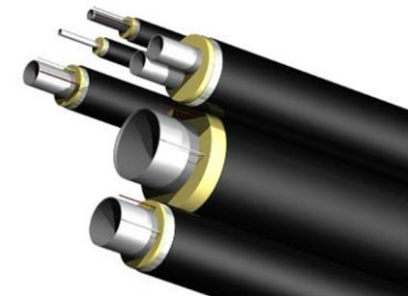
Series 3



- All these variants can be delivered with or without a diffusion barrier
- The diffusion barrier secures that heat loss properties will remain the same during life time

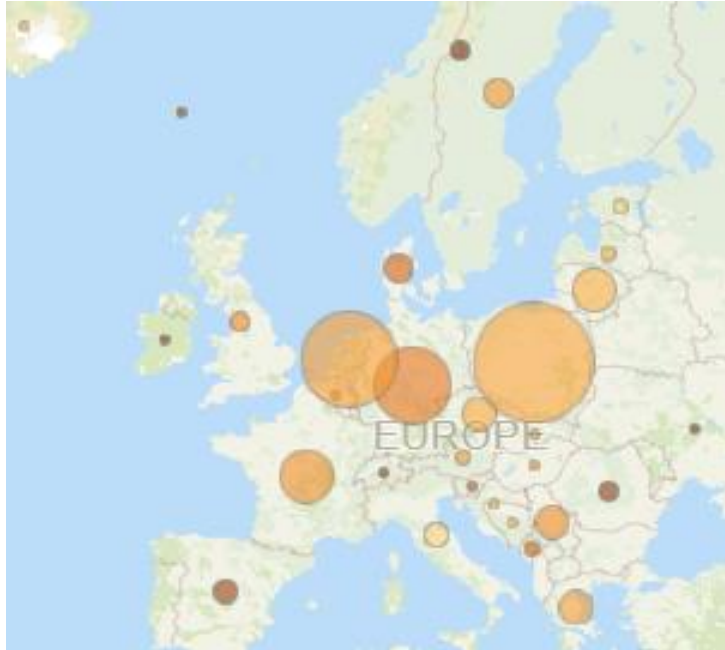


- → 12 different choices for the same project



Markets for pair of pipe

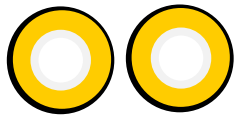
Single pipe series 1



Single pipe series 2



Single pipe series 3



Series 1 single pipe is 60% of the total market of pair of pipe

Series 1 single pipe is the pipe system with the worst insulation properties

We see many energy companies that make their choice of pipe system based on

“We do what we do because this is what we always have done”

Total Cost of Ownership includes

- Investment (CAPEX)

- Pre-insulated pipes

- Excavation and asphalt

- Pipe handling, welding and jointing

- Consulting, design

- Supervision

- Operation (OPEX)

