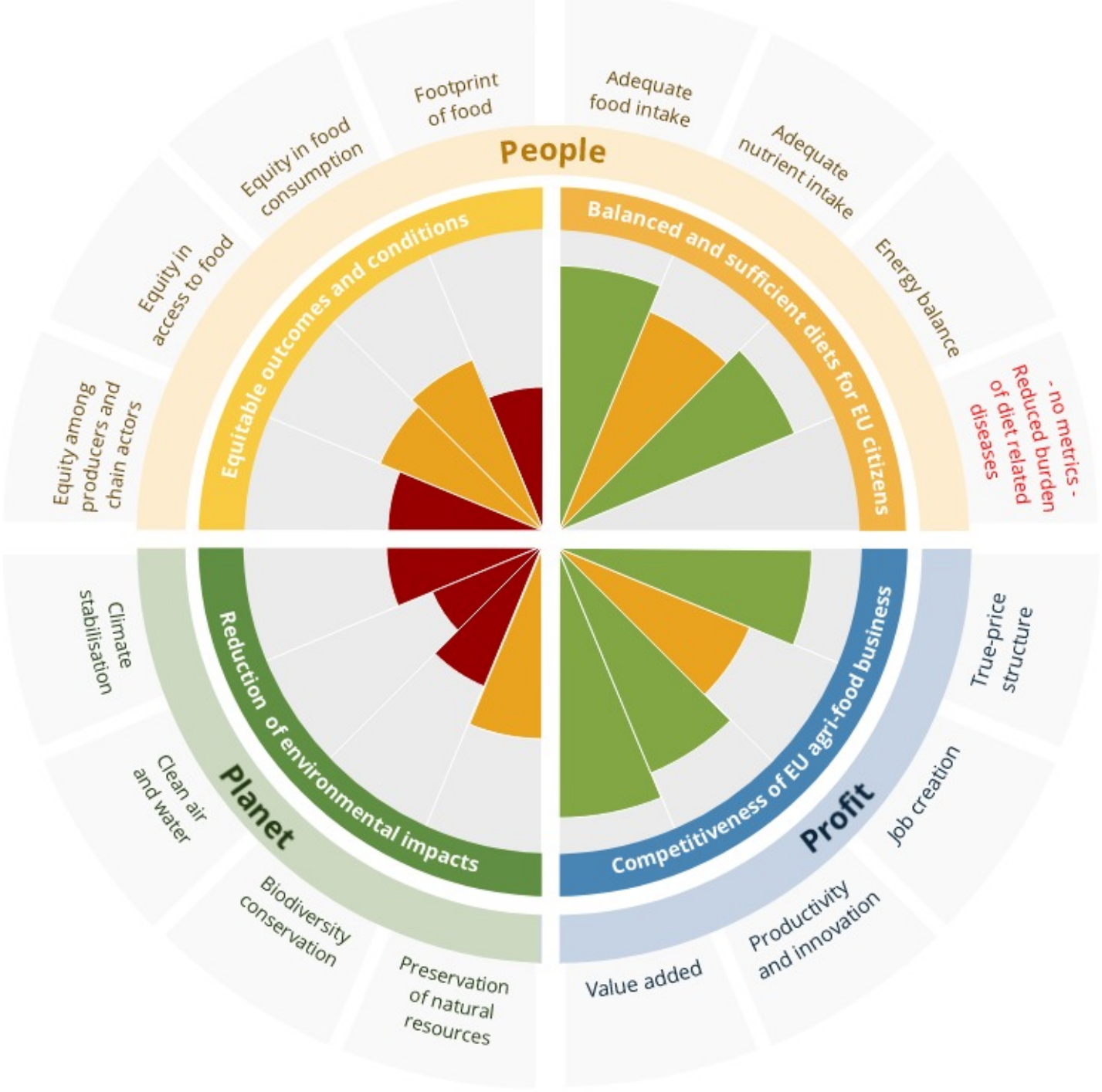
Metrics, models and foresight for sustainable EU food and nutrition security

Working with partners towards EU **food systems** that contribute to **health, environment, equity** and **viable enterprise**...

