



E4Water: Economically and Ecologically Efficient Water Management in the
European Chemical Industry

LCA AND WATER FOOTPRINT AS TOOLS FOR DECISION SUPPORT

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WHAT ARE THE BENEFITS OF LCA AND WATER FOOTPRINT?

- ✘ Often better understanding of current process and future options
- ✘ Allowing for process optimisation
 - + Awareness about consequences and benefits,
- ✘ Putting your system in a broader perspective

WHAT DO YOU NEED (INPUT)

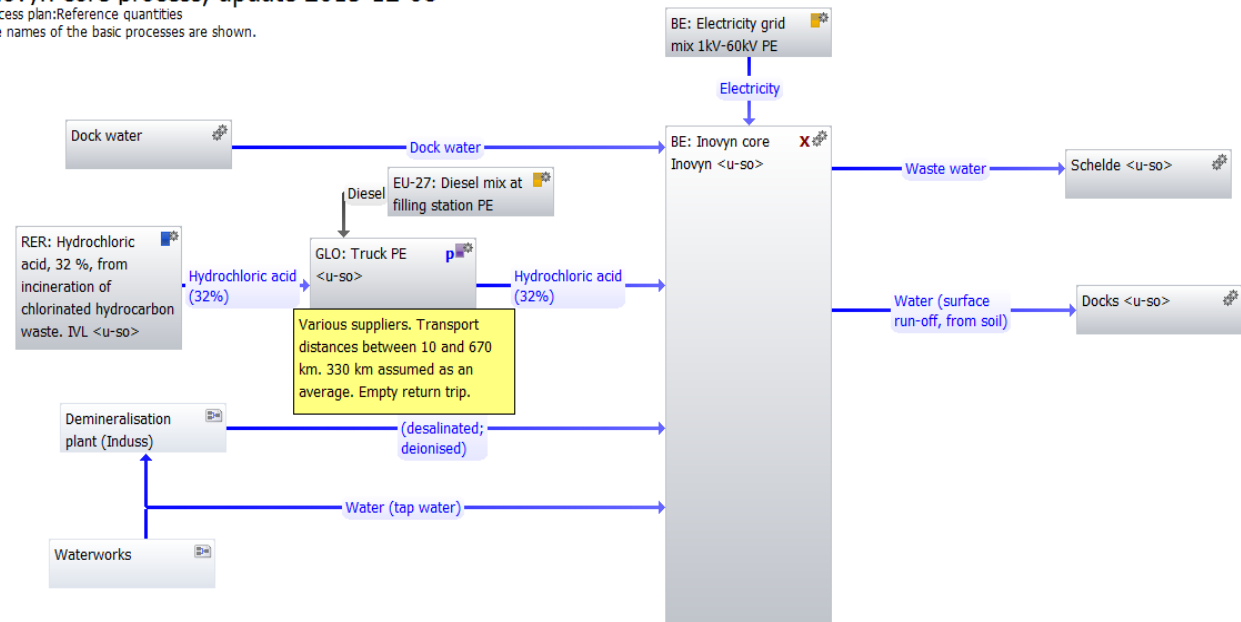
- ✘ Definition of the question:
 - + what is your benefit (functional unit)?
 - + Which system are you looking at (system boundaries)?
- ✘ Mass and energy balance
 - + input and output, including sources
- ✘ You can also use process modelling in order to get more information of your current and future system

WHAT IS DONE WITH IT


- ✘ Setting up an LCA model of the system
- ✘ Calculation of the impact
- ✘ Assessment and possible interpretation of results

