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A participatory backcasting initiative
Feedbacks and lessons learned from seven countries on how to develop agricultural transformation pathways

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Summary:

The decline and degradation of natural resources and the evolution of the global food demand impose to think through a real transformation of current agricultural systems. Altering ongoing trajectories will though not be feasible without involving a wide community of actors in the development of alternative pathways at the national and subnational levels. Since 2015, the Agricultural Transformation Pathways Initiative has been supporting various groups of stakeholders in the development and implementation of national transformation pathways towards SDG-compatible systems. The initiative currently supports this work in seven countries: Uruguay, China, the United Kingdom, New Zealand, France, the Netherlands and Tunisia. The community of actors from within these countries has developed a methodology based on participatory backcasting approaches stemming from the energy, climate and economics literature, as well as additional tools to tackle the complexity of developing transformative scenarios towards more sustainable agricultural systems.

This contribution aims to illustrate how participatory backcasting exercises were practically conducted in the different countries, by presenting the approach and the tools that were developed and used to support the development of national transformation pathways.

The paper also wishes to provide insight on common transition steps that were discussed by the different countries, regardless of the economic and biophysical situation of origin. In particular, the ATP initiative shows that national transformation pathways of agricultural systems tend to always include a reflection over the following topics: the closing of loops, the socio-economic dimensions of sustainability, and the issue of demand.

Article:

Faced to the decline and degradation of natural resources and to the evolution of the global food demand, agricultural systems need to provide rapid answers to economic, social and environmental sustainability challenges. The growing stakes at hand impose to think through a real transformation of current systems. Altering ongoing trajectories will though not be feasible without involving a wide community of actors in the development of alternative pathways at the national and subnational levels. Foresight exercises, that “invite to consider the future as something that we create or build” (de Jouvenel, 2005), might help build common narratives or shared “representations of the world” (Muller, 2000) that could encourage transition away from current locked-in sociotechnical systems.

Since 2015, the Agricultural Transformation Pathways Initiative has been supporting various groups of stakeholders in the development and implementation of national transformation pathways towards SDG-compatible systems. The initiative currently supports this work in seven countries: Uruguay, China, the United Kingdom, New Zealand, France, the Netherlands and Tunisia. The community of actors from within these countries has developed a methodology based on participatory backcasting approaches stemming from the energy, climate and economics literature, as well as additional tools to tackle the complexity of

developing transformative scenarios towards more sustainable agricultural systems. The methodological steps and tools developed in the framework of the initiative might help structure the debate around an interactive planning approach that enables agricultural actors to take ownership of the SDGs at the national and subnational levels, and to start developing and implementing transformation pathways towards SDG-compatible agricultural systems.

This paper aims to present these methodological steps and tools, as well as some of the key points of agricultural transformation that were discussed no matter what the specificities of national geographical and socio-economic circumstances.

I. Methodological outputs

A. From climate and energy planning approaches to participatory backcasting for the agricultural sector

The general approach used by the Agricultural Transformation Pathways initiative builds on previous work using foresight exercises to show that the future is not entirely predetermined, but results from decisions made by stakeholders (Mermet 2005; de Jouvenel 2004). Scenarios resulting from foresight exercises have been used to explore different futures or different perspectives of future developments, as well as to support decision-making (Van Notten 2006).

Backcasting is a specific scenario approach that has been applied for more than three decades as an operational approach in the pursuit of sustainable development. It differs from forecasting in that the latter develops multiple futures from a single present, while the former develops pathway(s) for a single desired future. “Backcasting” indeed denotes a process in which a target is fixed for a future date, and then a pathway towards achieving that target is identified by moving backward in time (Robinson, 1990). This more normative approach has been used extensively to develop strategic paths towards greater sustainability at different scales, particularly in the energy sector or to decrease greenhouse gas emissions (Robinson, 1982; Mulder & Biesiot, 1998; Anderson, 2001; Giurco et al., 2011; Deep Decarbonization Pathway Project, 2015…). The approach is strongly problem-solving oriented and enables the setting of priorities and goals, the ranking of solutions in terms of priority and the identification of steps that need to be taken, and also when particular steps must be carried out to enable the desired outcome to be obtained.

