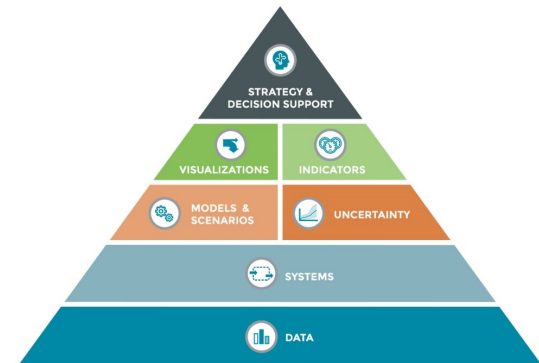




MinFuture

Example for the Pyramid: The Austrian Phosphorus Budget



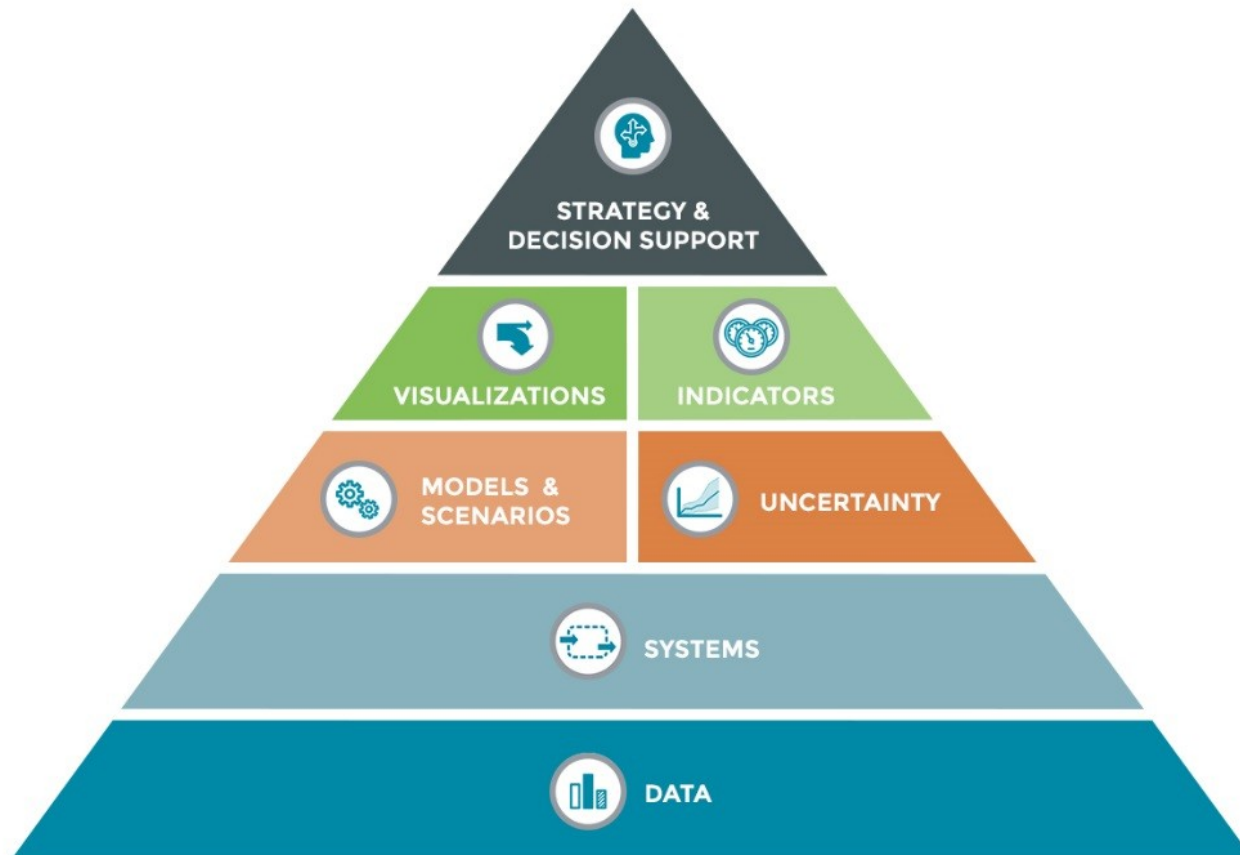
Helmut Rechberger, Astrid Allesch

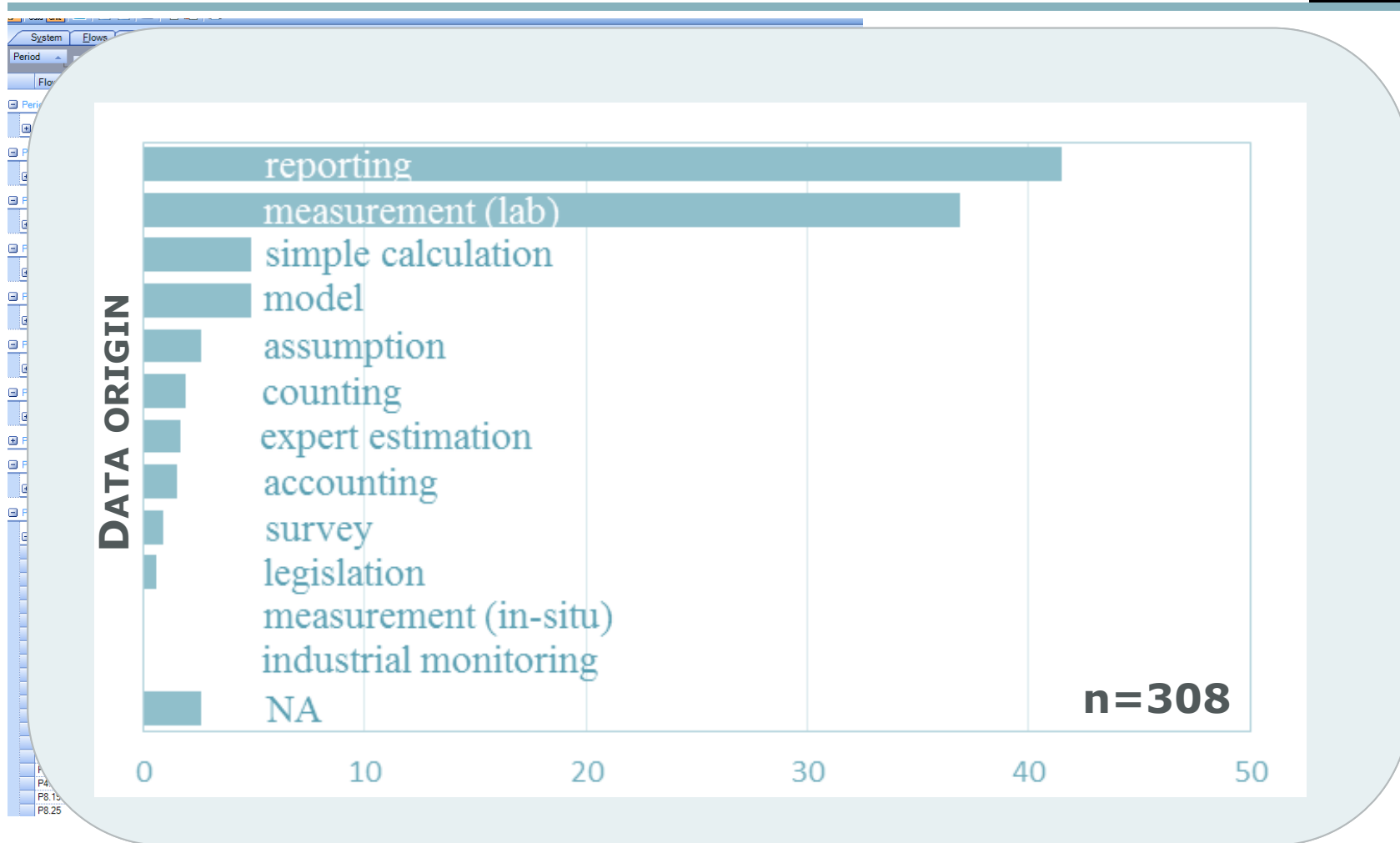


MinFuture is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 730330. The contents of this document are the sole responsibility of MinFuture and can in no way be taken to reflect the views of the European Union.