- Heat loss cost

- Pumping cost

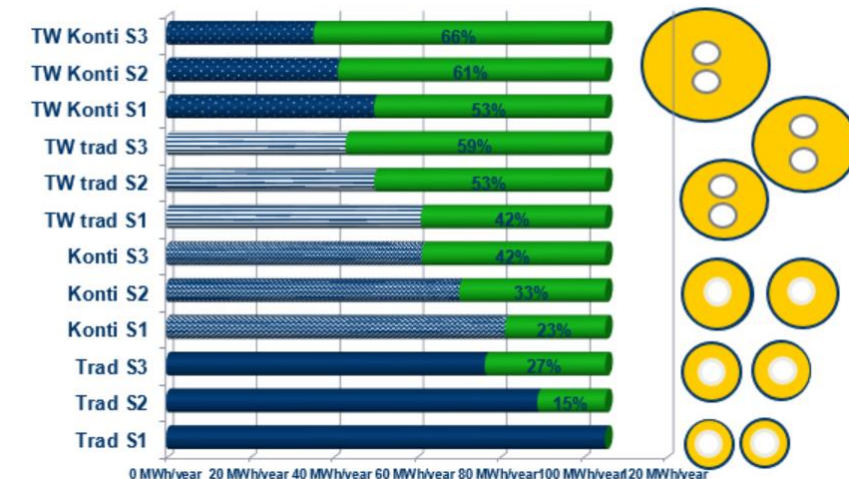
- Repairs

- Maintenance

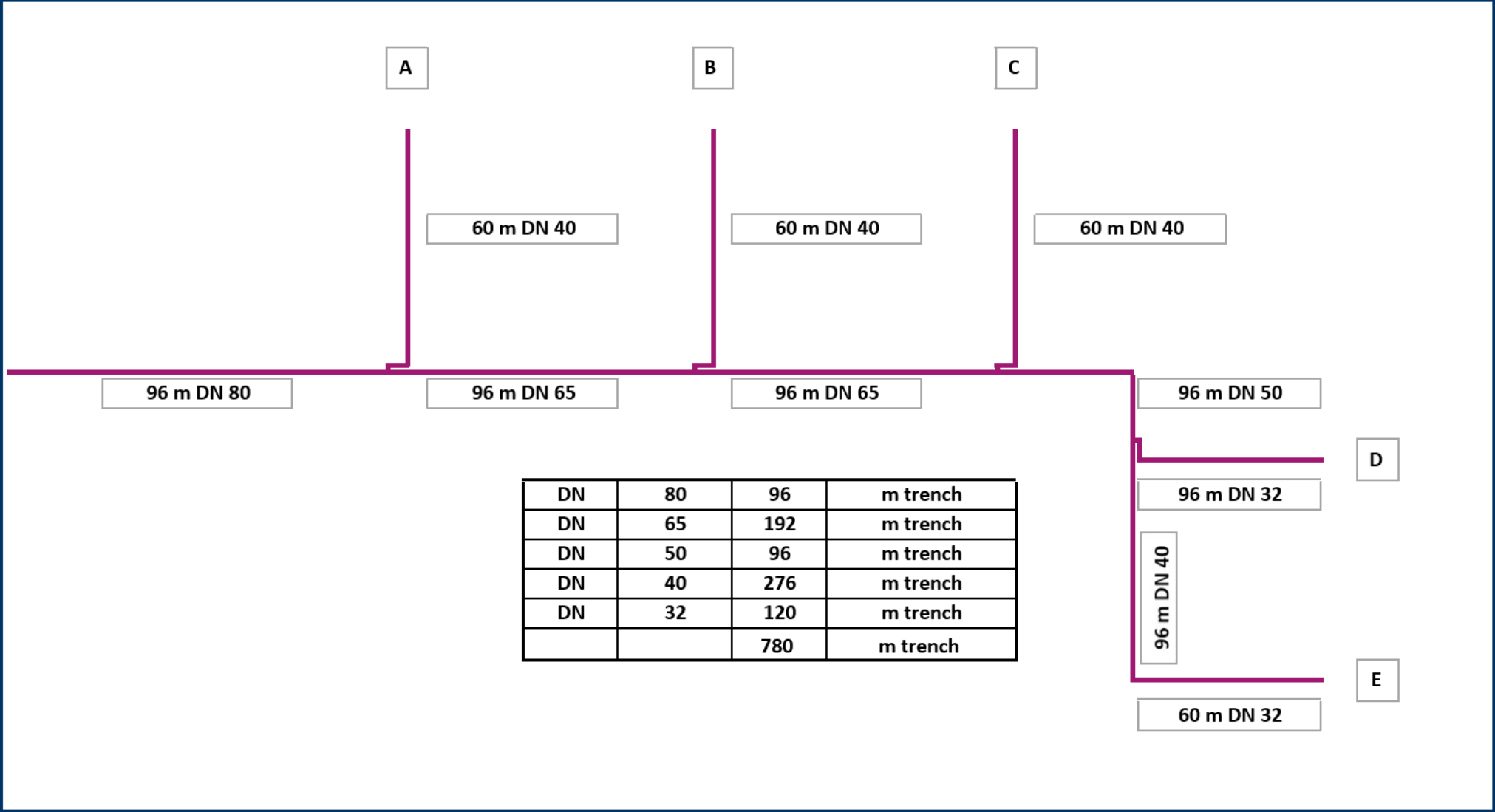
- Surveillance



Heat loss - 1000 m DN 80 – average 30 years



TCO tool, 12 different pipe scenarios for the same project



TCO tool, Input of data

LOGSTOR

TCO – Total Cost of Ownership

Favourites

How to use TCO

Design data

Winter

Summer

T flow [°C]