Developing a foresight culture focusing on the long term can be a way to cope with the growing uncertainty characterizing current agricultural systems, but also to raise the level of ambition of transformation. Backcasting, on its side, is a specific foresight methodology that can help connect future targets to concrete actions that need to be rapidly taken (Robinson, 1982; Mulder & Biesiot, 1998; Anderson, 2001; Giurco et al., 2011; Deep Decarbonization Pathway Project; 2015, Vervoort et al., 2014). However, backcasting has rarely been used as an approach to help stakeholders think through transformation of the agricultural sector so far.

The Agricultural Transformation Pathways Initiative (ATPi) has been supporting national country teams in the development of participatory backcasting exercises, where a diverse group of stakeholders (academics, government officials, industrial actors as well as farmers and NGOs, from various national and subnational levels) interacts to prioritize goals, set levels of ambition, and discuss concrete steps of implementation, as well as obstacles and solutions. This interactive planning approach helps frame the discussion on transition around different visions of country-specific agricultural challenges, as a way to start building the political consensus that is key to design and implement short-term solutions consistent with long-term sustainability goals.

B. Letting country teams set priorities and monitoring indicators

The key challenge encountered when trying to use backcasting as an approach to develop pathways towards more sustainable agricultural systems is that contrary to climate policies, of which the main aim is to decrease GHG emissions, sustainability objectives for agricultural systems can encompass dozens of different subjects.

A key step in the initiative was to develop an SDG-based grid of sustainability indicators for agricultural systems. The SDGs indeed form a comprehensive set of sustainable development targets and indicators that was agreed upon by the countries of the United Nations in September 2015. In the framework of the ATP initiative, which adopts an extended vision of the agricultural sector that encompasses its links to territories, food systems and the bioeconomy, the 169 targets of the 17 SGDs have been carefully reviewed to select 47 SDG targets relevant to reflect the challenges of the agricultural and food sector (Schwoob et al. 2018). A comprehensive "check-list" of 10 categories of objectives that agricultural policies shall consider, either to improve their direct impacts or to anticipate potential negative effects. These 10 objective categories were classified into 3 larger groups reflecting (i) the socioeconomic stakes at the farm level; (ii) the environmental stakes; (iii) the larger societal stakes. They can be presented as follows:

- Box 1, Environmental stakes: (1) land, (2) water, (3) climate, and (4) biodiversity. These categories relate to the preservation of natural resources that are essential to agricultural production (natural capital) and also reflect the wide range of services that agriculture is expected to provide (preservation of natural resources, landscape conservation, etc.);
- Box 2, Socio-economic stakes at the farm level: (5) the incomes of small and poor farmers, (6) farm/farmer resilience to social, economic and environmental shocks, (7) entrepreneurship capacities and (8) decent work. These categories relate to the current situation of farms and farmers and to the potential evolution of their situation, both in terms of resilience to risks and the ability to seize opportunities;
- Box 3, Broader societal stakes: (9) health and diets, and (10) job creation (in the farming and agri-food sectors). These categories relate to the bottom end of agricultural and food systems, to which agricultural production is ultimately prone to contribute.

Despite its limits, this framework constitutes a necessary starting point, simpler than the SDGs, but still comprehensive, to foster better reporting and to trigger constructive debates in the development of new agricultural policies.