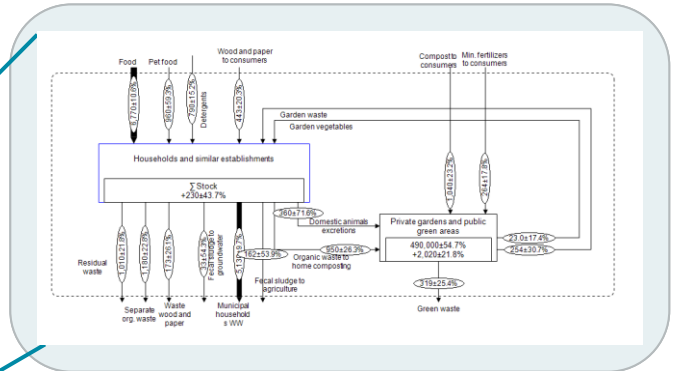
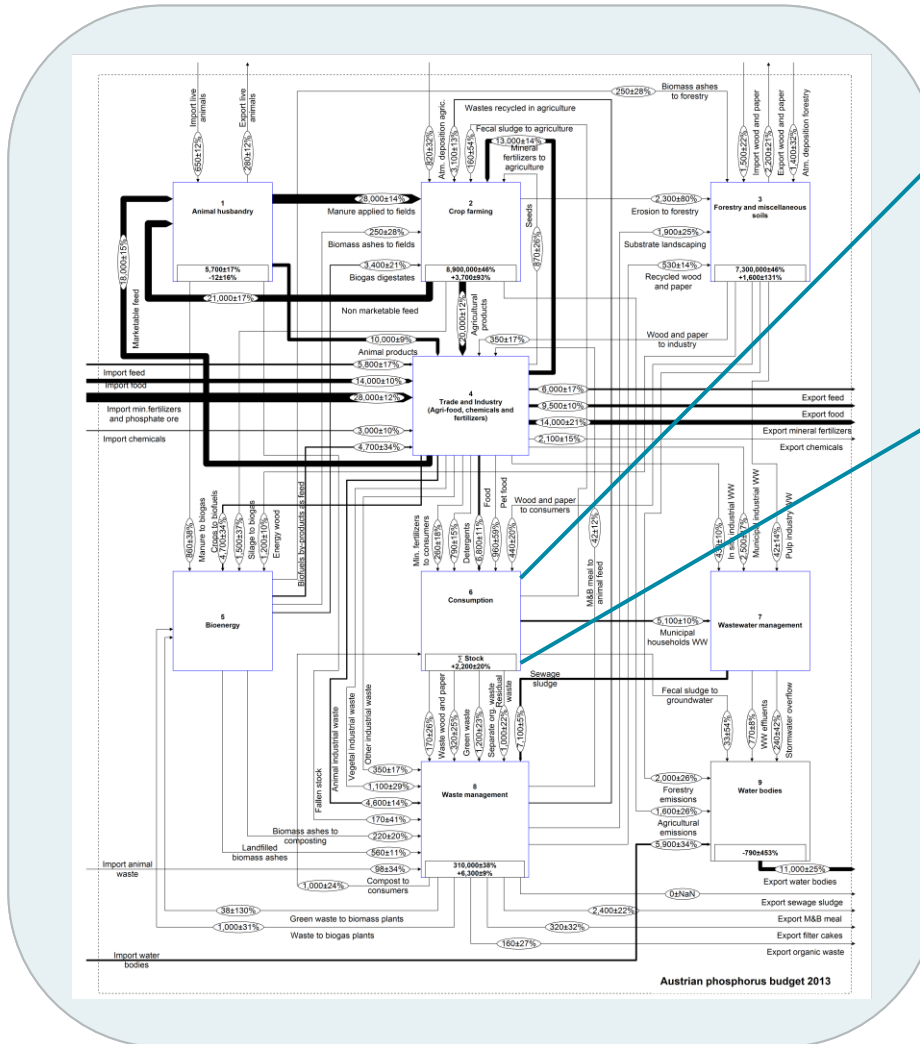
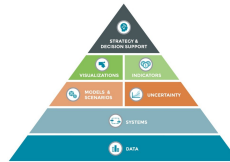
www.minfuture.eu

