

Expert Panel on Nitrogen and Food

Progress report for TFRN-15 (04/02/2021) on:

Appetite for Change:

*food system options for nitrogen,
environment & health.*

2nd ENA Special Report on Nitrogen & Food

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Clare Howard, Mark Sutton*



Nitrogen on the Table



PBL Netherlands Environmental
Assessment Agency

Nitrogen on the Table

The influence of food choices on
nitrogen emissions and the
European environment

*Special Report of the European Nitrogen
Assessment*



Key messages

- Only 22% of the nitrogen input into the EU agricultural system is transformed into food; the rest is lost in various forms;
- Livestock sector is responsible of 80% of agricultural nitrogen losses to the environment (mainly nitrate and ammonia);
- A 50% lower meat and dairy consumption and production would lead to:
 - EU diets more in line with health recommendations
 - Around 40% lower nitrogen emissions
 - 25- 43% lower greenhouse gas emissions
 - EU would import less soy, and export more cereals

EPNF1: Nitrogen on the Table

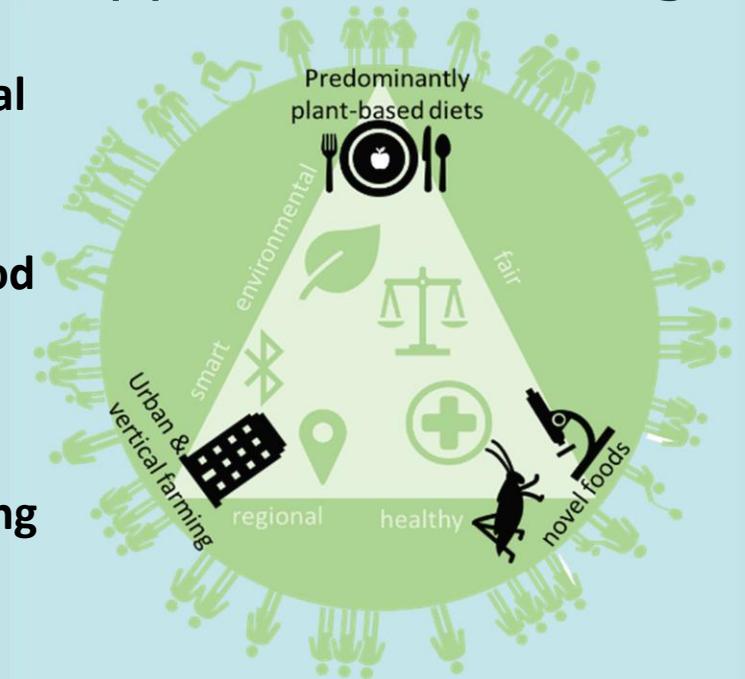


... the influence ...

- i. combination of **improved farm level technical measures** and **shifts in consumption** → food system NUE? Required incentives?
- ii. **relative potential of dietary changes and food waste reduction?**
- iii. **health effects** of a range of dietary patterns that generate less nitrogen pollution?
- iv. can science strengthen the case for **controlling nitrogen pollution and optimizing diets** to meet human health goals?

([WGSR 53rd Session. Inf. Document](#), December 2015)

EPNF2: Appetite for Change



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Managing nutrients: the key to achieve sustainable food systems for healthy diets

Edited by Adrian Leip, Susanna Kugelberg, Benjamin Bodirsky
Last update 17 October 2020

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Implications of a food system approach for policy agenda-setting design

<https://www.sciencedirect.com/journal/global-food-security/special-issue/10658FVGSC6>

There was the need of new research for the new report

- Corrado, S. et al. 2020. **Unveiling the potential for an efficient use of nitrogen along the food supply and consumption chain.** Glob. Food Sec. 25, 100368. <https://doi.org/10.1016/j.gfs.2020.100368> (open access)
- Costa Leite et al. 2020. **Healthy low nitrogen footprint diets.** Glob. Food Sec. 24, 100342. <https://doi.org/10.1016/j.gfs.2019.100342> (open access)
- Hutchings, N.J. et al. 2020. **Measures to increase the nitrogen use efficiency of European agricultural production.** Glob. Food Sec. 26, 100381. <https://doi.org/10.1016/j.gfs.2020.100381> (open access)
- Kugelberg, S. et al. 2021. **Implications of a food system approach for policy agenda-setting design.** Glob. Food Sec. 28, 100451. <https://doi.org/10.1016/j.gfs.2020.100451> (open access)
- Latka, C. et al. 2021. **Paying the price for environmentally sustainable and healthy EU diets.** Glob. Food Sec. 28, 100437. <https://doi.org/10.1016/j.gfs.2020.100437> (open access)
- Leip, A. et al. 2021. **The role of nitrogen in achieving sustainable food systems for healthy diets.** Glob. Food Sec. (in press). <https://doi.org/10.1016/j.gfs.2020.100408> (open access)
- Weindl, I. et al. 2020. **Sustainable food protein supply reconciling human and ecosystem health: A Leibniz Position.** Glob. Food Sec. 25, 100367. <https://doi.org/10.1016/j.gfs.2020.100367> ([researchgate.net](https://www.researchgate.net))
- ... more soon

Other publications

Check out <http://www.clrtap-tfrn.org/content/epnf>

EPNF2 – Sustainability Issues

- All EPNF meetings followed the concept of Nitrogen Neutrality
 - 1. Reduced Nitrogen footprint of the meetings
 - 2. Estimation of Nitrogen footprint (not always)
 - 3. Compensation of N and C footprints
- Meetings in Cercedilla 2018 & Edinburgh 2019 'particularly' sustainable
 - Vegetarian/vegan catering
 - Hybrid meeting
- Cercedilla Manifesto & open petition
 - openpetition.eu/!cercedillamanifesto

