Energy analyses - DWA Neighbourhood Programme

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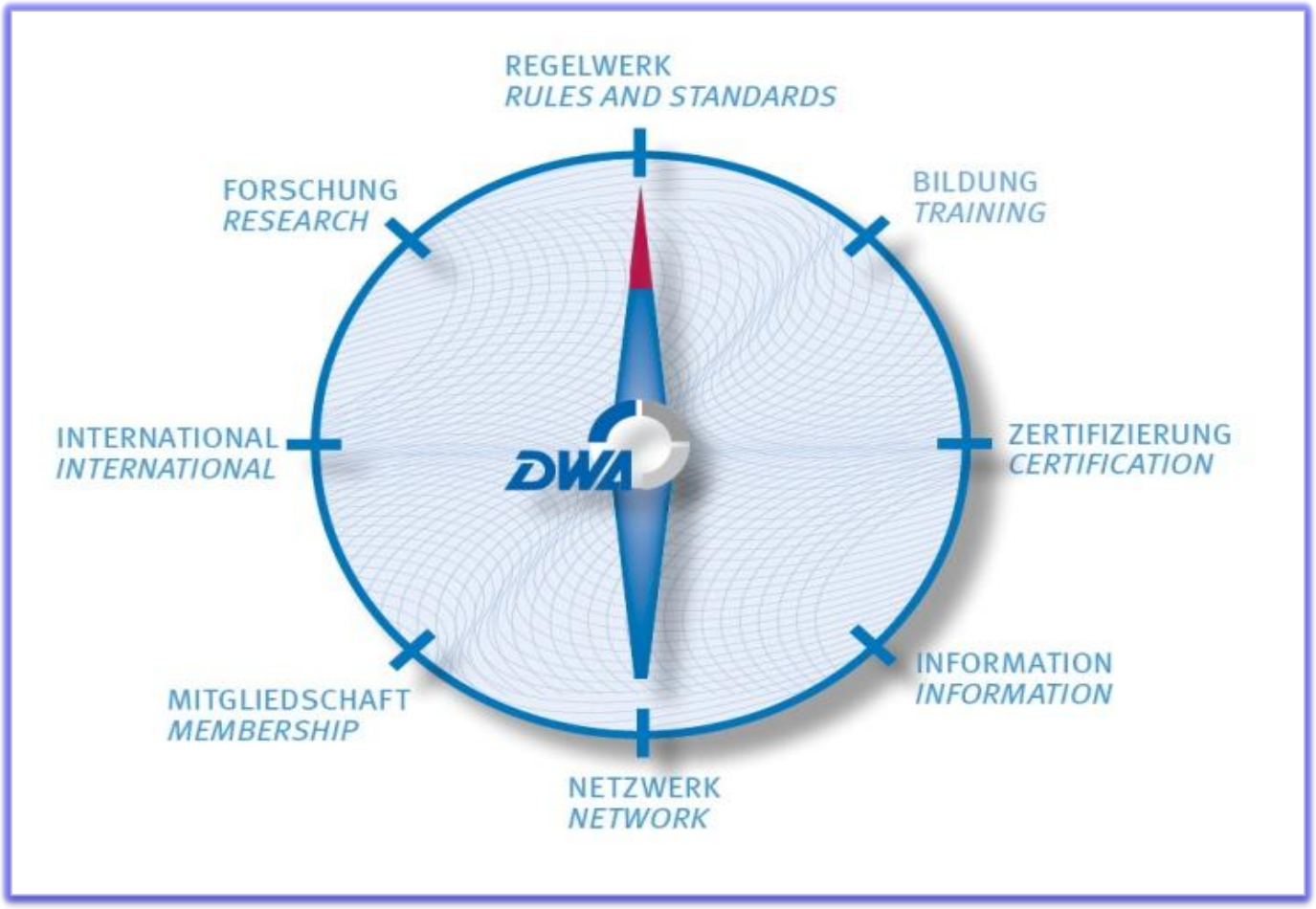
DWA
German Association for Water, Wastewater and Waste