Inovyn core process, update 2015-12-08

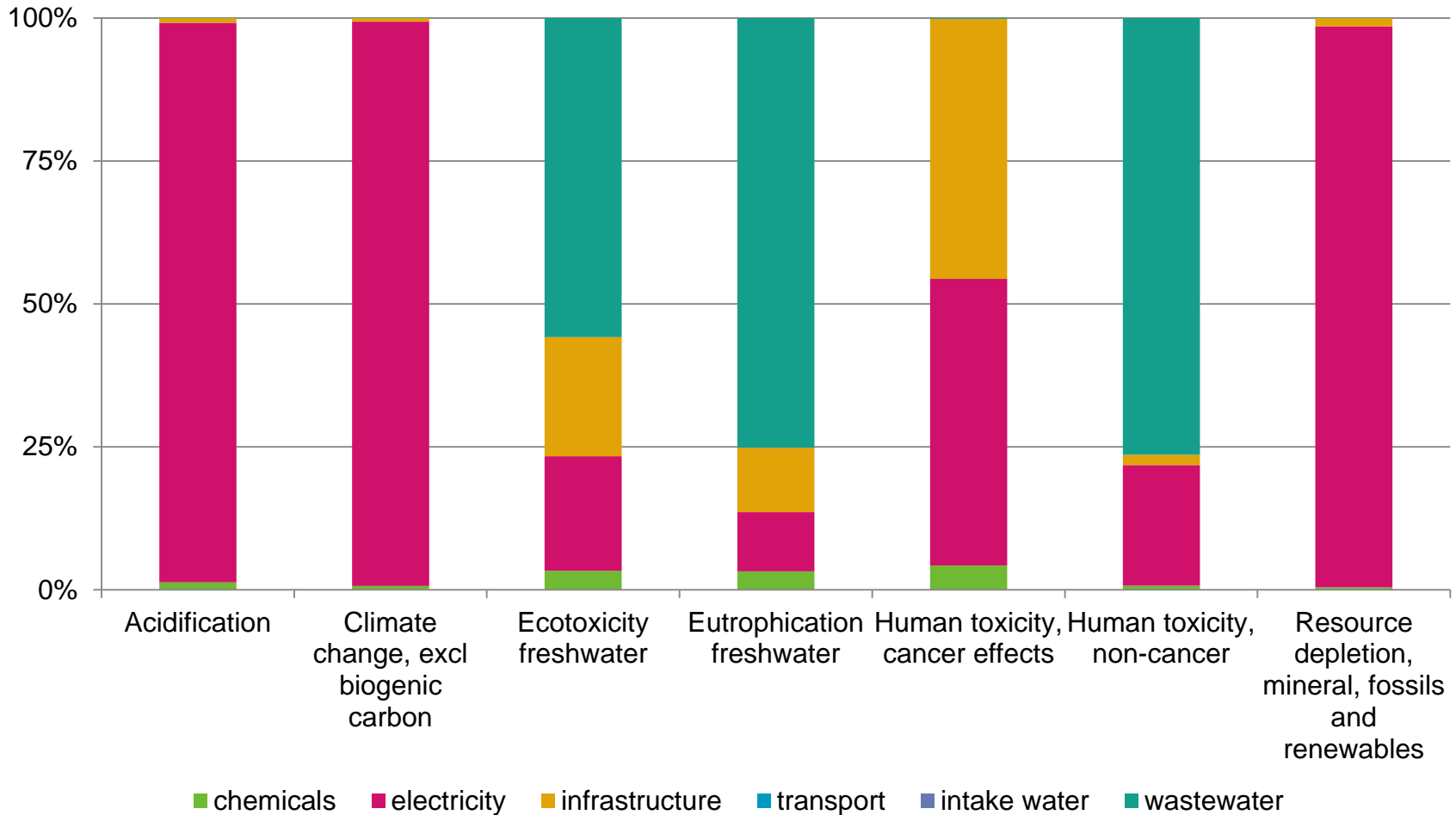
Process plan: Reference quantities
The names of the basic processes are shown.



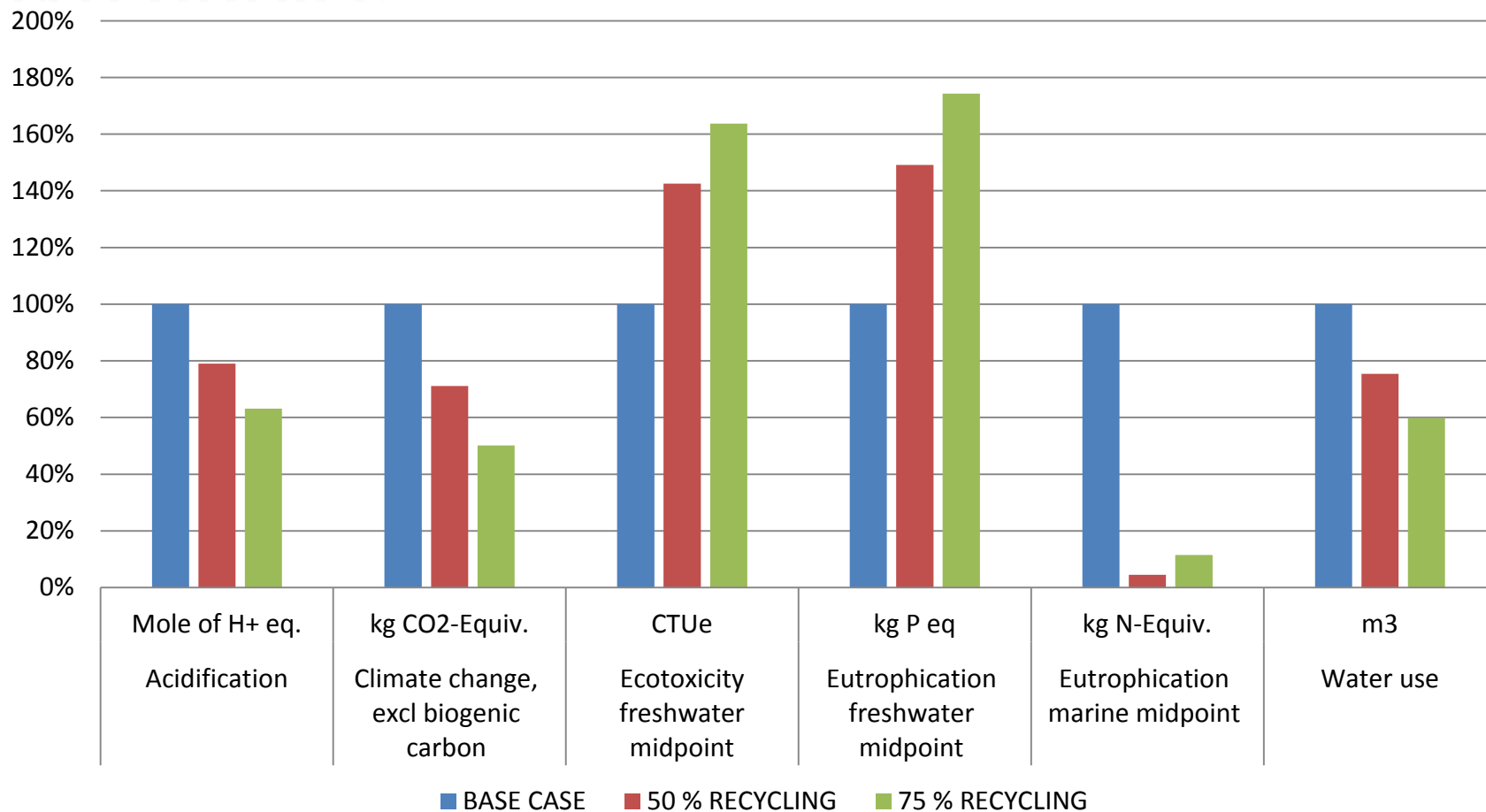
WHAT DO YOU GET?