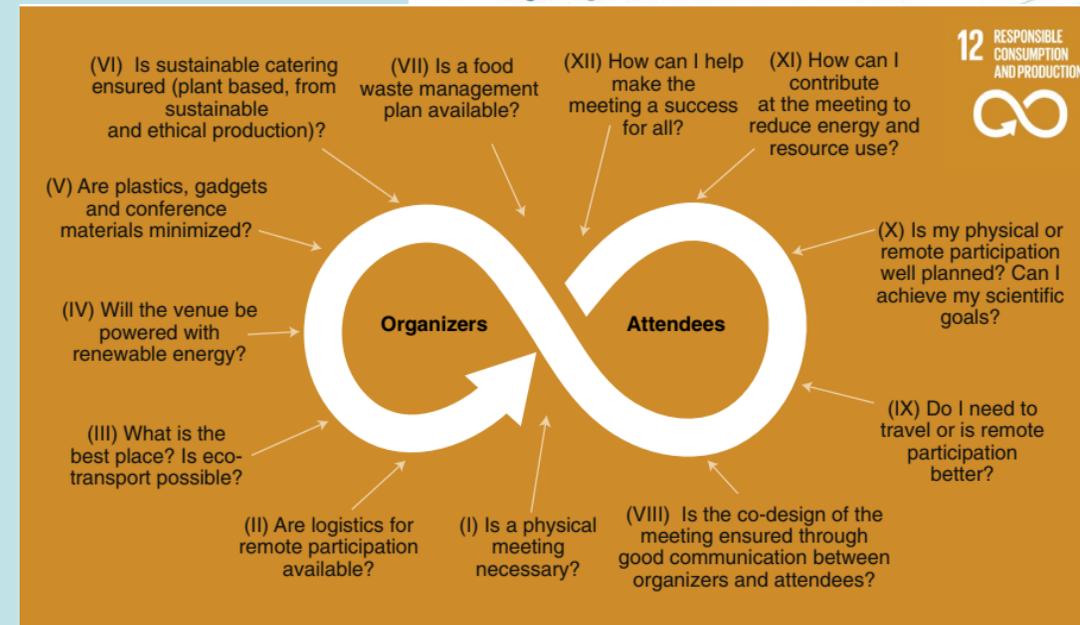
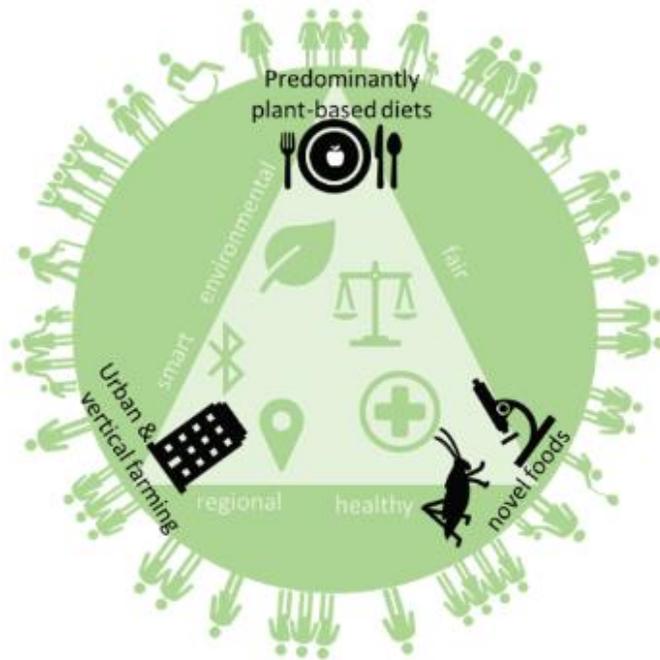


Fig. 1 | Twelve points to enhance the sustainability of research meetings as proposed by the Cercedilla Manifesto. The Cercedilla Manifesto is based on a co-creative approach to the production, provision and consumption of food and services at scientific meetings, and is inspired by Sustainable Development Goal 12.

Sanz et al. 2020, Nature Food

Appetite for Change

Food system options for nitrogen, environment & health



2nd Special Report of the
European Nitrogen Assessment
on Nitrogen & Food

- Part A. Food systems today: A health and nitrogen perspective**
- Chapter 1. Nitrogen and food systems
 - Chapter 2. Nitrogen in the food system: health and environment implications
 - Chapter 3. Food system archetypes
- Part B Food systems a la carte: Elaborating a recipe for sustainable food systems**
- Chapter 4. The scope to improve nitrogen use efficiency of European food systems
 - Chapter 5. Future foods as alternatives to conventional animal-source foods
 - Chapter 6. Sustainability-minded Food Based Dietary Guidelines (SFBDGs) as a tool to promote human and planetary health
 - Chapter 7. Consumer-oriented food policies for healthy and environmentally sustainable diets
- Part C Serving sustainable food systems: Gathering around the table and sharing our plates**
- Chapter 8. Governing a transition towards a sustainable food system
 - Chapter 9. Navigating towards future food systems with a sustainability compass
 - Chapter 10. Reaching nitrogen reduction emissions targets in the European Union
- Conclusions