...by delivering high-quality research on **metrics**, **models** and **foresight** to support evidence-based **policies and innovation strategies** for a sustainable and food and nutrition secure EU.



Play with the visualizer tool at: http://susfans.eu

SFNS Visualizer

The further the wedge reaches towards the outside line, the closer the indicator's status to the sustainability goal is.

The colour of the wedge indicates the status of the indicator with respect to the goal. Hold the mouse over the wedge to see the exact value of the indicator.

- 70 - 100%
- 40 - 70%
- 0 - 40%

SUSFANS Research Consortium (April 2015- March 2019)

WAGENINGEN UNIVERSITY & RESEARCH

crea Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria

universitätbonn ILR

INRA SCIENCE & IMPACT

anses agence nationale de sécurité sanitaire alimentation, environnement, travail

IIASA International Institute for Applied Systems Analysis

CEPS

Luke NATURAL RESOURCES INSTITUTE FINLAND

UNIVERSITY OF OXFORD

eci

RISE

ILSI Europe

National Taiwan University

SZU

Danmarks Tekniske Universitet DTU

JRC EUROPEAN COMMISSION

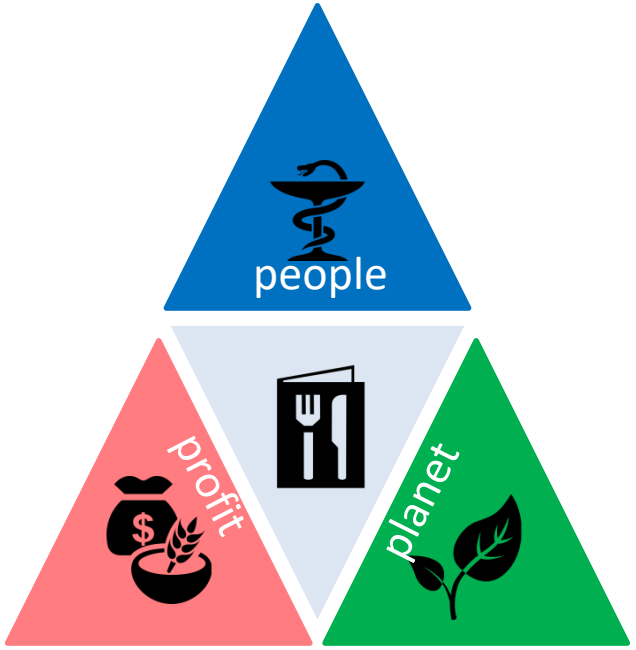
+ PhD project SHARP-BASIC: TIFN, WUR, DSM, FrieslandCampina, Unilever

EU grant no. 633692 under H2020-SFS-19A (Societal challenge 2)