MinFuture - Pyramide

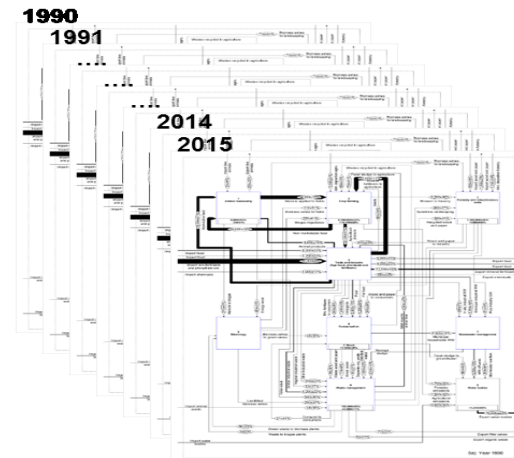




Austrian Phosphor Balance of Zoboli et al. (2015) evaluated in Schwab et al. (2016a)



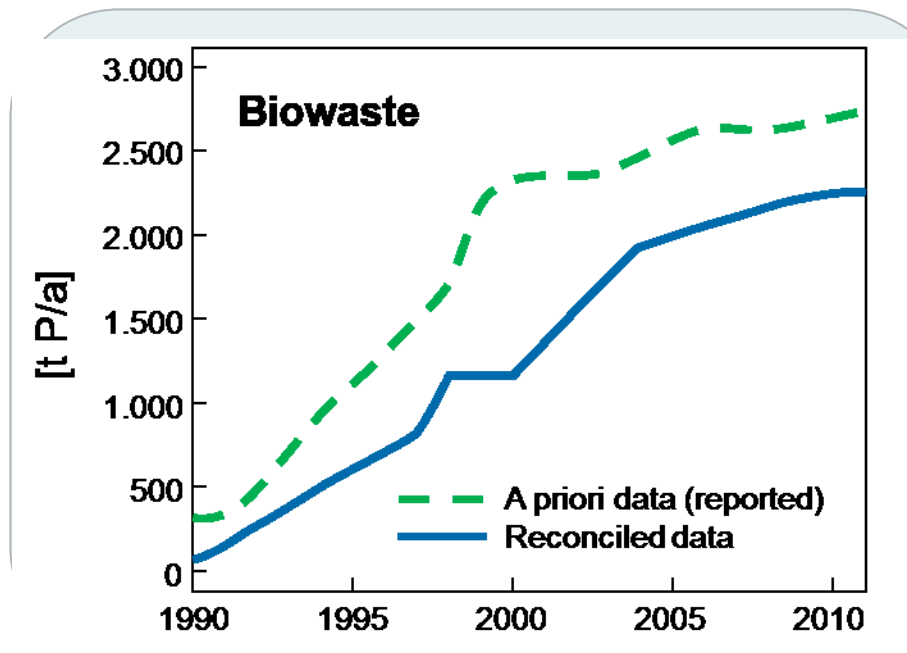
- 56 processes
- 8 stocks
- 122 flows



Uncertainty

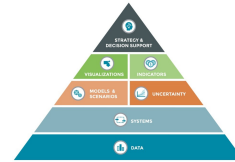


- **Methods to assign reasonable uncertainties to all kind of data:** ✓
- **Methods to consider propagation of uncertainty (errors):** ✓
- **Methods to consider conflicting data (reconciliation):** ✓

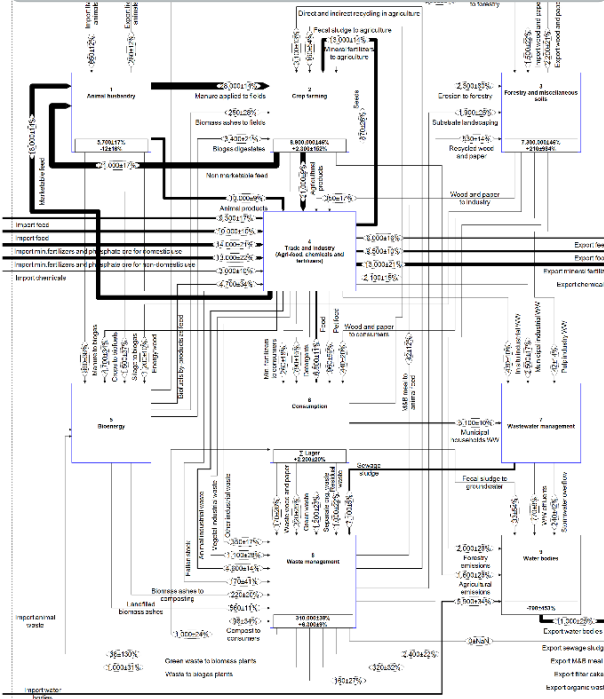


Putting data into context (system) helps identifying systematic errors.