The report in a nutshell

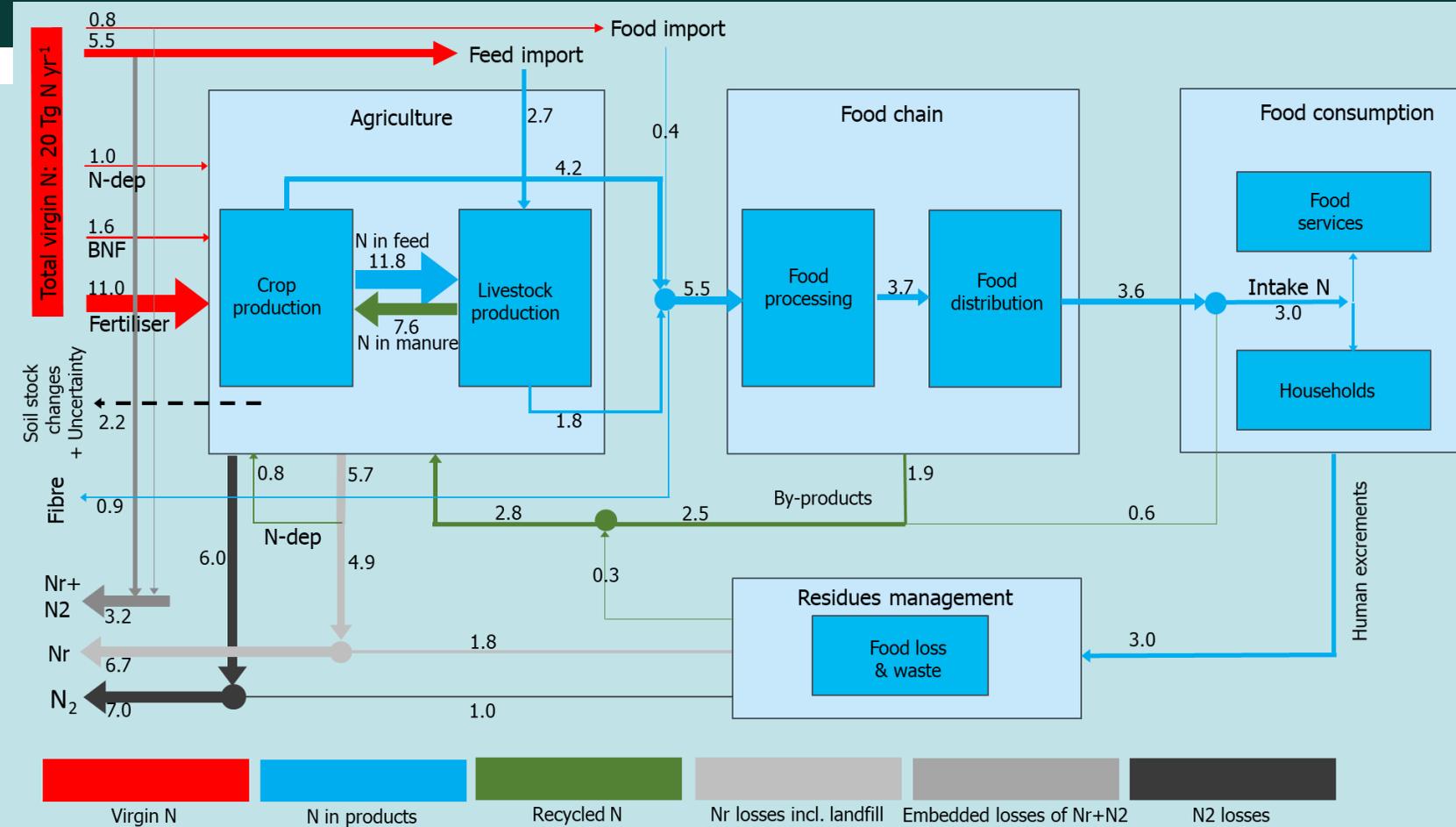
Sustainable food systems are un-thinkable without sustainable N management. Solutions to balance nitrogen flows throughout the food system to reduce nitrogen pollution will make the food system more resilient and efficient, and help to provide healthy diets for all.

There is significant scope in increasing food system NUE with supply-side measures, but achieving a 50% reduction of N losses implies high socio-economic costs, thus diet change appears an essential condition for success.

Transition to sustainable food systems and sustainable N management requires that governments adopt a systemic approach to reach multiple and integrated objectives, be inclusive, accountable, and come up with coordinated mutually enforcing policy solutions.

Part A - Food systems today: Food systems from a health and nitrogen perspective

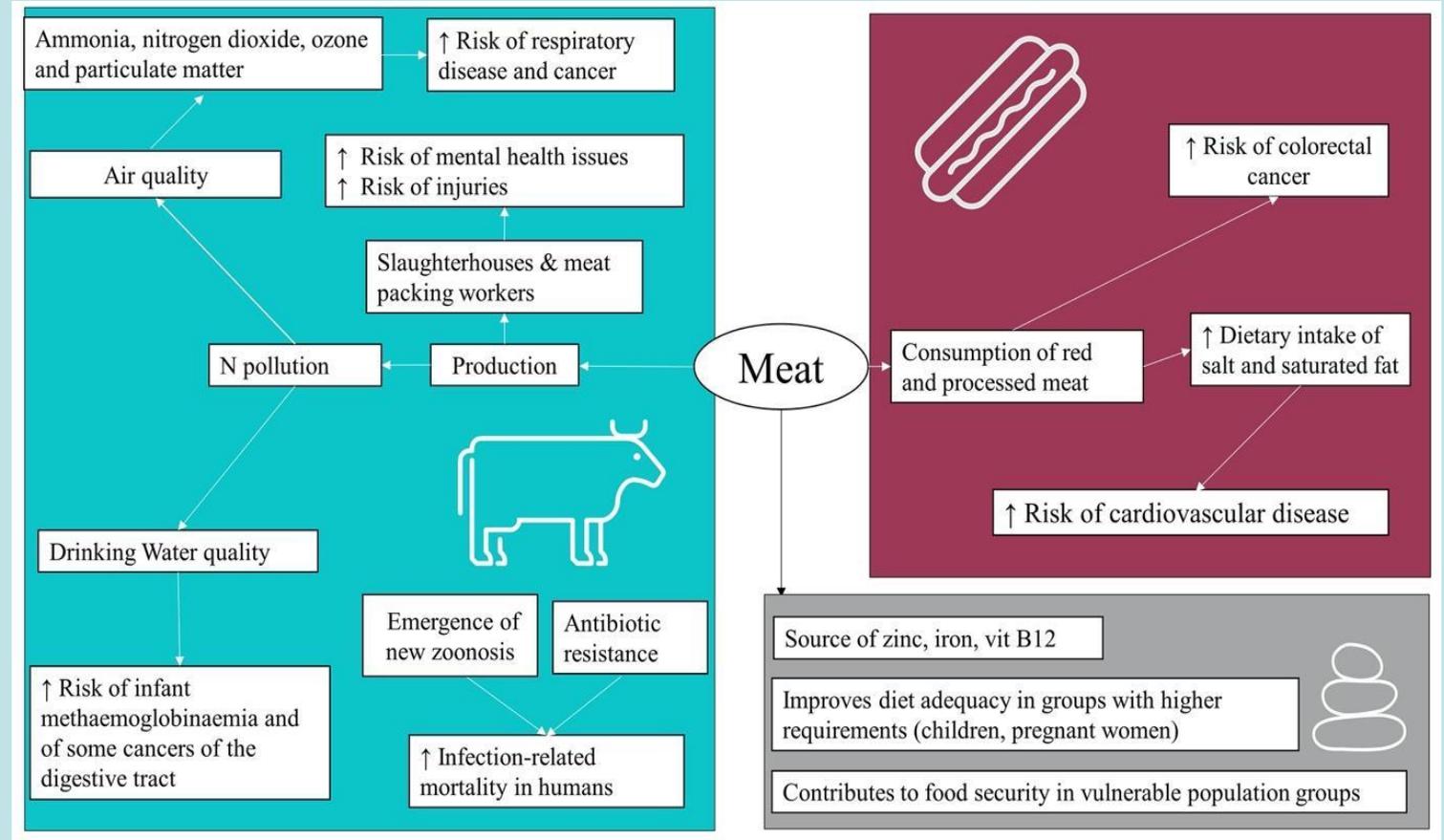
- Achieving sustainable nitrogen management and sustainable food system faces significant challenges and are closely linked – successful policies think systemically and holistically to find the most powerful leverages.