European *sustainable* food and nutrition security

Diet

Underlying production systems

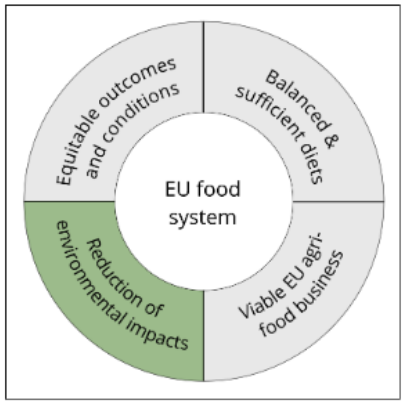


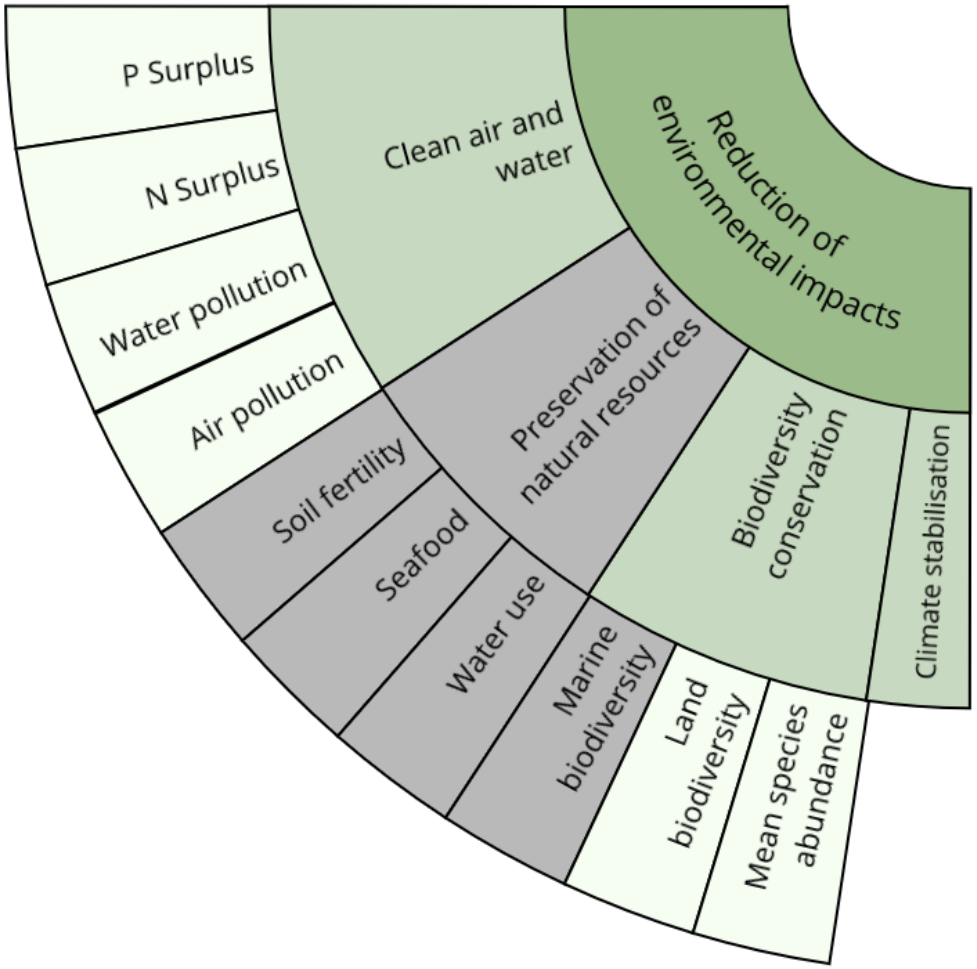
Rutten et al. 2016, *Ag. Systems*
Zurek et al. 2018, *Sustainability*

Assessing the sustainability of food systems in the EU – in 16 policy relevant metrics

Policy goal	Metric
Balanced and sufficient diets for EU citizens	Energy balance
	Adequate Nutrient intake
	Adequate Food intake
	Reduced burden of diet-related diseases
Equitable outcomes and conditions	Equity among consumers (outcomes)
	Equity among producers and chain actors
	Equity in the use of natural resource
	Equity in conditions in the food systems: ethics and justice
Reduction of environmental impacts	Climate stabilisation
	Clean air and water
	Biodiversity conservation
	Preservation of natural resources
Competitiveness of the EU agri-food business	Value added
	Productivity & innovation
	Job creation
	Emission price gap