- ✘ An updated process scheme 
- ✘ The environmental impact of your process for different impact categories
- ✘ The source of the environmental impact
 - + Reduction of the impact and process optimisation go often hand in hand
- ✘ For LCC also similar information about capital and operating costs

SOURCES OF ENVIRONMENTAL IMPACT



ENVIRONMENTAL IMPACT FOR DIFFERENT CATEGORIES



EXAMPLES OF RESULTS

- ✘ Dow:
 - + A future system can save water without increasing the environmental impact
- ✘ INOVYN-Antwerp:
 - + Using an external residual water stream (a highly concentrated brine) as a source of water provides a number of benefits
- ✘ INOVYN-Martorell:
 - + A future system will save water and give positive environmental effects for some parameters, while others will have higher impact. The production process of consumables plays a role

EXAMPLES OF RESULTS

✘ TOTAL:

- + A future system will save water but for a majority of environmental categories there will be higher impact. Use of electricity for cooling played an important role for the impact.
- + Further improvements are investigated to improve environmental performance

✘ KALUNDBORG:

- + The approach to use algae provides new benefits/products from process waters. It might reduce carbon dioxide emissions locally, but not on a systemic perspective. Energy use for lighting is an important source for environmental impact

IF WE HAVE LCA, WHY ALSO WATER FOOTPRINT?

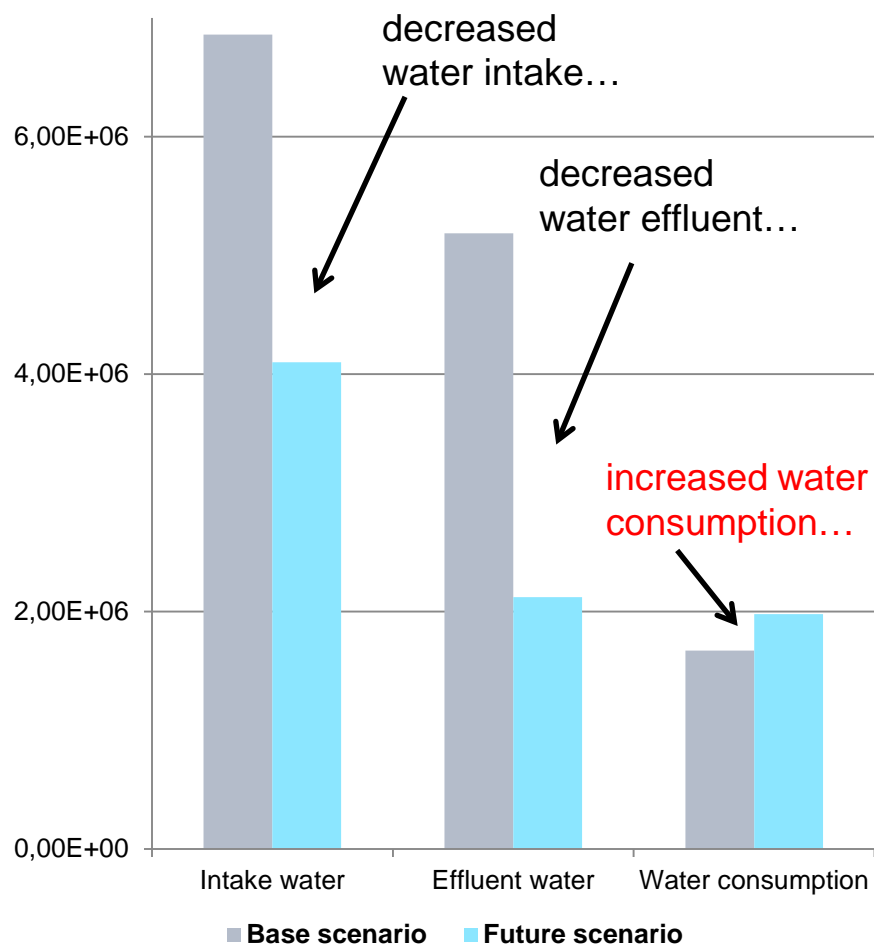
- ✘ In many cases an LCA will be a good choice, water use is one part of it
- ✘ Water footprint puts a specific focus on the water aspects
- ✘ You get more information about water related impact