Consolidated nitrogen budget for the agri-food system of the European Union in 2015 derived from Eurostat, FAOstat, Corrado et al. (2020), Westhoek et al. (2015). Quantities of N are reported in Tg. (BNF: biological N fixation). [Chapter 1]

Part A - Food systems today: Food systems from a health and nitrogen perspective

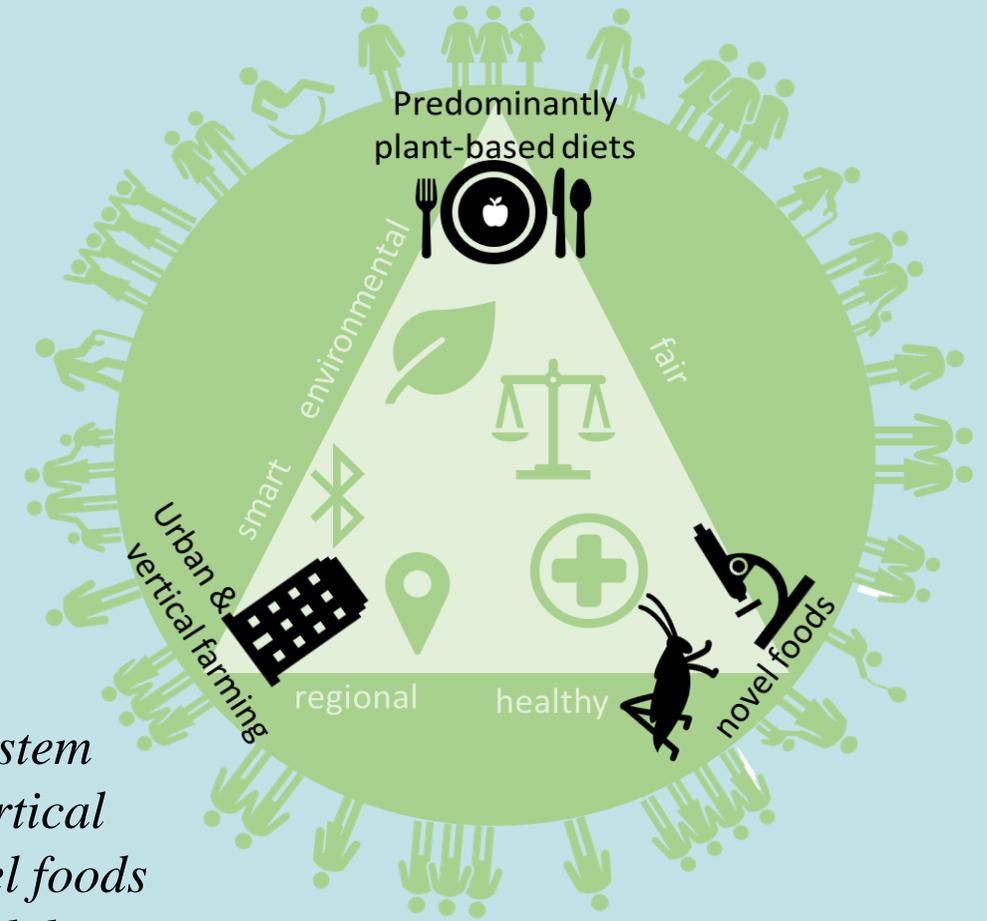
- 'Nutrition sensitive' agricultural and food policies actively promote sustainably produced food for healthy diets rich in plant- and limited in animal-source food, in particular red and processed meats.



Health impacts of meat production and consumption [Chapter 2]