Sustainability Index: environment



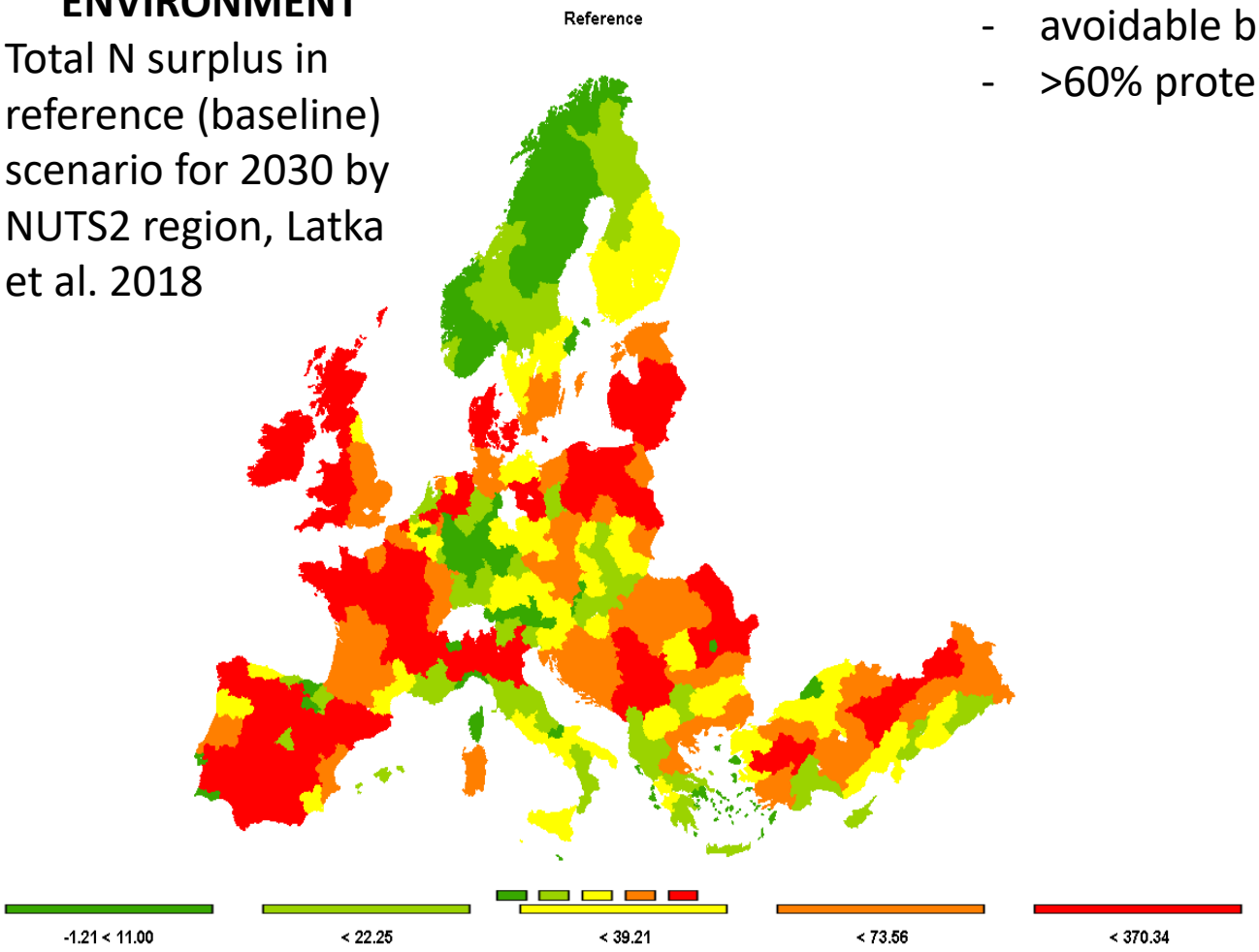


Performance metric
Aggregate indicator
Derived variable
Not quantifiable at this moment

Environmental & diet indicators vary regionally and are off target across EU

ENVIRONMENT

Total N surplus in reference (baseline) scenario for 2030 by NUTS2 region, Latka et al. 2018