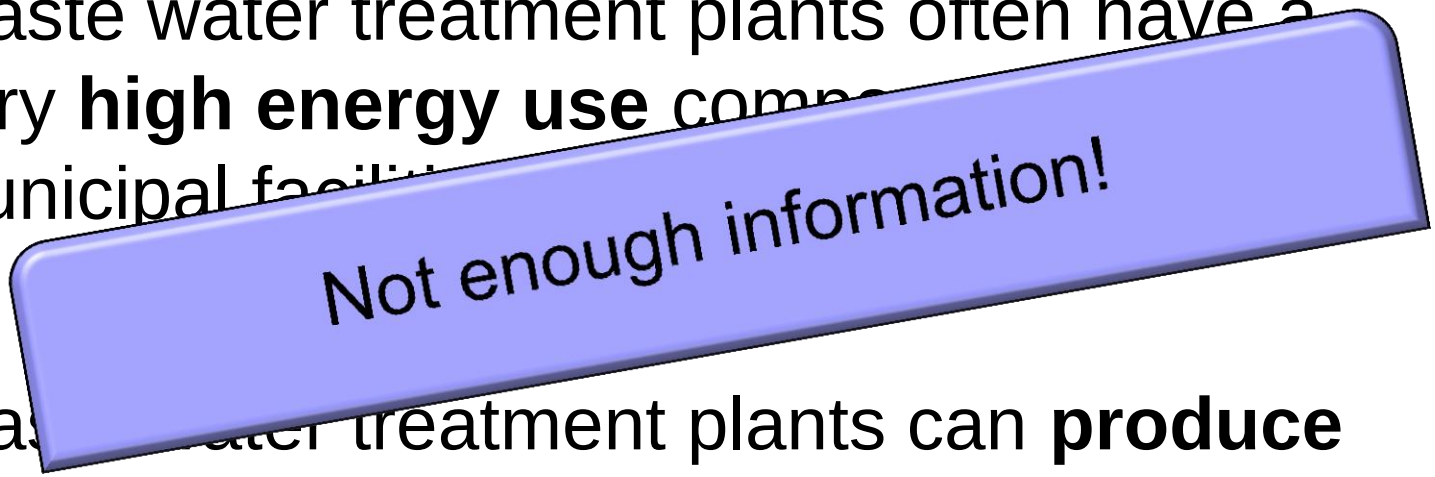
What do we do?

Technical-Scientific Association – Non Government Organisation



Background

- Waste water treatment plants often have a very **high energy use** compa… municipal facili…



- Wa… treatment plants can **produce energy**

- Energy is an extremely **important topic** in Germany – especially as nuclear plants are not seen as a sustainable solution.

Energy analyses

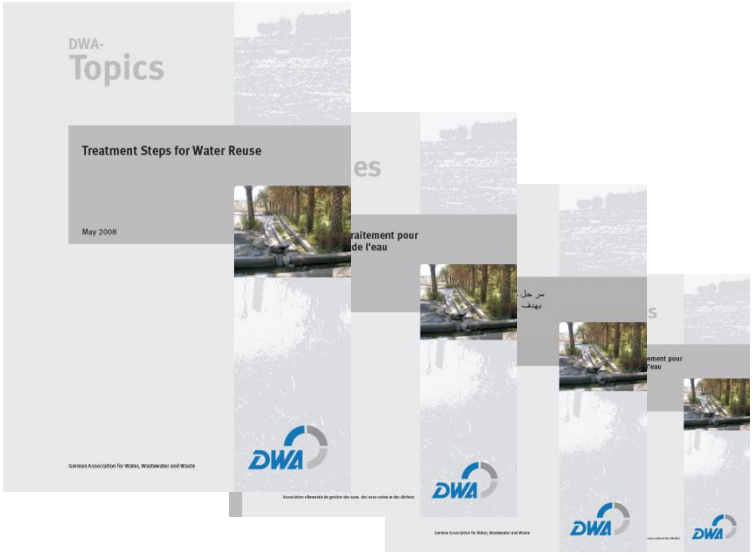
Challenges

- Lack of data for sewage treatment plants
- Lack of defined parameters
- Lack of data on a specific treatment plant
- Many influencing factors
- Specific conditions lead to a high variety
- Motivation ?