This grid of objectives can be proposed to country teams as a framework to think through sustainable development goals and set priorities for the agricultural sector. Although countries may differently prioritize the 10 objective categories to which agricultural policies should contribute, there should at least be safeguards for the objectives that would not be among the top priorities. Ensuring that policy options delivering synergies between these two sets of objectives enter the scope of possible options increases the chances for the new policies to be aligned with the Agenda 2030. The analytical framework depicted above is a useful tool that can help keep all the stakes in mind, including the "safeguarding" ones. Nevertheless, to fully operationalize the SDGs for agricultural policies, it is fundamental to take another step forward, by selecting indicators to assess the current state and ongoing evolution, and to track progress towards the achievement of each of the 10 objective categories. Schwoob et al. (2018) propose a list of indicators that could be used for European countries for 21 of the 47 selected targets, on the basis of SDG indicators or existing databases. However, it is of course up to the countries to select their own priority objectives, as well as indicators and targets, according to the specificities of their national situations. Countries ought to select the most appropriate indicators, *i.e.* the most representative of what would be a truly transformational pathway for their agricultural and food sector. Although the SDGs are global and need to be applied in all

countries, priorities in terms of courses of action and monitoring frameworks must be established according to the specific situation of each country. Targeting priority sectors and priority actions is fundamental for taking prompt action and the triggering of transformation as soon as possible.