80

70

i

T return [°C]

35

40

i

T soil [°C]

4

14

i

Days in operation

215

150

i

Pressure [bar]

6

i

Soil Cover [m]

0,6

i

Lambda Soil [W/mK]

1,6

i

TCO Calculation data

Currency

EUR

Exchange rate

1

i

Interest [%]

3

i

Period TCO calc [years]

30

i

Energy unit

MWh

i

Energy price [price/unit]

40

i

CO₂ Emission data

Fuel type

NaturalGas

i

Ton CO₂/TJ

55,52

i

Include CO₂ in TCO

☒

i

CO₂ quote price (currency/ton)

35

i

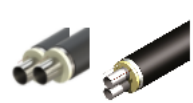
Number of years in TCO

10

i

Enter metre trench pipe by dimension

Bonded pipe system



120

DN32 / ø42,4

276


DN40 / ø48,3

96

DN50 / ø60,3

+ Add

FlexPipe system

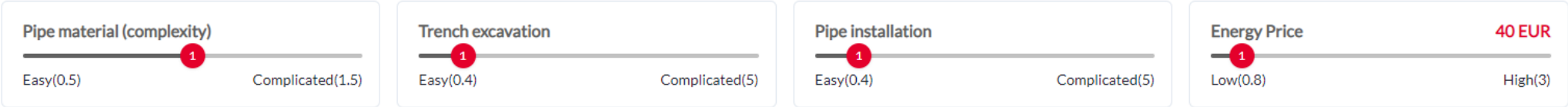


Select type

+ Add

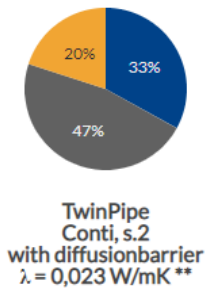
★ Add to favourites

Calculate TCO

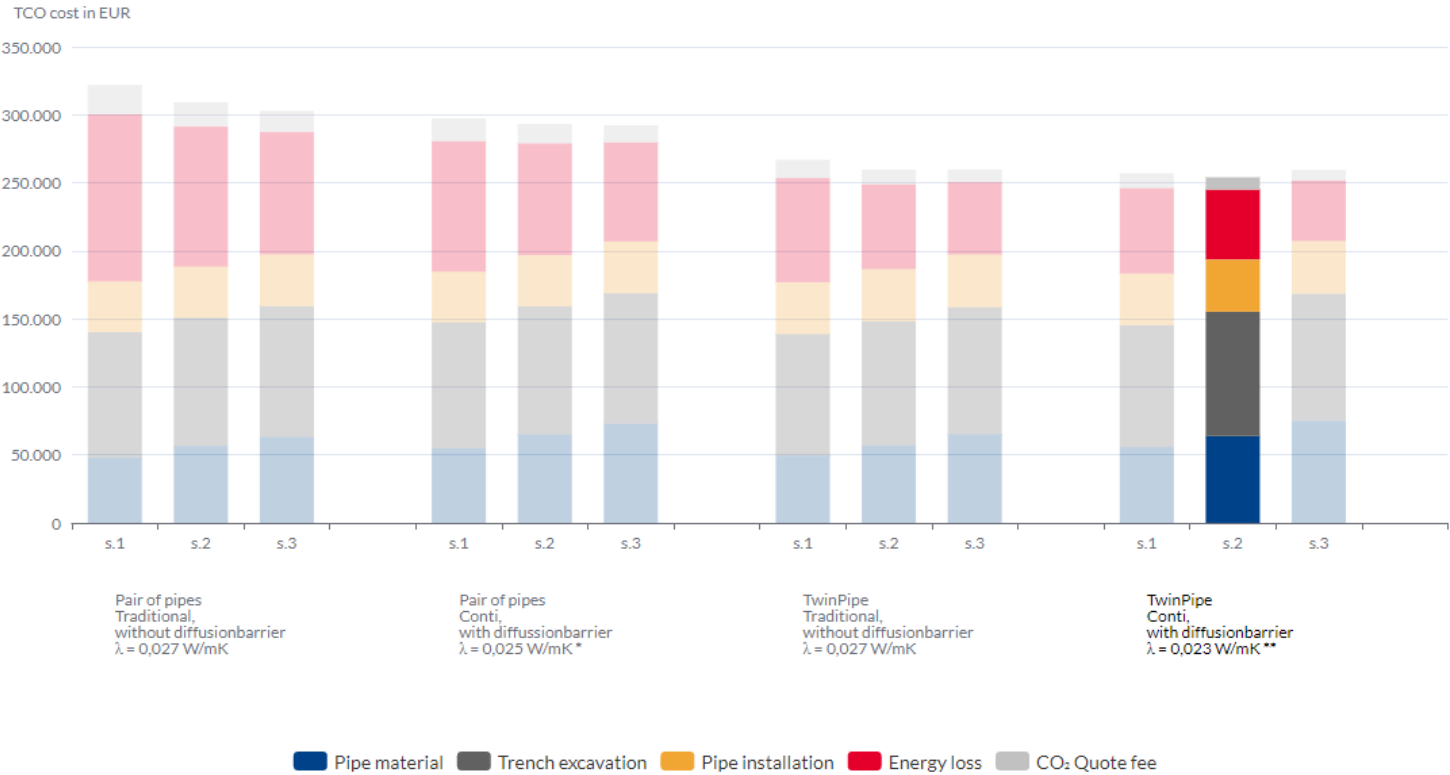


Results of calculation

Dimensions DN20-DN200