Rules and standards

A draft standard (DWA-A 216) will be published next year defining:

- Energy checks and analysis
- Relevant parameters
- Aims to be the basis of data collection to ensure comparability



Kennwerte des Energiechecks

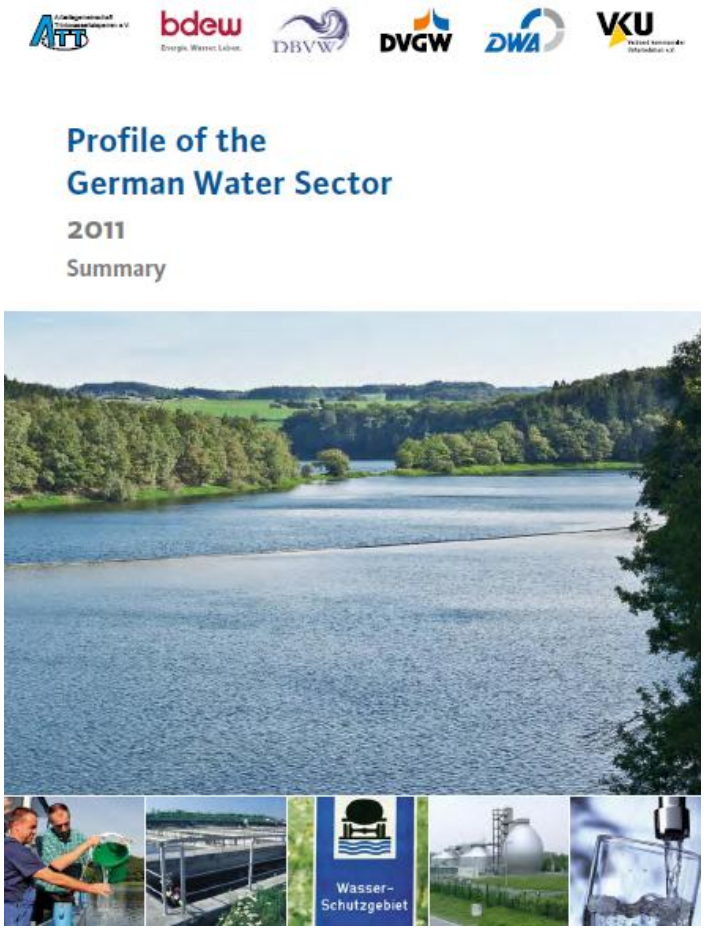
Kläranlagen:

	Einheit	Bezeichnung		Defintion verwendeter Größen
e_{ges}	[kWh/(E·a)]	Spez. Stromverbrauch Gesamt	$e_{ges} = E_{ges} / EW_{CSB}$	E_{ges} = Stromverbrauch gesamt [kWh/a] EW_{CSB} = Einwohnerwert bezogen auf 120gCSB /EW*d [E+EGW]
e_B	[kWh/(E·a)]	Spez. Stromverbrauch Belüftung	$e_B = E_B / EW_{CSB}$	E_B = Stromverbrauch Belüftung Belebungsbecken [kWh/a] EW_{CSB} = Einwohnerwert bezogen auf 120gCSB /EW*d [E+EGW]
Kläranlagen mit Faulung				
$e_{FG,1}$ $e_{FG,2}$	[l_N/(E·d)] [l_N/kgoTS]	Spez. Faulgas-produktion	$e_{FG} = Q_{FG} / EW_{CSB}$ $e_{FG} = Q_{FG} / m_{oTS,ZU}$	Q_{FG} = Jahresmittelwert der Faulgasasproduktion [l_N/d)] (normiert auf 0°C und 1013 mbar) EW_{CSB} = Einwohnerwert bezogen auf 120gCSB /EW*d [E+EGW] $m_{oTS,ZU}$ = Jahresmittelwert zugeführte oTR-Fracht zur Faulung [kg oTR_{ZU}]
N_{FG}	[%]	Grad der Faulgasum-wandlung in Elektrizi-tät	$N = (E_{KWK}/E_{FG})\cdot 100$	E_{KWK} = Jahresproduktion KWK Anlagen bzw. Direktantrieb von Verdichtern [kWh/a] E_{FG} = Heizwert der Jahresfaulgasproduktion = $Q_{FG} \cdot HI,n\ 1$ (HI,n 1 = Heizwert Faulgas = 6,4 kWh/m^3)
V_E	[%]	Eigenversorgungs-grad Elektrizität	$V_E = (E_{KWK}/E_{ges}) \cdot 100$	E_{KWK} = Jahresproduktion Strom aus KWK Anlagen bzw. Direktantrieb von Verdichtern [kWh/a] E_{ges} = Stromverbrauch gesamt [kWh/a]
e_{ext}	[kWh/(E·a)	Spez. externer Wär-mebezug	$e_{ext} = E_{therm} / EW_{CSB}$	E_{therm} = extern zugeführte Wärmemenge [kWh/a] = $Q_{Primärenergieträger} \cdot HI,n1$ HI,n1 = Heizwert Heizöl = 10 kWh/l HI,n1 = Heizwert Erdgas = 9,4 kWh/m^3

Pumpwerke:

Spez. Stromverbrauch pro m3 und manometrischer Förderhöhe [Wh/m3*m]

Benchmarking



- Report for the public
- Highly aggregated level of benchmarking data
- Long and short version covering relevant aspects of the water sector

Neighborhoods – help each other

- Sewage-neighborhoods since1968
- Goal continuous training of operating personnel
- By now about 500 neighborhoods (sewage treatment plants, sewer, and water) exist
- Each year, about 20,000 participants train in various areas