Models & Scenarios



P Austria 2013

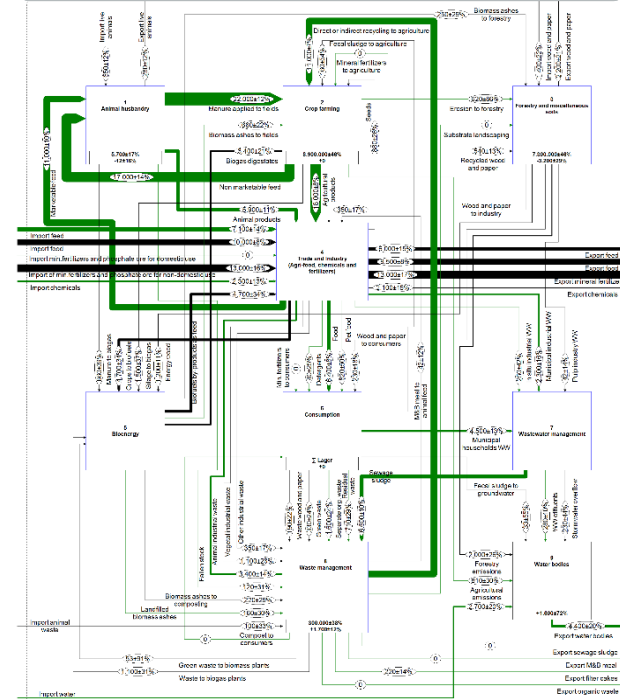


15 actions



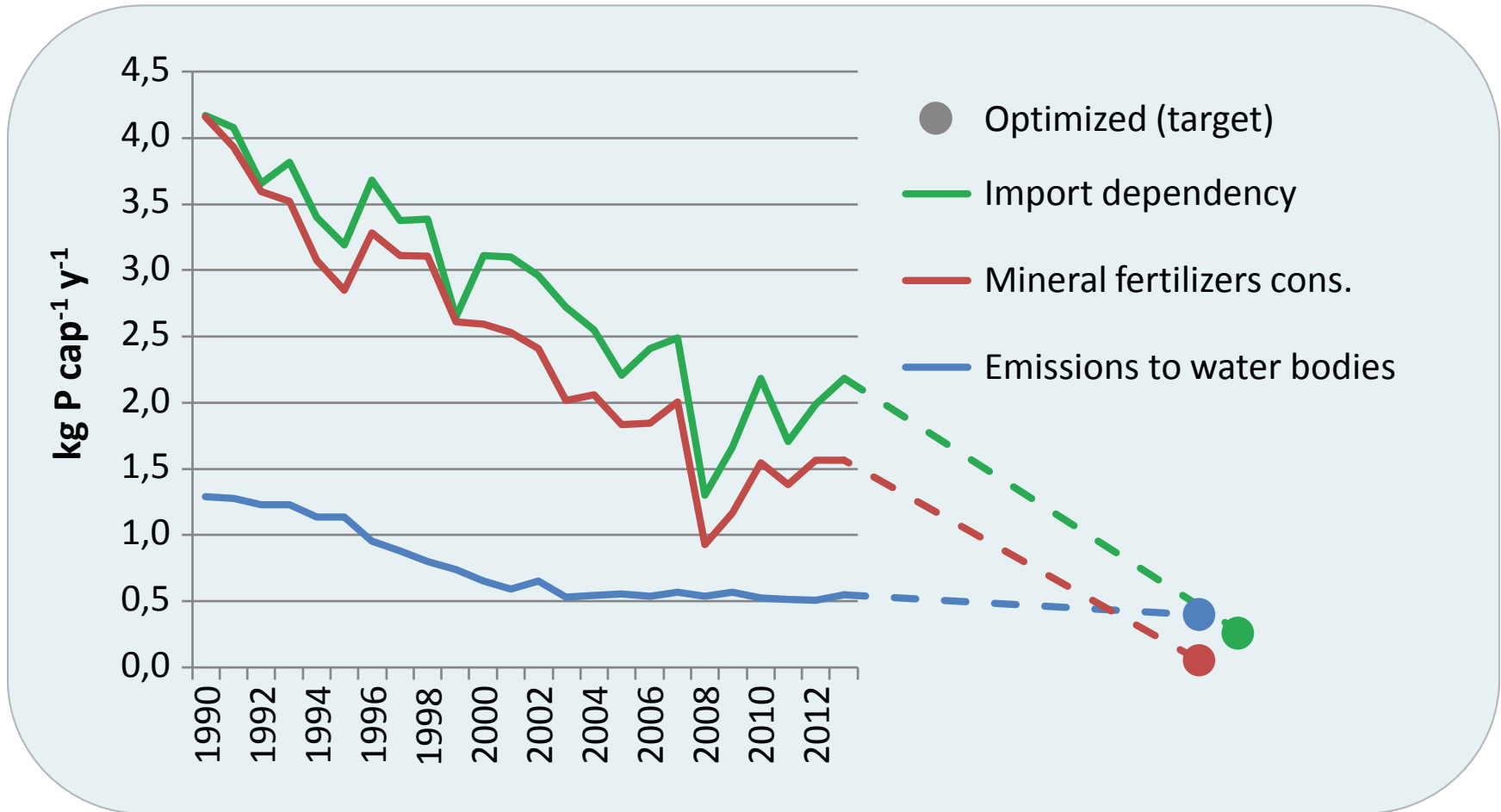
- P-recovery from meat & bone
- P-recovery from sewage sludge
- Optimized compost use
- Separate collection of biowaste
- Healthy diet
- Optimized harvesting
- P in fodder
- Ban of detergents
- P surplus on grassland
- Point sources
- Erosion abatement
- ...