DN20-DN200 note regarding lambda values:
* Pair of pipes, Conti in DN200 series 2 and series 3 have lambda value at 0,025 W/mK
** Twin pipes, DN100 series 2/3 and DN125-DN200 series 1/2/3 have lambda value 0,027 W/mK

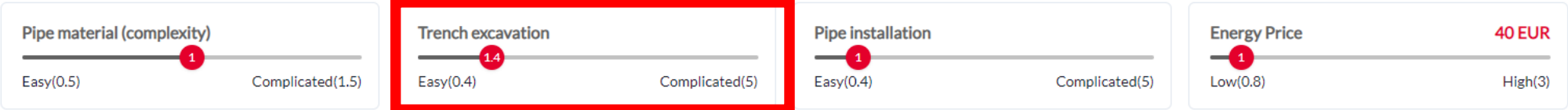


Calibrate the system in relation to share of the different parts
of the investment cost

Make sensitivity analysis on price of energy and period for the
calculation

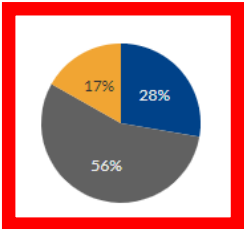
Use the sliders

Calibrate the share of investment costs



Results of calculation

Dimensions DN20-DN200

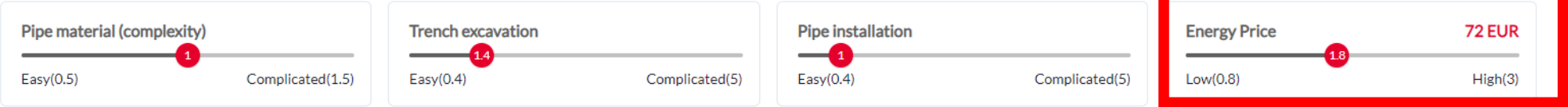


TwinPipe
Conti, s.2
with diffusionbarrier
 $\lambda = 0,023 \text{ W/mK}^{**}$

DN20-DN200 note regarding lambda values:
* Pair of pipes, Conti in DN200 series 2 and series 3 have lambda value at 0,025 W/mK
** Twin pipes, DN100 series 2/3 and DN125-DN200 series1/2/3 have lambda value 0,027 W/mK