Neighborhoods – comparison of performance

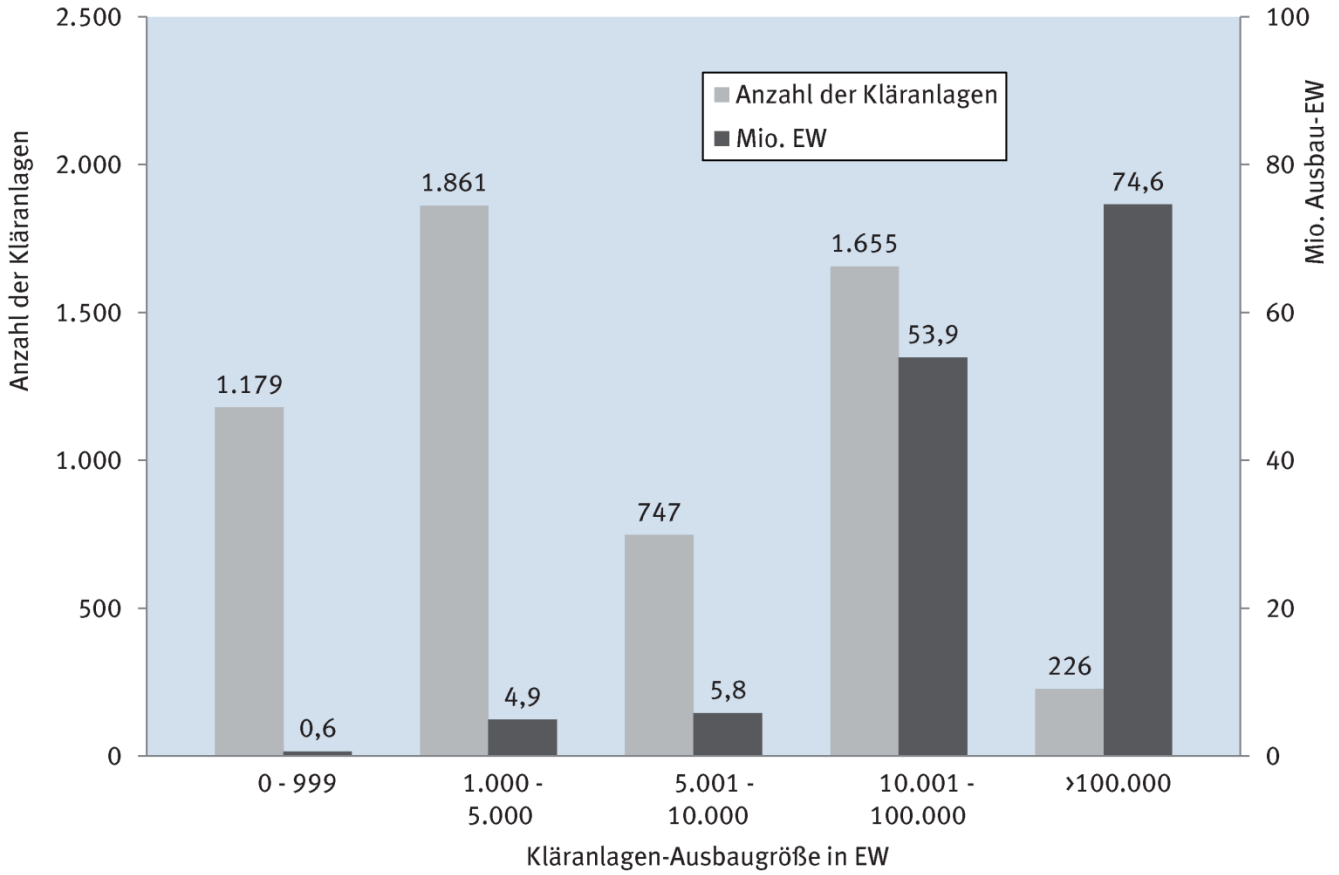
This year

„Use of electricity“

Data from 4 300 treatment plants was compared.

Neighborhoods – comparison of performance

- Annual comparison of performance since 1988
- Nearly 6 000 wastewater treatment participate