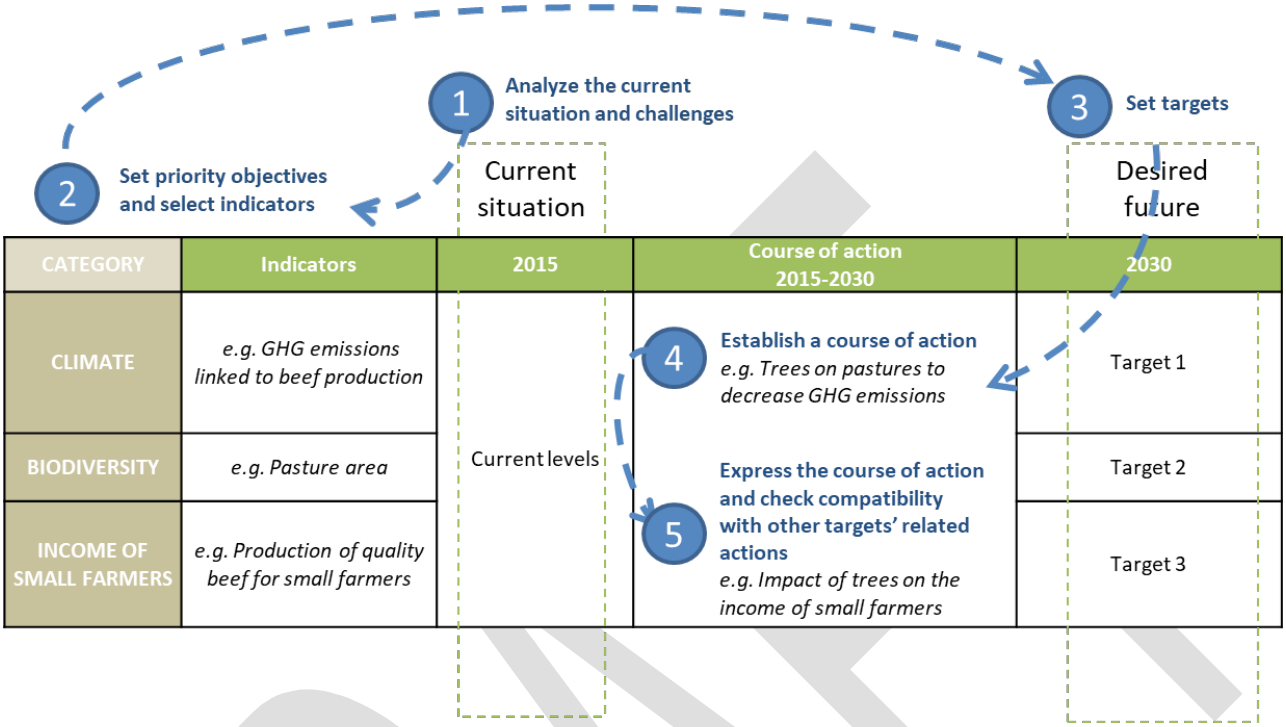

Figure 1: Illustration of the backcasting steps of ATPi

The backcasting approach that we propose for the establishment of agricultural transformation pathways (Figure 1) is a general approach. Different methods can be used and it does not matter whether countries choose to start with an analysis of the whole agricultural sector and then focus on priority sectors (such as China or France) or decide to adopt a more bottom-up approach (such as Uruguay). In addition to the analytical framework mentioned above, which can help countries select priority objectives and support peer-review processes, a wide range of tools, from literature analysis and stakeholders consultations to modelling can be used to establish appropriate targets. The NUFER model developed at the national scale in China was, for instance, a useful tool to establish targets for productivity and consumption and linked them with a first course of action. In Uruguay, the review of the practices and achievements of the best performing farmers within the FUCREA (Federación Uruguaya de los Grupos Crea, an organization that includes some of the most productive Uruguayan farmers) enabled the country team to establish targets at the national level. In the Netherlands, some targets were established according to thresholds derived from the literature: for instance, De Vries et al. (2013) propose critical limits based on the effect of N surplus on environmental pollution, for NH3 deposition (1µg/m), NO3 in groundwater (50 mg NO3/l) and total N concentration in surface water (1.0-2.5 mg/l). Other targets were discussed on the basis of a disaggregation of global targets using an integrated assessment model IMAGE under two socioeconomic pathways (SSP1 and SSP2): for instance, meeting the 1.5°C climate mitigation target in 2100 would require Dutch GHG emissions per hectare by 35% by 2050. Finally, some targets were established using already existing policy goals (for instance, in the case of France, halving the GHG emissions of the agricultural sector was one of the core element of the new Low Carbon Strategy).

C. Developing pathways

“Pathways”, which we understand here as “courses of action for achieving specified results”, encompass the notion of change from one state to another. According to Rosenbloom (2017), who did an extensive review of existing work that use the concept of “pathways” to frame the challenge of transitioning to low-carbon societies, pathways can be of three different natures:

- Biophysical pathways, that aim “to inform climate and earth systems models, impact assessments, and set the context for high-level climate negotiations”;
- Techno-economic pathways, that are “sequences of techno-economic adjustments linking current sector configurations to desirable low-carbon future states”, and include reflection on investment patterns that lead to new technical configurations;
- Socio-technical pathways, that recognize “the interconnected nature of technological and social change” and move “beyond the biophysical and techno-economic dimensions to encompass the broader political, institutional, cultural, and behavioural dynamics relevant to long-term processes of societal change”. This latest acceptation is the closest one to what we aim to use here.

For Rosenbloom, developing socio-technical pathways implies to elucidate transition processes (the way in which societal systems shift from one socio-technical configuration to another over time) and to deliberate simulation of transition to see how locked-in systems can be subverted, that lead to the development of more concrete strategies by which change might be realized.

In our case, elucidating transition processes can be supported, in practice, by a thorough analysis of past policies or foreign policies and associated results. Simulating transition in participatory ways and discussing explicit “theories of change” or “program theories” (Funnell and Rogers, 2011) for all targets that are considered as priority objectives can help identify particular bottlenecks as well as levers of action to address lock-in factors. For instance, is the current trend heading in the right direction in respect to the end target? What might be the underlying factors for a trend heading in the wrong direction? A program theory derived from such analysis and stakeholders approach could be an explicit model of how a specific measure (whether from public action or collective action) could contribute to the outcomes it intends to achieve through a series of intermediate actions and results: how is it supposed to bring about which changes? By activating which drivers? Changing which behaviours? This involves being as explicit as possible about the different assumptions that link a policy measure to the activities it is supposed to generate, their outcomes and their impacts—following the whole “results-chain”.

In Uruguay for instance, the analysis of existing roadblocks (e.g. the knowledge gap between the best performing farmers and the rest of the farmers), levers (e.g. good interinstitutional framework with connections between research, governmental institutions and extension services) and past failures (e.g. lack of incentive for the farmers to continue improving their practices once international development agencies-funded programs were finished) pushed the country team to develop an inter-institutional program for technology transfer: the “regional beef task forces”. These latest include a variety of organizations, such as the National Institute for Agricultural Research (INIA), the Agrarian Plan Institute (IPA), the Uruguayan Wool Secretariat (SUL) and the National Meats Institute (INAC), with different roles played by each (INIA for technological issues, IPA for capacity building, MGAP for the operational framework at the local level).