Optimised system

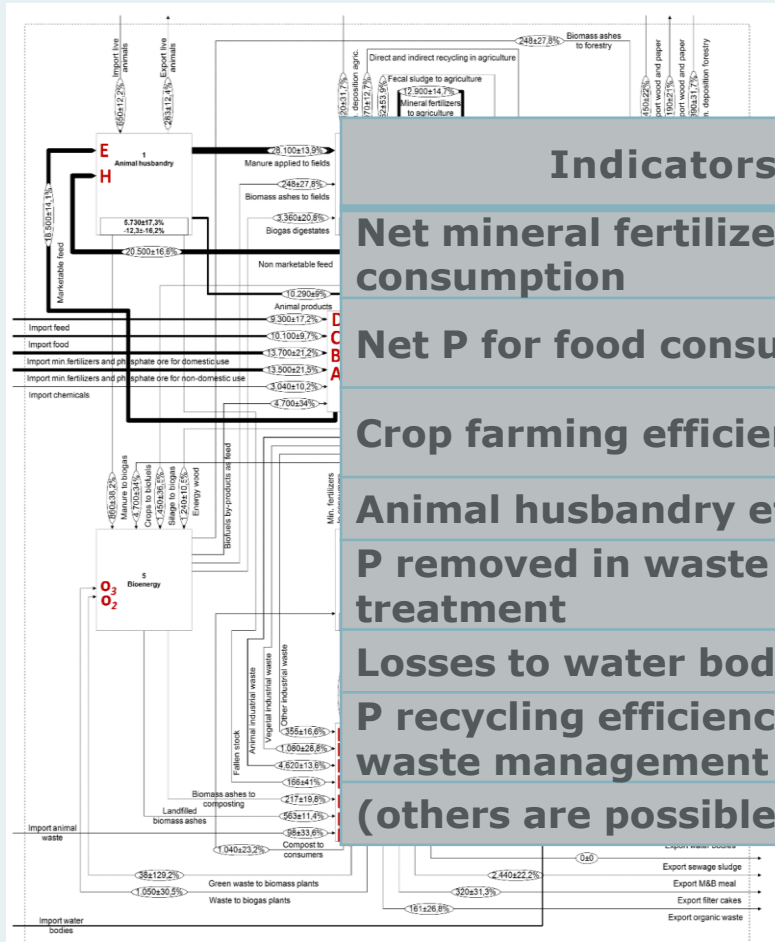
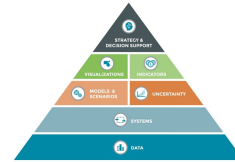


[kgP/cap.yr]	2013	Optimum	Change [%]
Import dependance	2.20	0.23	-90
Consumption of mineral fertilizer	1.60	0.00	-100
Emissions to water bodies	0.54	0.39	-28