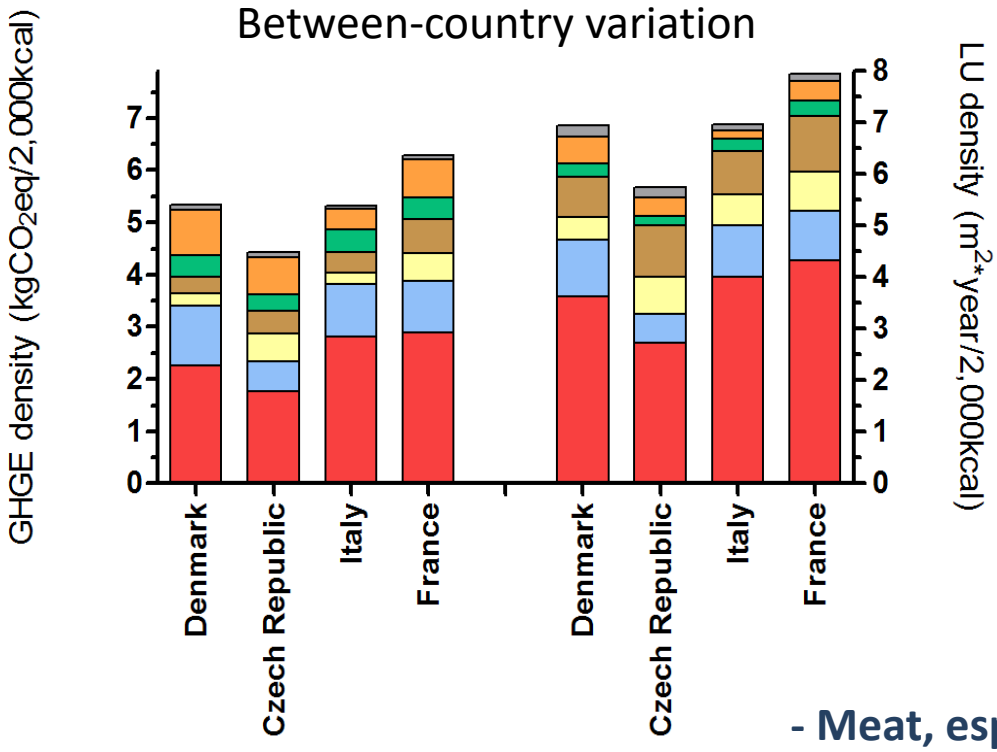
DIET

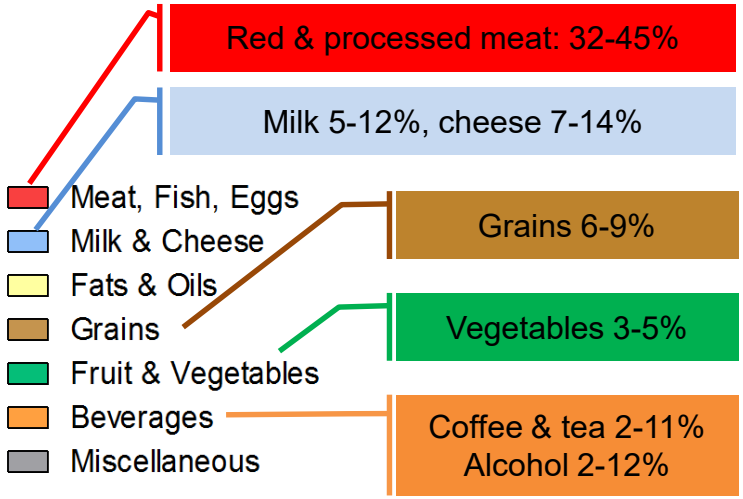
- avoidable burden of diet-related diseases
- >60% protein from animal source food

Assessment: Business viability & equity under pressure

- The economic viability of primary agriculture/ fisheries and food production is under threat
  - more competitive regions, and low profit margins.
- Equity and social justice under pressure
  - food access not guaranteed; unequal diet quality, by education levels and gender.
  - Farmer's profit margins oscillate 4-5 times more than food retail; large buying power from upstream value chain partners.