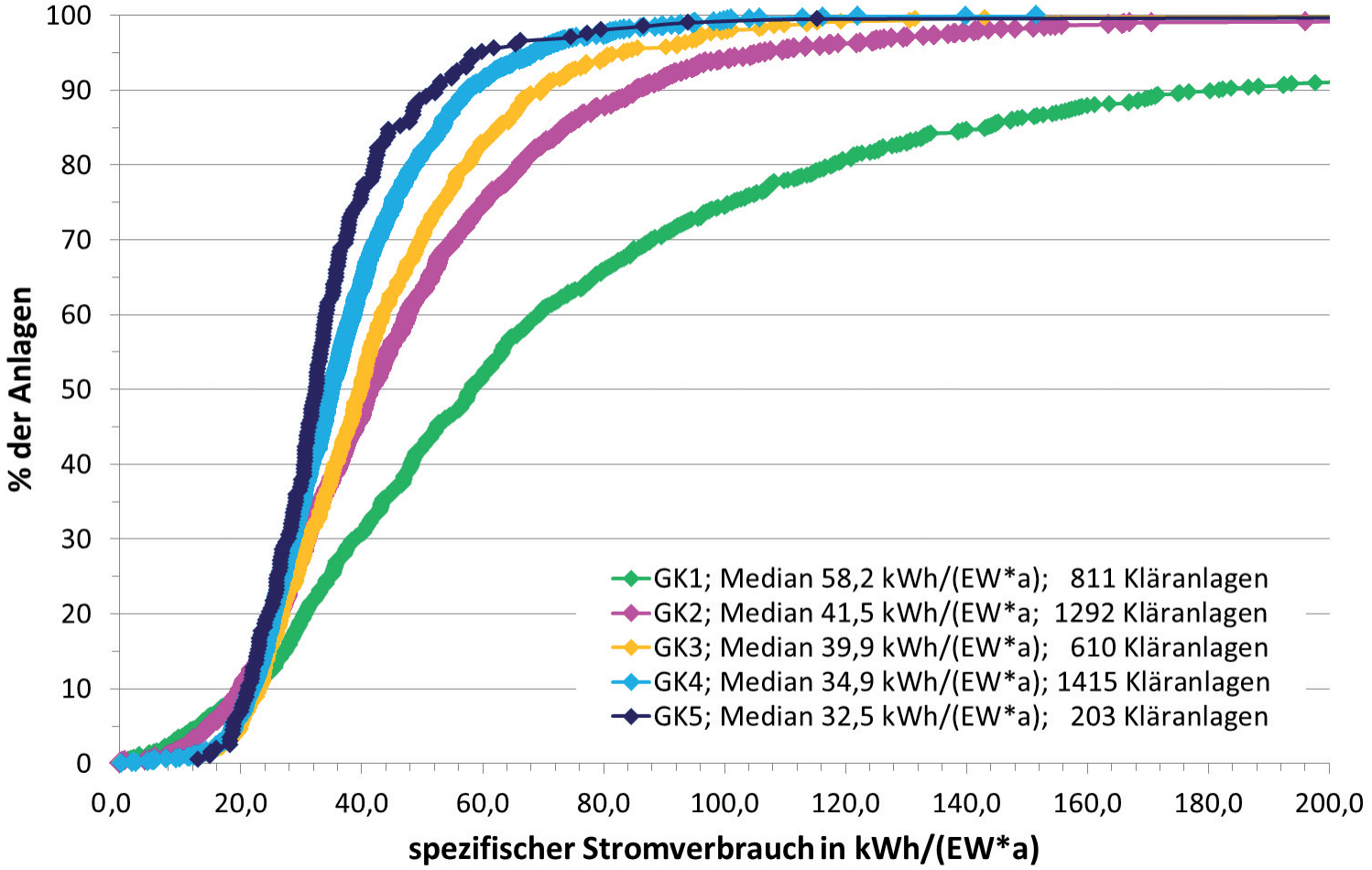


Neighborhoods – comparison of performance

„Use of electricity“

Results?

Results



Amount of electricity used in sewage treatment plants of different sizes.

Results

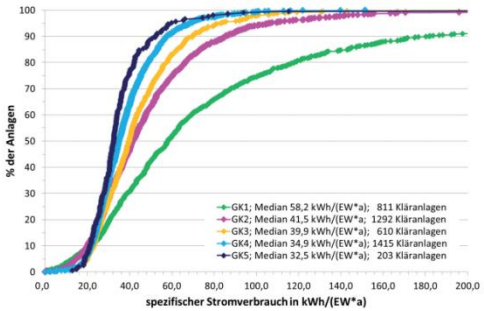
	Anzahl	Ausbau-größe	Mittlere Belastung	Stromver-brauch	spez. Stromver-brauch
Dimension	–	Mio. EW	Mio. EW	GWh/a	kWh/ (EW*a)
GK 1	811	0,4	0,4	22,7	54,1
GK 2	1.292	3,6	3,1	128,6	41,5
GK 3	610	4,7	4,0	152,6	38,1
GK 4	1.415	46,1	36,0	1.229,3	34,1
GK 5	203	66,0	51,2	1.684,6	32,9
Gesamt	**4.331**	**120,8**	**94,7**	**3.217,7**	**34,0**