Part A - Food systems today: Food systems from a health and nitrogen perspective

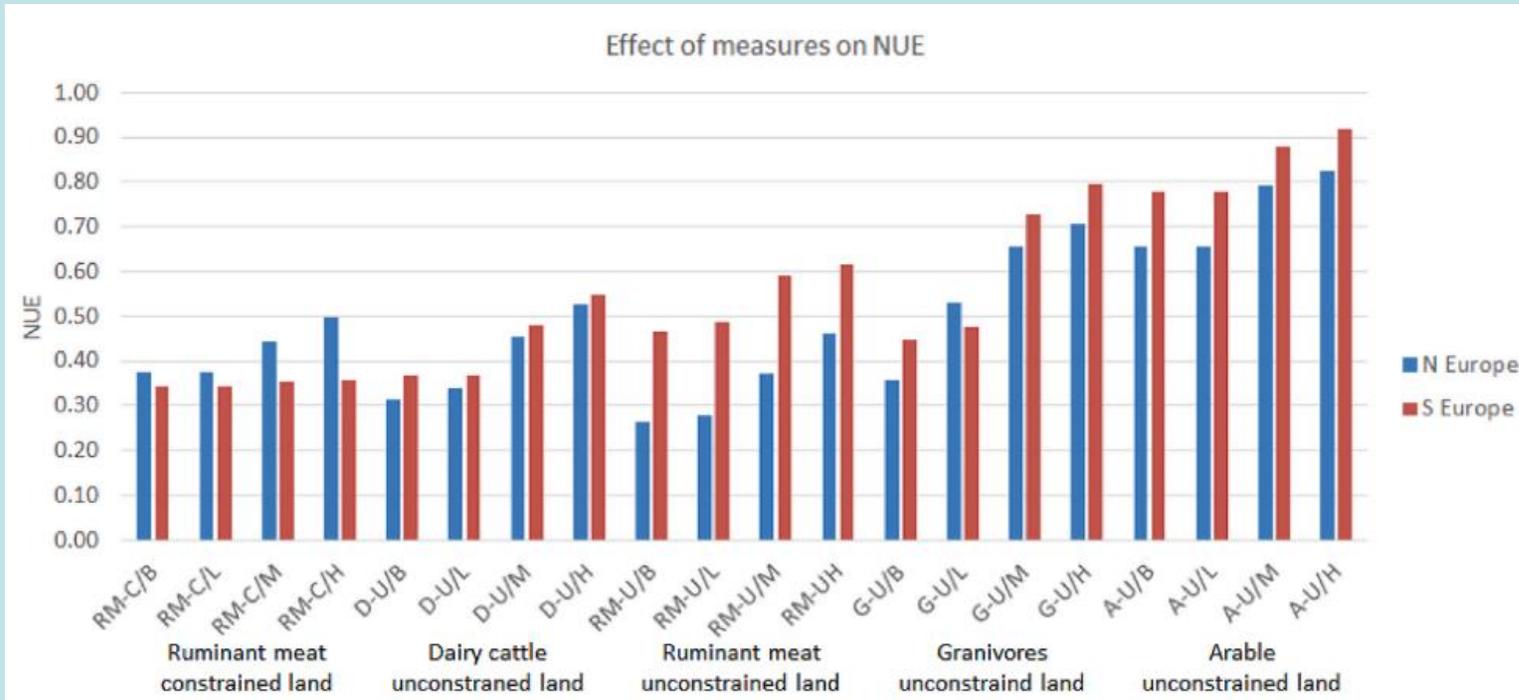
- As sustainable food system can vary significantly in concept, scales, and technologies, sustainable food system policies are able to combine traditional indigenous knowledge with latest research findings, and find context-specific optimum solutions to serve all people.



A sustainable visionary food system could encompass urban and vertical farming, the production of novel foods and pre-dominantly plant-based diets.

[Chapter 3]

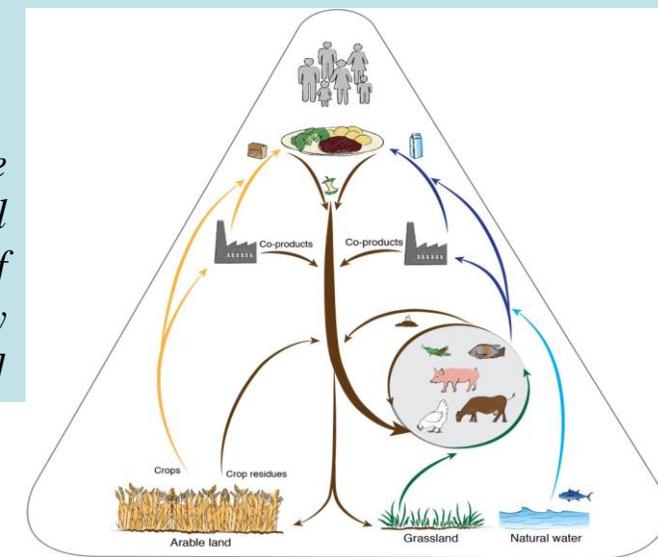
Part B - Food systems a la carte: Elaborating a recipe for sustainable food systems



*The NUE for the production systems in N and S Europe
C: Constrained land; U: Unconstrained land
Ambition levels Base (/B), Low (L), Medium (M) and High (H). [Chapter 4]*

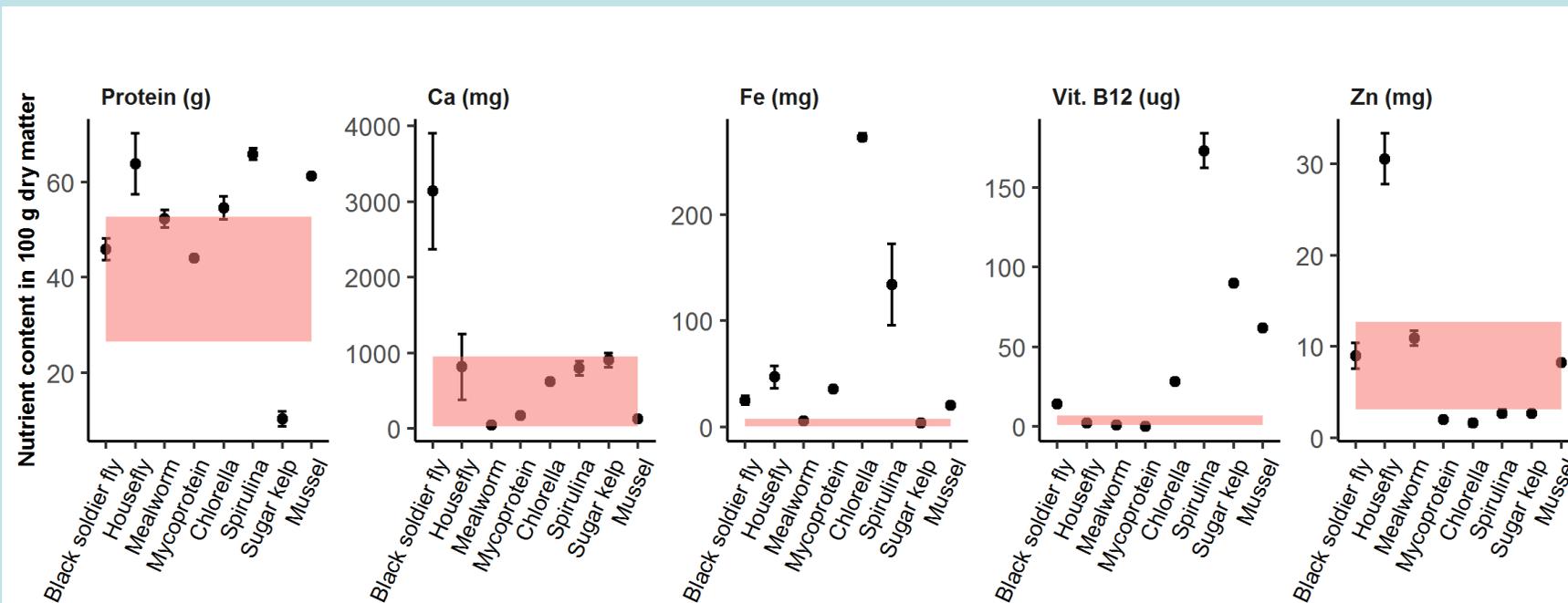
- There is urgent need, but also room, for increasing European agricultural NUE, with arable systems having both a higher NUE and more potential for improvement than livestock systems; livestock feed should be restricted to non-edible biomass.