Environmental imprint of EU diets

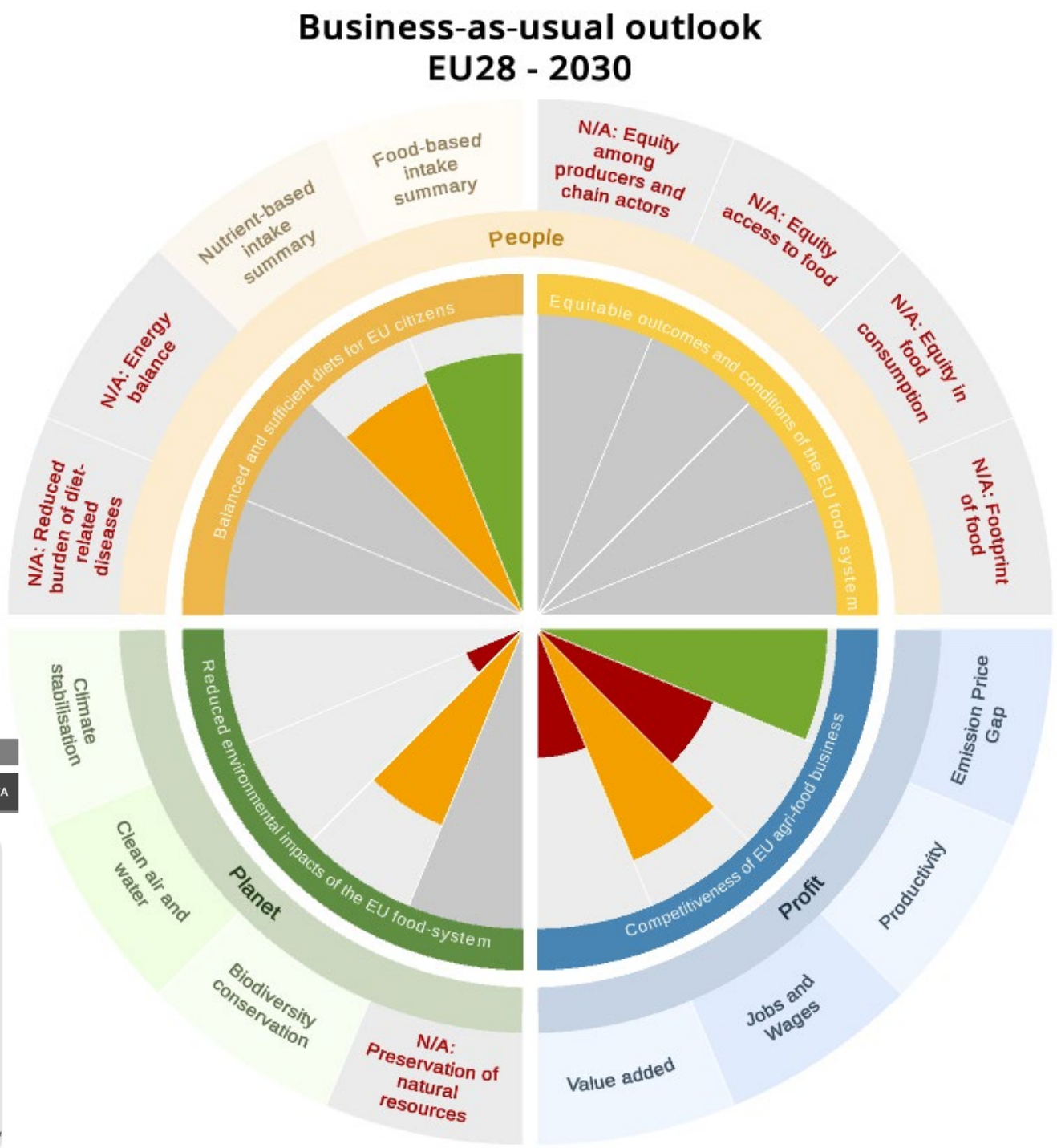




- Meat, especially red meat, is the main contributor
- Overeating also explains large part of diet-related GHG emission and land use (~10% per 200 kcal/day)

Mertens et al (2019) – paper under revision

Sustainability performance of the EU food system: “insufficiently future-proof”



COUNTRY

CZE | DNK | EU28 | FRA | ITA

SFNS Visualizer

The further the wedge reaches towards the outside line, the closer the indicator's status to the sustainability goal is.