WHAT IS WATER FOOTPRINT?

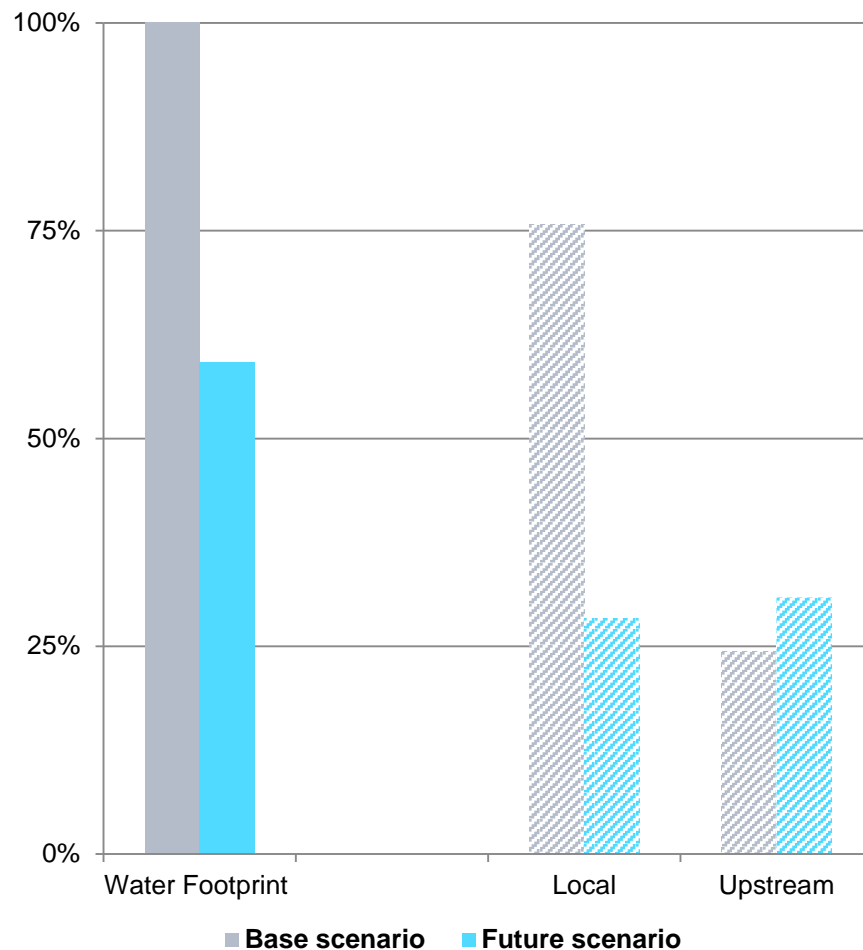
- ✘ Several methods out there (and an ISO Standard 14046)
- ✘ Mostly a similar approach as LCA, but more focused
- ✘ Defines how water is used:
 - + Consumption
 - + Degradative (quality before and afterwards)
- ✘ Helps to understand options for improved water management and treatment options

WHAT DO YOU GET?

Water consumption (m³ water)



Swiss Ecological Scarcity Method



SOME GENERIC FINDINGS OF E4WATER

- ✘ Commitment at all relevant levels is crucial already in an early phase
- ✘ LCA modelling can be combined with process modelling for optimisation
- ✘ If water is an important question,
 - + LCA and LCC gives a broader perspective useful for decisions
 - + Water footprint allows to get more details on water questions from a more holistic perspective