Indicators¹



Indicators²

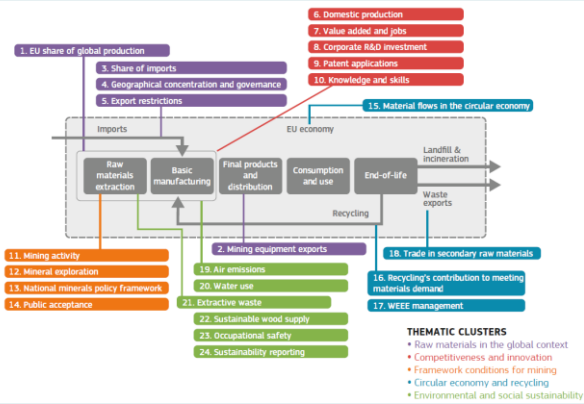


Indicators	Results	Calculations
Net mineral fertilizer consumption	14.000 tP y ⁻¹	=(A+B)-N
Net P for food consumption	17.900 tP y ⁻¹	=(A+B+C+D)- (L+M+N)
Crop farming efficiency	41 %	=N / (P+F+G+J+Q+R+S)
Animal husbandry efficiency	26 %	=I ₁ / (E+H)
P removed in waste water treatment	88 %	=I ₂ / (O+T+U+V)
Losses to water bodies	5.430 tP y ⁻¹	=X-Y
P recycling efficiency of waste management	39 %	=(O ₂₋₆ +J) / (I ₂₋₁₃)
(others are possible)

Indicators³



Raw Materials Scoreboard



The **EU circular economy** monitoring framework consists of 10 indicators

Production and consumption

1	EU self-sufficiency for raw materials
2	Green Public Procurement
3a-c	Waste generation

Waste generation (P) 2013

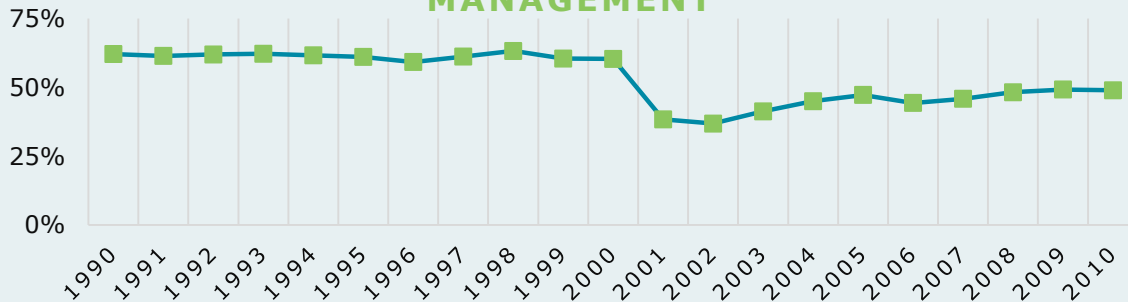
17.000
Tons

5a-b	Overall recycling rates
6a-f	Recycling rates for specific waste streams

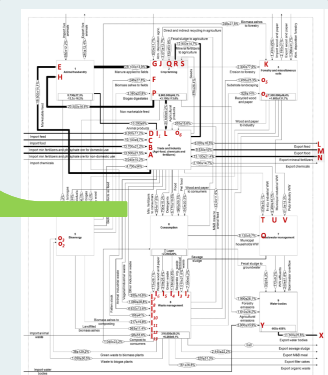
Recycling efficiency of waste management (P) 2013

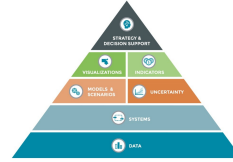
39 %

P RECYCLING EFFICIENCY OF WASTE MANAGEMENT



...le raw mate
...novation, e
...ents, jobs





- **Visualisation is important to grasp complex systems**
- **For communication**
- **Requires tailor-made and powerful software**