95 - 100% | 40 - 70%
70 - 94 % | 0 - 40%

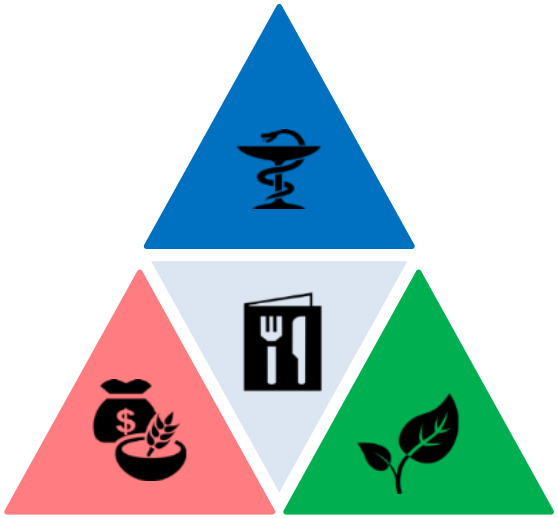
The colour of the wedge indicates the status of the indicator with respect to the goal. Hold the mouse over the wedge to see the exact value of the indicator.

Hold the mouse over any section of the visualizer to see whether *more information is available*. If so, click and you will be redirected to more information in a separate tab.

Visualizer design: Environmental Change Institute, Uni of Oxford
SFNS Metrics approach: SUSFANS project

Havlik et al. (2019)

Towards solution: ”SHARP” diets



Sustainable (environmental)

Healthy

Affordable

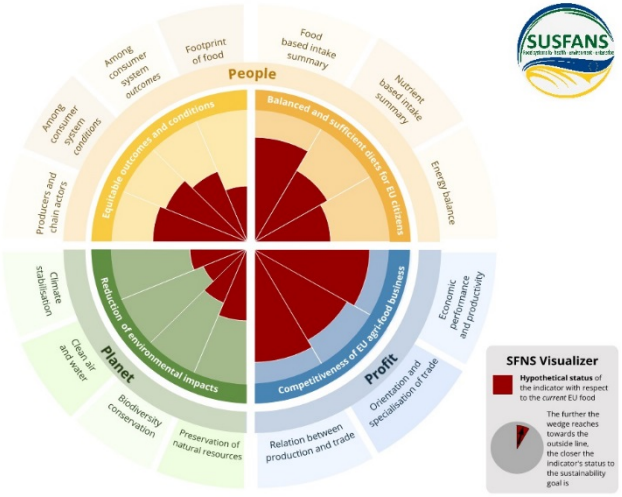
Reliable

Preferred (from consumer perspective)

SHARP model proposes **realistic** dietary changes based on representative **individual-level** dietary intake data

SUSFANS modelling toolbox: assessing diet & food system transformations

Macro-economy	Diet and health	Primary production
MAGNET Complete economy; Income effects. *Global, country level*	**SHARP** Product detail; Specific diet needs. *EU level*	**GLOBIOM/Agriprice4cast** Environmental impacts; Spatial detail; Primary production price volatility. *Global, grid level*
	DIET Consumer preferences; Health & environment. *EU level*	**CAPRI** EU food supply details; Global market details. *Global, EU, national, province level*



SUSFANS METRICS (2010 – 2030 – 2050)

Equity	*Nutrition*	*Economy*	*Environment*

DIET SHIFT SCENARIOS

SCENARIO targets
Healthier diet recommendation suitable for macro models

% change of the 2010 consumption levels / household demand by simulation period

Scenario 1 Consuming healthy food	2020	2030	2040	2050
Fruit, vegetables (nuts)	+25	+50	+75	+100
Red meat & meat products	-12.5	-25.0	-37.5	-50.0
Sugar	-12.5	-25.0	-37.5	-50.0
Energy (isocaloric)	0	0	0	0