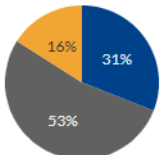


TCO tool, Sensitivity analysis energy cost and period



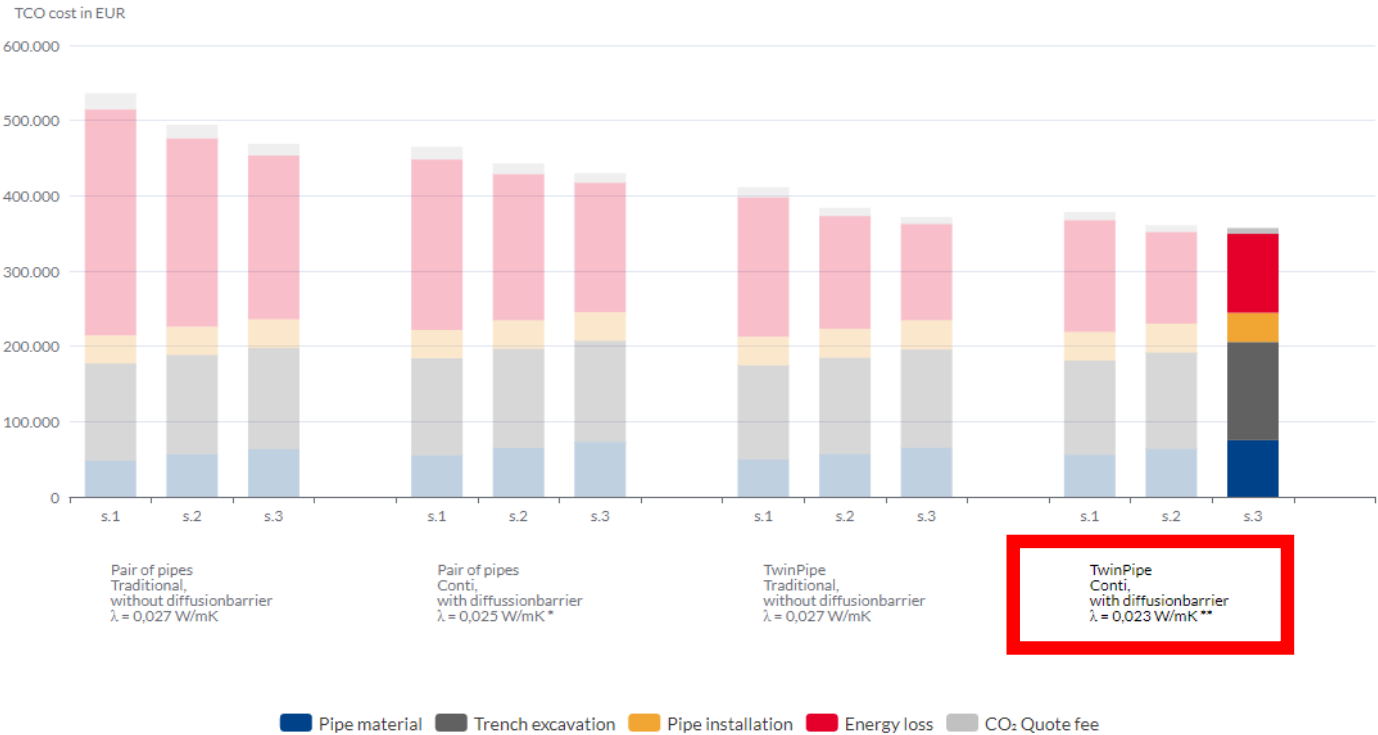
Results of calculation

Dimensions DN20-DN200



TwinPipe
Conti, s.3
with diffusionbarrier
 $\lambda = 0,023 \text{ W/mK}^{**}$

DN20-DN200 note regarding lambda values:
* Pair of pipes, Conti in DN200 series 2 and series 3 have lambda value at 0,025 W/mK
** Twin pipes, DN100 series 2/3 and DN125-DN200 series 1/2/3 have lambda value 0,027 W/mK