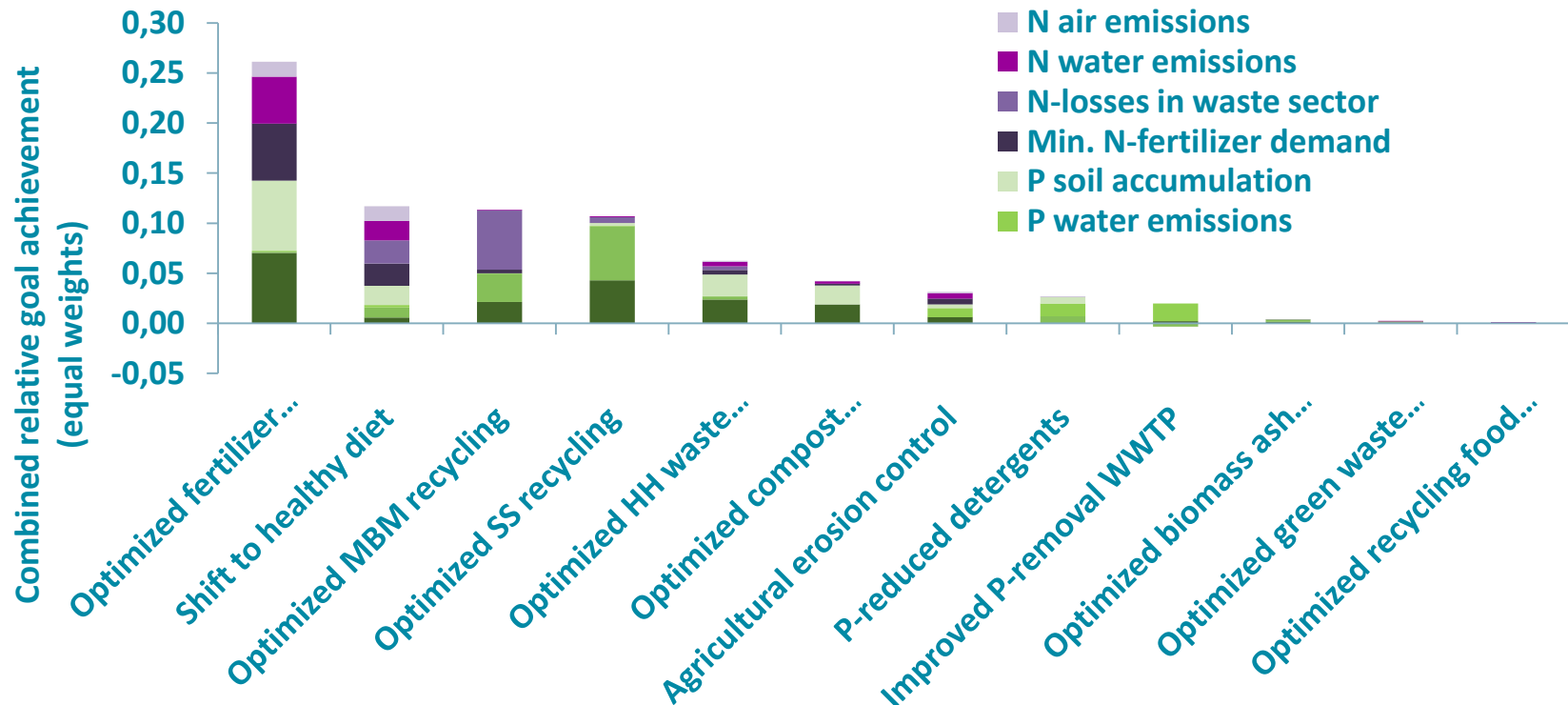
Austria

N

P



○ Ranking of measures



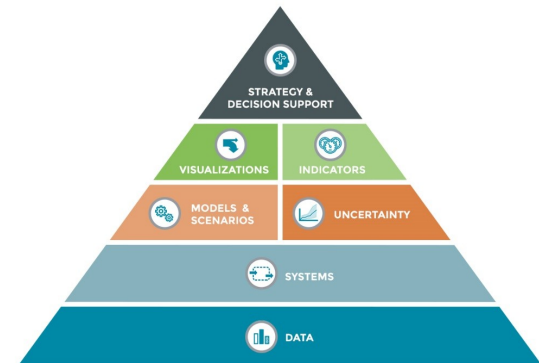
○ Requires combination with other resources (energy, costs,..)



MinFuture

Thank you!

Example for the Pyramid:
The Austrian Phosphorus Budget



Helmut Rechberger, Astrid Allesch



MinFuture is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 730330. The contents of this document are the sole responsibility of MinFuture and can in no way be taken to reflect the views of the European Union.

www.minfuture.eu