Scenario 2: Consuming only right amount of calories	2020	2030	2040	2050
Energy	-2.5	-5.0	-7.5	-10.0

Scenario 3 (Combined)
Consuming balanced and sufficient diet

Result: Unfeasible price changes are needed – the case of beef

Change in EU consumer beef price (compared to 2010,%)

	2030	2050
Sustainability outlooks		
REF0	-3	-9
REF-	-2	-5
REF+	-4	-12
Diet shift scenarios		
(1) Healthy foods	74	270
(2) Right calories	75	275
(3) Balanced & sufficient diet	75	275

- All contextual scenarios project an increase in meat purchases, reducing meat consumption thus requires a trend reversal
- Large increases (up to 275% by 2050) to counteract the current trends
- Springmann et al (2016) estimate a 26% increase in beef prices by 2020 for the EU (high income countries) based on GHG emissions

Source: MAGNET simulations and SHARP data for 4 countries

Consuming healthy diet scenario:

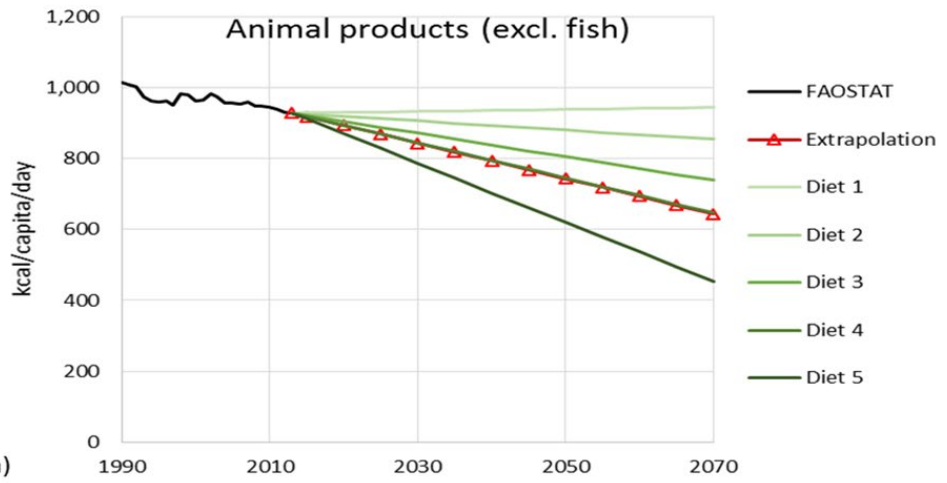
Modest co-benefits for environmental sustainability, mixed impact on the business case for EU food

Havlik et al. (2019)

EU LTS Diet change scenarios – importance of int. trade

- Several diet options tested
- LTS finally relied on Diet4
- Sensitivity around international trade response

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Bovine meat	-50%	-50%	-50%	-50%	-50%
Sheep and goat meat	-50%	-50%	-50%	-50%	-50%
Milk	2010	2010	-50%	-50%	-50%
Pig meat	BAU	2010	BAU	2010	-50%
Poultry meat	BAU	2010	BAU	2010	-50%
Eggs	BAU	2010	BAU	2010	-50%



Petr Havlik, personal communication

Conclusion

EU can shift towards sustainable diets and a sustainable food supply system by 2030-2050

Needs transformation of production, trade, distribution, and consumption of food.

Recommendations

1. Develop an EU policy **protocol to monitor the health and sustainability impact** of food consumption and intake.
2. Better enable **market decisions** that support a **transformation** for sustainable and healthier food supply and consumption
3. **Experiment** with system solutions (supply & demand!), market **intervention. Social innovation**!
4. **Reconnect different policies**, under an aligned multi-level and multi-dimensional food policy framework in the EU and Member States

THANK YOU

More on SUSFANS at https://www.susfans.eu/ or contact Thom Achterbosch (coordinator) at thom.achterbosch@wur.nl