EU food system assessment, metrics and visualization
And integrated approach
Dr Monika Zurek
Environmental Change Institute, University of Oxford
European sustainable food and nutrition security

Food and nutrition security in EU
World Food Summit, 1996
+
Sustainability concept

Rutten et al. (2018); Zurek et al. (2017, 2018)
An approach for enabling a new debate on and monitoring food system change – WP1

1. The creation of a **participatory environment**;

2. The development of a **conceptual framework** mapping out the driving forces, actors, outcomes and goals for the EU food system (Zurek et al. 2016);

3. An approach to devising a set of **performance metrics** for assessing the food system's status and **innovation options** across four key policy goals formulated by food system actors (Zurek et al. 2017);

4. A **modelling strategy** for quantifying the sustainability status of FNS in the EU/performance metrics (Kuiper et al. 2017);

5. A **visualization tool** that allows food system actors to assess the outcomes and associated trade-offs of possible innovation options in an integrated manner across the policy goals (the SFNS visualizer) (Zurek et al. 2018).
Assessing Sustainable Food and Nutrition Security of the EU Food System—An Integrated Approach

Monika Zurek 1,*, Aniek Hebinck 1,2, Adrian Leip 3, Joost Vervoort 1,4, Marijke Kuiper 5, Maria Garrone 6, Petr Havlík 7, Thomas Heckelei 8, Sara Hornborg 9, John Ingram 10, Anneleen Kuijsten 10, Lindsay Shutes 5, Johanna M. Geleijnse 10, Ida Terluin 5, Pieter van ’t Veer 10, Jo Wijnands 5,†, Andrea Zimmermann 8,11,‡ and Thom Achterbosch 5

1 Environmental change Institute, University of Oxford, Oxford OX1 3QY, UK; aniek.hebinck@su.se (A.H.); j.m.vervoort@uu.nl (J.V.); john.ingram@eci.ox.ac.uk (J.I.)
2 Stockholm Resilience Centre, Stockholm University, 10405 Stockholm, Sweden
3 European Commission, Joint Research Centre, I-21027 Ispra (VA), Italy; adrian.leip@ec.europa.eu
4 Copernicus Institute of Sustainable Development, University of Utrecht, 3584 CB Utrecht, The Netherlands
5 Wageningen Economic Research, 2595 BM The Hague, The Netherlands; marijke.kuiper@wur.nl (M.K.);
lindsayjshutes@gmail.com (L.S.); ida.terluin@wur.nl (I.T.); thom.achterbosch@wur.nl (T.A.)
6 LICOS—Centre for Institutions and Economic Performance, KU Leuven University, 3000 Leuven, Belgium;
maria.garrone@kuleuven.be
7 Ecosystems Services and Management Program, International Institute for Applied Systems Analysis, 2361 Laxenburg, Austria; havlikpt@iiasa.ac.at
8 Institute for Food and Resource Economics, University of Bonn, 53115 Bonn, Germany;
thomas.heckelei@ir.uni-bonn.de (T.H.); andrea.zimmermann@fao.org (A.Z.)
9 Agrifood and Bioscience, RISE Research Institutes of Sweden, 40229 Gothenburg, Sweden;
sara.hornborg@ri.se
10 Division of Human Nutrition and Health, Wageningen University, 6700 AA Wageningen, The Netherlands;
anneleen.kuijsten@wur.nl (A.K.); marianne.geleijnse@wur.nl (J.M.G.); pieter.vantveer@wur.nl (P.v.V.)
11 Trade and Markets Division, Food and Agriculture Organization of the United Nations, 00153 Rome, Italy
* Correspondence: monika.zurek@eci.ox.ac.uk; Tel.: +44-(0)1865-285531
† Jo Wijnands passed away.

Received: 29 September 2018; Accepted: 13 November 2018; Published: 19 November 2018
1. The participatory environment: Stakeholder core group (SCG)

35 members in the Stakeholder Core Group from the public sector, food industry and NGOs

4 meetings: 1) conceptual framework, driving forces, approach to metrics
2) performance metrics, scenarios for the EU food system
3) innovations in the livestock and fish sector
4) consumer research and innovations in the fruit and vegetable sector, overall findings and messages emerging from the project and how to relay them

Feedback/questions in-between meetings
SUSFANS Conceptual Framework for Assessing EU Sustainable FNS

**INDIRECT Drivers of the Food System, e.g.**
- Economic development
- Populations dynamics
- Technological change
- Agriculture and trade policies
- Environmental issues
- Culture and lifestyles

**Status of EU FNS and sustainability performance of the EU Food System**
- Food and nutrition security
- Farm, fishery, food business performance
- Environmental impacts
- Interactions with global food security
- Sociocultural wellbeing

**EU Policy Goals**
- Balanced and sufficient diets for EU citizens
- Reduced environmental impact
- Competitive EU agrifood business
- Equitable conditions and outcomes

**EU Policy makers**
- EU & national policy makers

**EU Food System**

**DIRECT Drivers of Food System Actors**

- **Consumers, e.g.**
  - Knowledge
  - Food choice motives (e.g., price)
  - Food involvement/interest
  - Attitudes and subjective norms
  - Demographics
  - Information
  - Food neo-phobia