The biophysical concept of circularity [Chapter 4]



Part B - Food systems a la carte: Elaborating a recipe for sustainable food systems

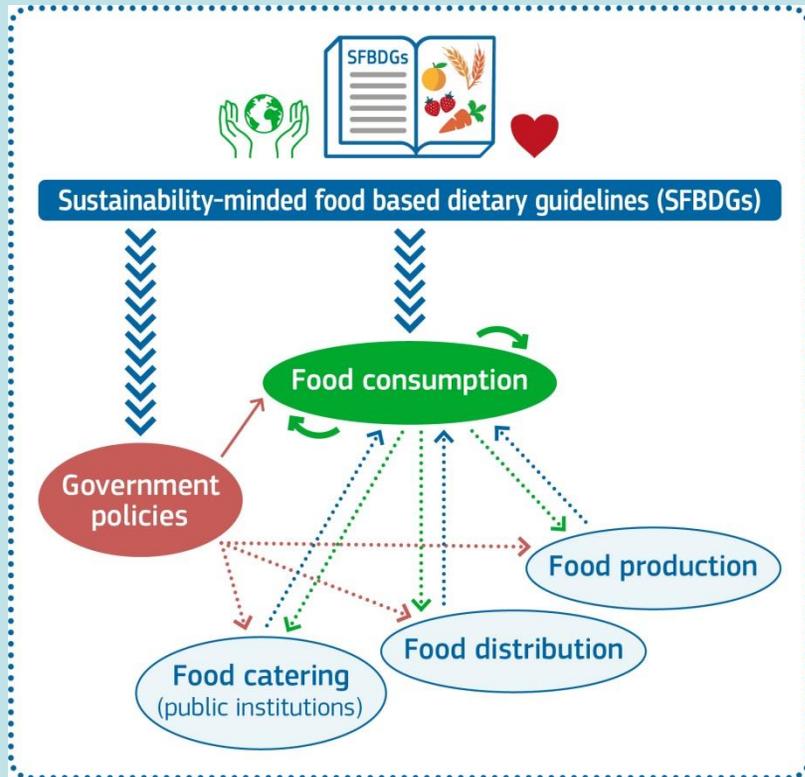
- Future foods offer opportunities for substituting unsustainable high consumption of animal-source foods; but to reap their nutritional and environmental potential, certain regulatory barriers need to be removed or reduced.



Nutrient content of future foods per 100 grams of dry matter (mean \pm std. error). The nutrient amounts found in conventional animal-source foods (i.e., milk, egg, pork, beef and chicken) are within the red shaded area.

[Chapter 5]

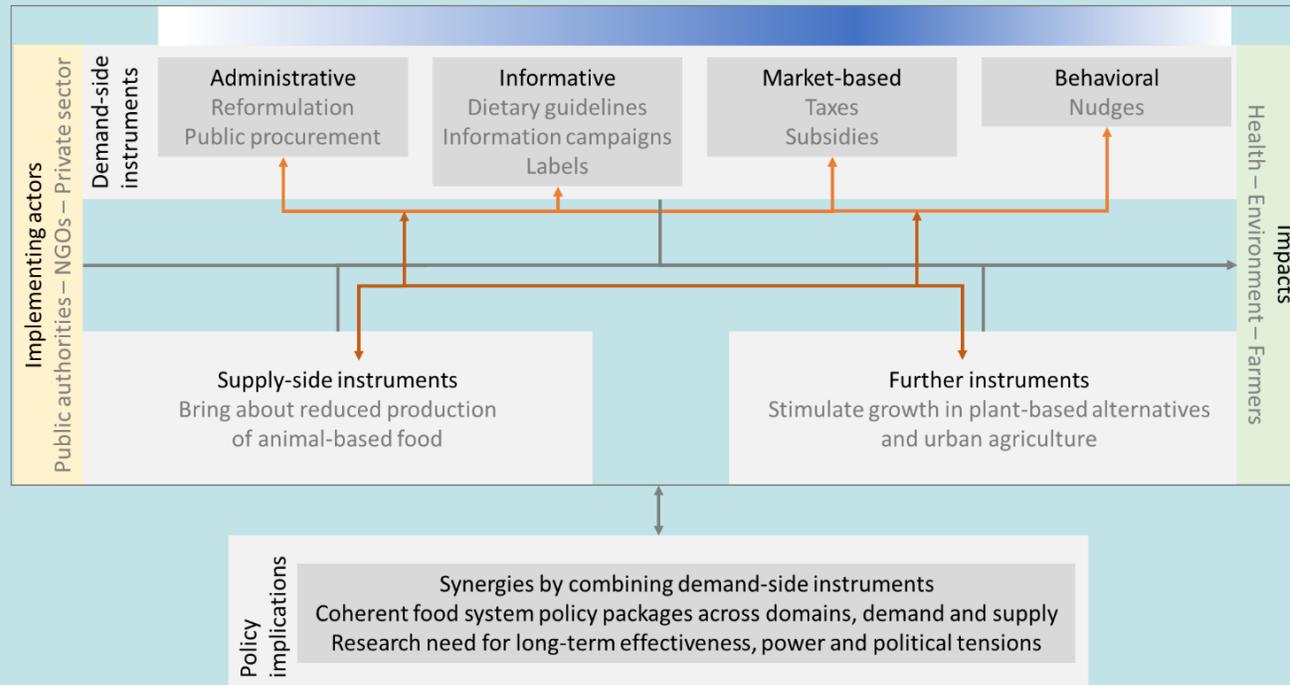
Part B - Food systems a la carte: Elaborating a recipe for sustainable food systems



Sustainability-minded food based dietary guidelines (SFBDGs) [Chapter 6]

- Update of current food-based dietary guidelines (FBDGs) into sustainability-minded FBDGs is crucial for achieving healthy and sustainable diets, and so is better adherence to them sought through leadership and commitment in achieving dietary targets.