Tabelle 2: Jährlicher Stromverbrauch der Kläranlagen

Summary

- Detailed analysis or benchmarking are not easily possible as the criteria are not clearly defined
- In many cases energy consumption is not measured for the individual processes
- Data collection presents additional work

Summary



- Energy is an important topic in Germany
- Defined parameters will be available shortly
- Structures for voluntary data collection exist

Conclusions

The way forward:

- Defined comparable parameters
- Voluntary data collection to evaluate appropriateness
- Spreading discussion and information exchange on all levels

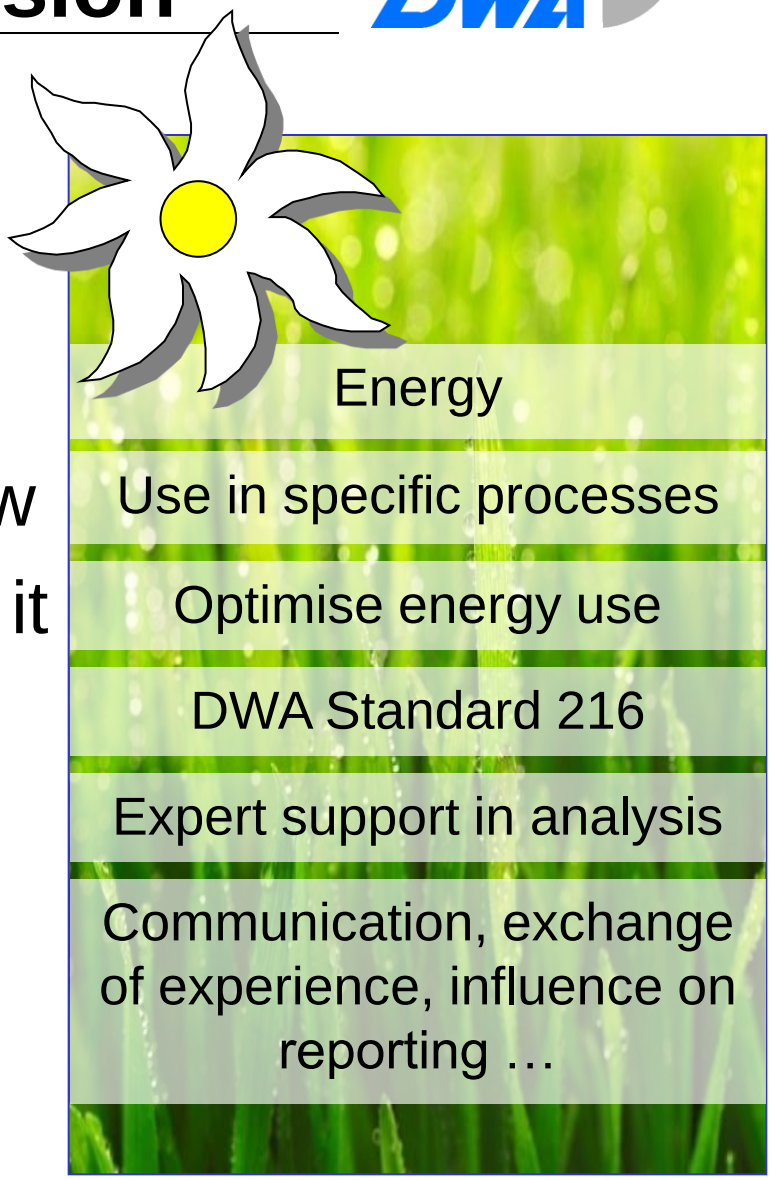
The goal:

Optimising energy use and production!

Following the discussion

One step after the next:

- Define specific areas
- Look at what you want to know
- Look a why you want to know it
- Find suitable parameters
- Find a motivation
- Go slowly, build trust



Thank you for your attention!

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