- **Food Chain, e.g.**
  - Food prices
  - Regulatory environment

- **Producers, e.g.**
  - Regulatory environment
  - Input and farm gate prices
  - Contract opportunities
  - Natural resource availability
  - Available technology
  - Producer and farm characteristics

**Food Systems Outcomes**
- Diets and consumption patterns
- Productivity, profit, and competitiveness
- Environmental conditions
- Fair and just social conditions for food system actors

**Food System Activities**
- Producing
- Processing/Packaging
- Wholesaling/Carrying
- Consuming
- Transporting/Trading
- Disposing/Reusing
- Storing
Metrics hierarchy for assessing sustainability performance of food system across societal goals and outcomes
SUSFANS performance metrics for EU food systems

Note: hypothetical assessment

Equitable outcomes & conditions

Balanced & sufficient diets

Reduced environmental impacts

Competitive agri-food business

Zurek et al. (work in progress)
3. Assessing the food system: Metrics for goals and sub-goals of EU sustainable FNS

Hierarchical approach to building performance metrics out of individual indicators, depicted in the SUSFANS SFNS-impact visualizer

Zurek et al. (2018)
<table>
<thead>
<tr>
<th>Policy goal</th>
<th>Specific goal = performance metrics</th>
<th>Explanation (draft version, will be updated)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balanced and sufficient diets for EU citizens</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy balance</td>
<td>Indicator: % of the population that is overweight and obese</td>
<td></td>
</tr>
<tr>
<td>Adequate Nutrient intake</td>
<td>Indicator: Nutrient based summary score</td>
<td></td>
</tr>
<tr>
<td>Adequate Food intake</td>
<td>Indicator: Food based summary score</td>
<td></td>
</tr>
<tr>
<td>Reduced prevalence of diet-related NCDs</td>
<td>Indicator: to be developed</td>
<td></td>
</tr>
<tr>
<td><strong>Equitable outcomes and conditions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity in food consumption</td>
<td>Concerning malnutrition in all its forms. Indicators: availability and accessibility of food and the stability of this.</td>
<td></td>
</tr>
<tr>
<td>Equity in access to food</td>
<td>Concerning ethical issues (animal welfare, technology acceptance, global food security) and social justice (e.g. consumer &amp; citizen empowerment; gender/age/race differentials)</td>
<td></td>
</tr>
<tr>
<td>Equity among producers and chain actors</td>
<td>Access to resources, finance &amp; technology, position of primary producers in the value chain</td>
<td></td>
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<tr>
<td>Footprint of food</td>
<td>Resources embedded in and emissions related to food consumption and production, representing equity across the generations</td>
<td></td>
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<tr>
<td><strong>Reduction of environmental impacts</strong></td>
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<tr>
<td>Climate stabilisation</td>
<td>GHG emission reductions, contribution to stable earth and maritime systems</td>
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<tr>
<td>Clean air and water</td>
<td>Nitrogen and phosphorus surplus, toxic substances</td>
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<tr>
<td>Biodiversity conservation</td>
<td>Agricultural land use diversity, reductions of the contribution of the agrifood chain to loss of mean species abundance (MSA)</td>
<td></td>
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<tr>
<td>Preservation of natural resources</td>
<td>Sustainable water use, exploitation of wild-caught seafood resources, and maintenance of soil fertility</td>
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<tr>
<td><strong>Competitiveness of the EU agri-food business</strong></td>
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<tr>
<td>Value added</td>
<td>Food sector growth; in relation to world food sector</td>
<td></td>
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<tr>
<td>Productivity &amp; innovation</td>
<td>Total and labour factor productivity growth in food sector; relative to economy</td>
<td></td>
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<tr>
<td>Job creation</td>
<td>Job &amp; wage growth in the food sector; relative to economy</td>
<td></td>
</tr>
<tr>
<td>True-price structure</td>
<td>True-price of food; Social (GHG) costs included in the market prices</td>
<td></td>
</tr>
</tbody>
</table>
4. Models in the SUSFANS box

**Macro-economy**
- MAGNET
  - Complete economy
  - Income effects
  - Long run
  - Global, countries

**Diet & health**
- SHARP
  - Product detail
  - Specific diet needs
  - Short run
  - EU4

- DIET
  - Consumers preferences
  - Health & environment
  - Short run
  - EU3

**Agricultural production**
- GLOBIOM
  - Spatial detail
  - Environmental impacts
  - Long run
  - Global, grid

- CAPRI
  - EU detail
  - Production detail
  - Long run
  - Global, EU, NUTS2
Example: Exploring innovations for livestock production

- Resource use
- Circular
- Consumption

- Feeding insects
- Product
- Reducing ASF consumption
- Alternative protein sources

7-27 g protein from ASF in diet

Default livestock EU

Slide: H. van Zanten, WUR
SUSFANS performance metrics for EU food systems

Note: hypothetical assessment

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https://anderson-rc.github.io/spidervis2/