Part B - Food systems a la carte: Elaborating a recipe for sustainable food systems

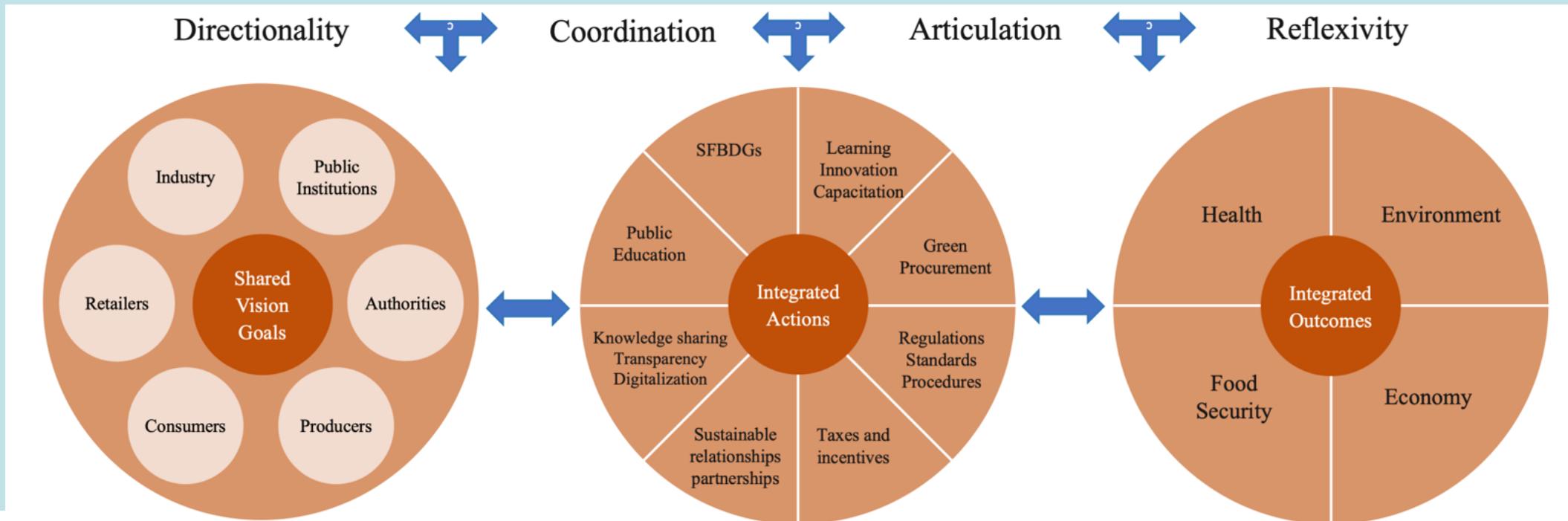


- A mix and better coherence of policies aimed at both provision and demand of foods, including implementation of demand side policies that have shown to be effective, will promote health and sustainable diets in populations.

Policy implementation is subject to various actors. A combination of various demand-side measures, together with supply-side, and further instruments is likely effective if coherently considering all relevant impact domains. [Chapter 7]

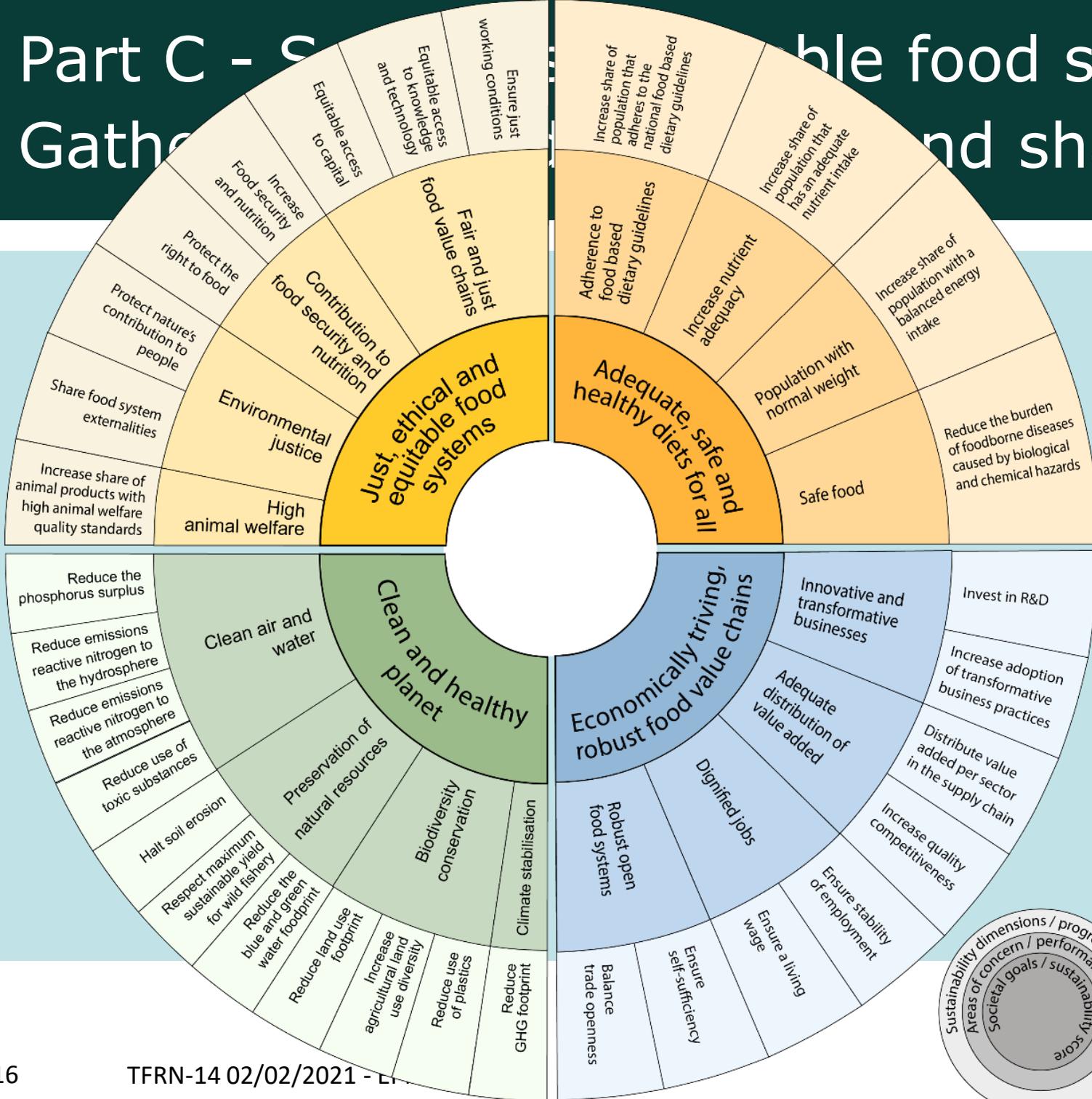
Part C - Serving sustainable food systems: Gathering around the table and sharing our plates