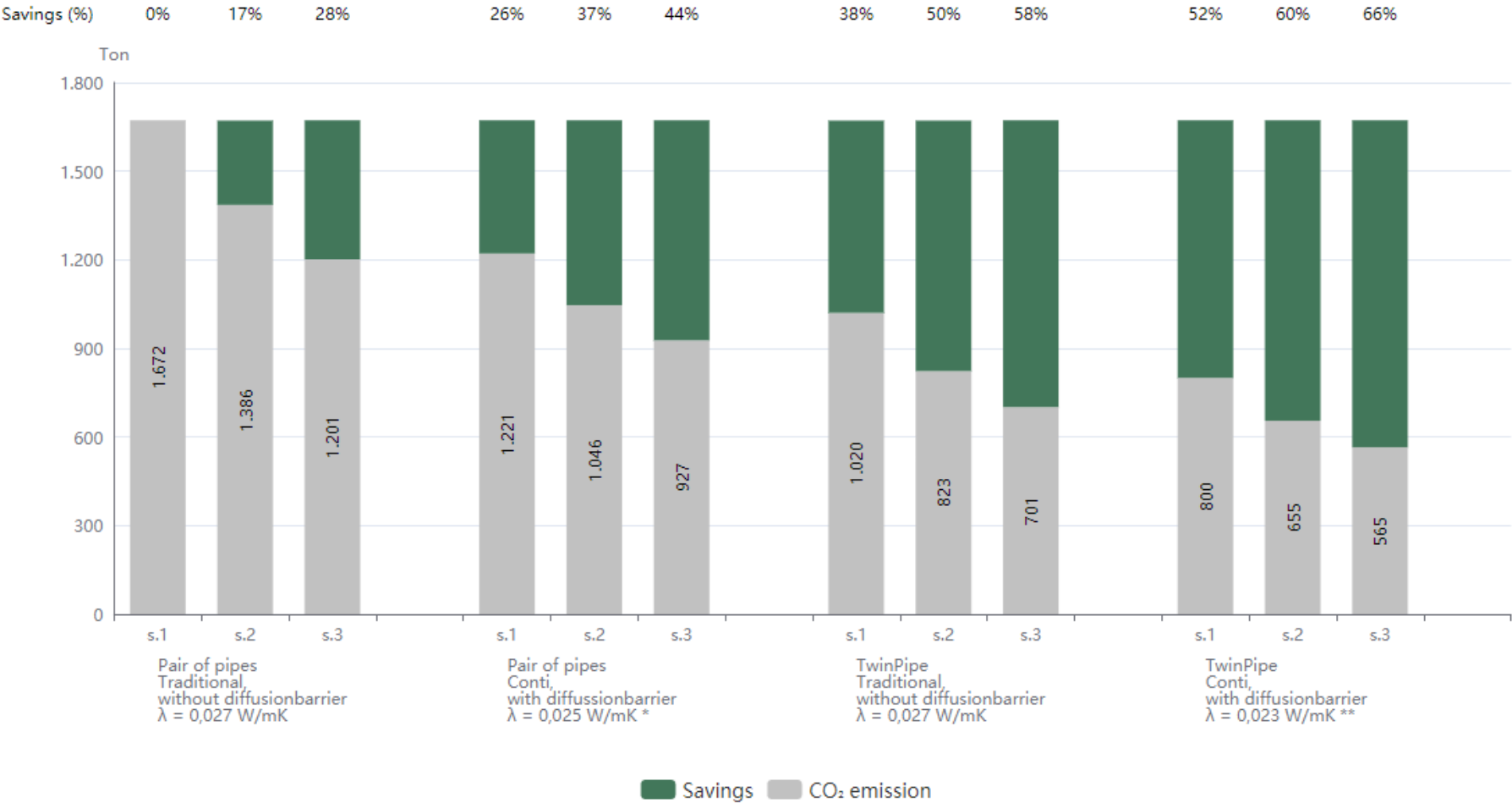


TCO tool, Calculation of CO₂ emission

CO₂ emission

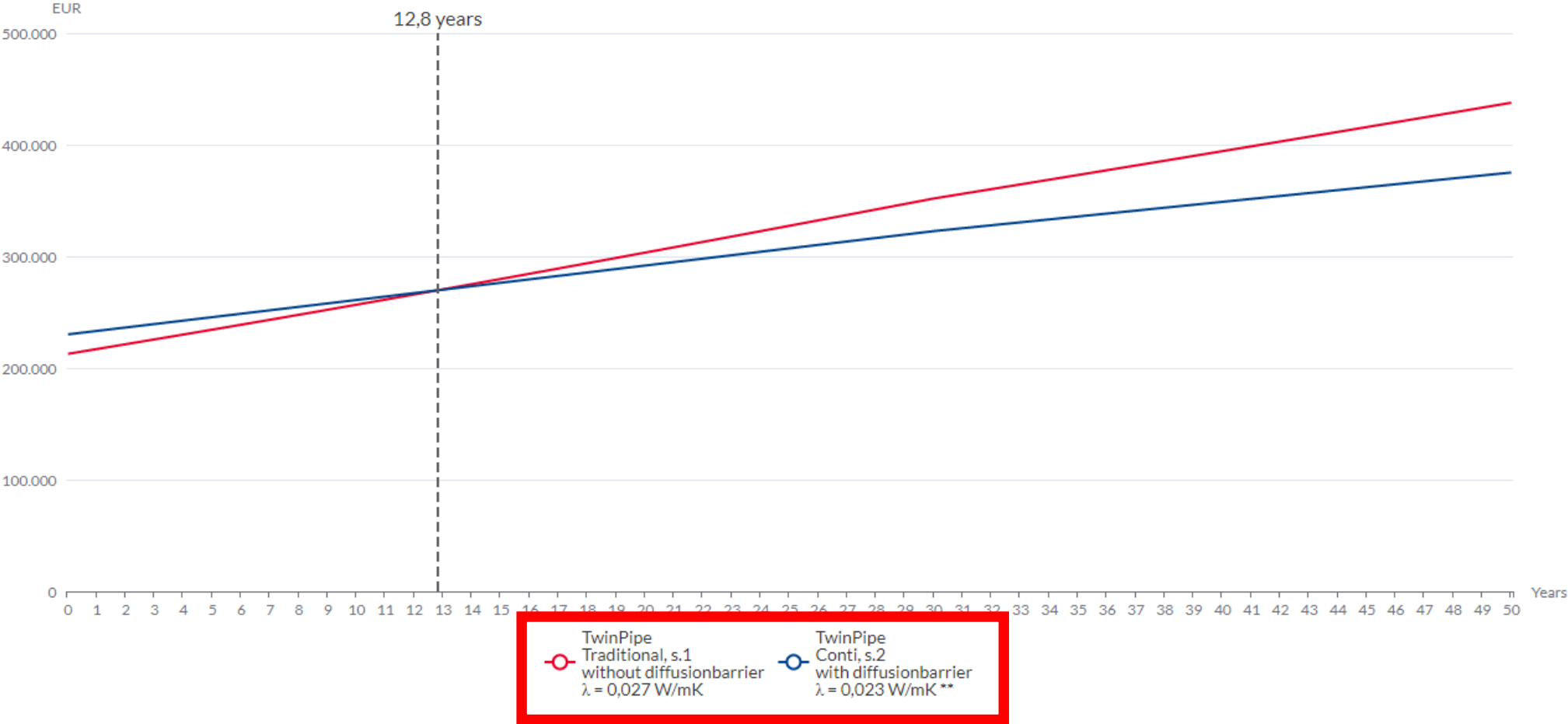
Values are summarized across all years and compared to the pipe solution with the highest CO₂ emission

Dimensions DN20-DN200



ROI

Dimensions DN20-DN200



The TCO tool is being tested in this period

Launch October 2021

Questions