- Rethinking *food system governance* is necessary and requires more efforts to re-design principles, tools and instruments applied in the policy and decision-making process to achieve sustainable food systems



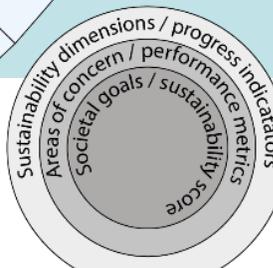
*Food system
governance
[Chapter 8]*

Part C - Sustainable food systems: Gathering evidence and sharing our plates

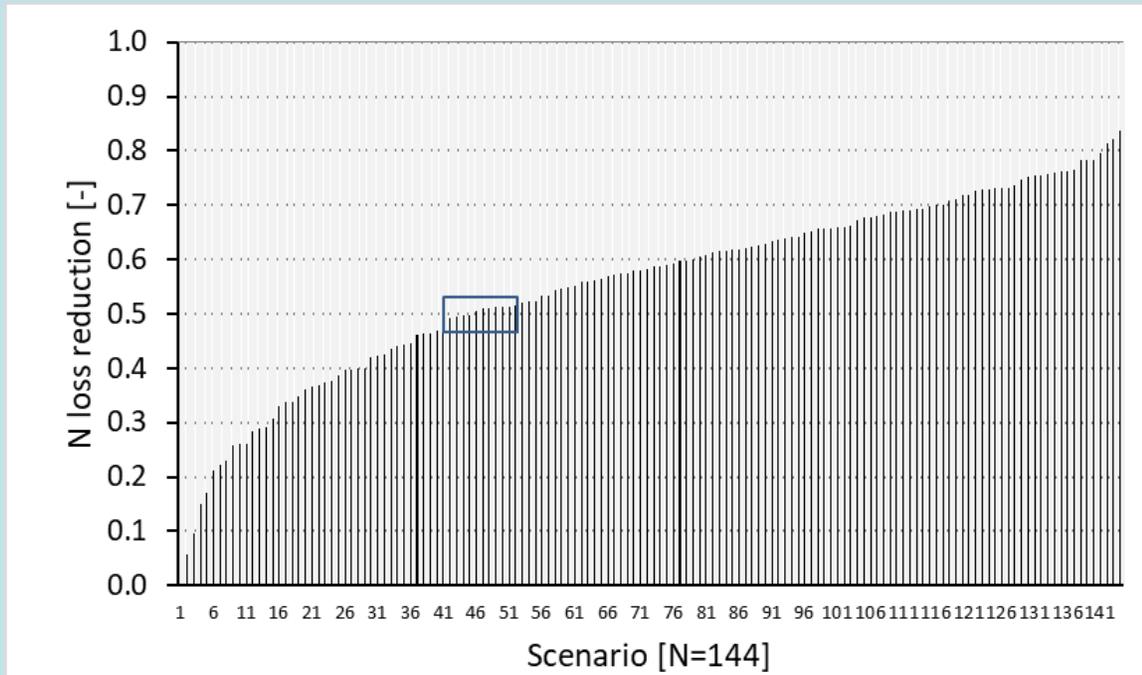


- Applying tools to quantify food system sustainability scores is important for identifying trade-offs and co-benefits in policy-making and requires policy targets for all sustainability objectives.

The food system sustainability compass
 Four societal goals (inner ring, measured by a sustainability score), areas of concern (middle ring, measured by performance metrics) and sustainability dimensions (outer ring, measured by progress indicators) make up the sustainability compass. [Chapter 9]



Part C - Serving sustainable food systems: Gathering around the table and sharing our plates



Reduction of N losses in 144 scenarios and selection of 12 scenario's with a N loss reduction between 49 and 51%. [Chapter 10]

- Reaching the N- targets will require a comprehensive policy package that in addition to technical innovations at the farm-level, enables social and behavioral innovations across the food system, including dietary shifts, to cut implementation barriers.

Scenarios include 4 farm gate ambition levels (Hutchings et al., 2020), 3 different post-farm gate food chain scenarios (Corrado et al., 2020), and 4 different diet ambitions (conventional, demitarian, vegetarian, vegan)

Appetite for Change: Status & timeline

- December 2020 – first full draft
- January 2021 – review by CEH; feedback & final revision pending; envisage VIP forewords; executive summary in elaboration
- February 2021 – short summary (2 pager) included in TFRN progress report & submitted to WGRS-59 (May 17-20)
- May 2021 – launch report with Science Media Center if possible
- May 2021 – submit final full report to WGRS-59 as informal document
- Check possible submission of Exec Summary as formal doc to WGRS-60