Strategy Category			
PRODUCTIVITY	BIODIVERSITY	CLIMATE	NUTRIENTS
Targets, Levers and Roadblocks			
Target: +25% productivity at farm gate **→ Identified Roadblocks:** ▪ Lack of technology transfer capacity ▪ Lack of labor skills ▪ Farmer attitude and age ▪ Farm infrastructure and water access ▪ R & D **→ Levers to overcome roadblocks:** Lever 1: Inter-institutional framework for **technology transfer** Lever 2: **Training** programs (farmers) Lever 3: **Incentives** to improve infrastructure, adopt better management practices and reduce financial risks	**Target:** Native forest conservation **→ Identified Roadblocks:** ▪ Stakeholders interests ▪ Knowledge adoption and diffusion ▪ R & D **→ Levers to overcome roadblocks:** Lever 1: Forest law based on incentives (1987) Lever 2: Grazing management practices Lever 3: Stewardship and environmental values	**Target:** -25% kg CO2 /kg LW **→ Identified Roadblocks:** ▪ R & D ▪ Cultural factors such as breed preference ▪ Lack of financial incentives ▪ Knowledge adoption and diffusion ▪ Farmer training **→ Levers to overcome roadblocks:** Lever 1: Research to improve feed conversion efficiency (genetics) Lever 2: Increased market reach and value for Uruguayan beef Lever 3: Data on GHG emissions and carbon footprint.	**Target:** -27% kg N / kg LW **→ Identified Roadblocks:** ▪ Enforcement of existing regulations ▪ Knowledge adoption and diffusion ▪ Farmer training ▪ Stakeholders interests ▪ Inter-institutional coordination ▪ R & D **→ Levers to overcome roadblocks:** Lever 1: Regulations on water quality standards and soil use and management practices (Water and soils law - 1981) Lever 2: Inter-institutional coordination on water quality at the watershed level Lever 3: Farmer best management practices. Lever 4: Incentives for adoption of new technology.

Table 1: Example of a "Strategy Matrix" with levers and roadblocks for the transformation of the Uruguayan beef sector

D. Who needs to be involved and when? Some reflections over participation

Building shared visions of the future and trajectories with communities of stakeholders, together with the backcasting approach depicted above, is one of the two methodological pillars used in the framework of the ATPi, as a way to:

(i) bring knowledge to the project by consulting experts and practitioners from within the country of interest;
(ii) foster policy debates on the important issues facing the country; and
(iii) generate shared representations of the world and agreement on key actions that need to be undertaken on the short-term.

By making the framing of issues and policy options visible, tangible and debatable, participatory approaches are increasingly presented by researchers and practitioners as key to design transitions towards sustainability (Bourgeois & Sette 2017; Bohunovsky et al., 2011; Weaver & Rotmans, 2006). However, it is usually difficult to communicate the "recipe" of good stakeholders' processes. Building on the experience gathered from the

dozen of workshops that were conducted in the seven countries of the initiative, this paper nevertheless intends to provide some key insights.

The first insight is linked to the type of actor leading the whole process. In the ATP initiative, national research teams (usually with a strong agronomic background) lead participatory processes in each country. The teams do not represent the positions of their national governments – which sometimes offers the possibility to explore more ambitious futures – but are all engaged in their domestic policy debates. The rationale of country research teams leading participatory processes lies in the fundamental importance of bringing research results to the table, as a way to foster dialogues (Figure 2). For instance, gathering material from the analysis of the current situation (average levels as well as achievements of the best performing farmers), from literature review on sustainability thresholds, from existing policy targets (in the case of them being ambitious enough) and through modelling is a particularly key step to foster good stakeholders dialogues.

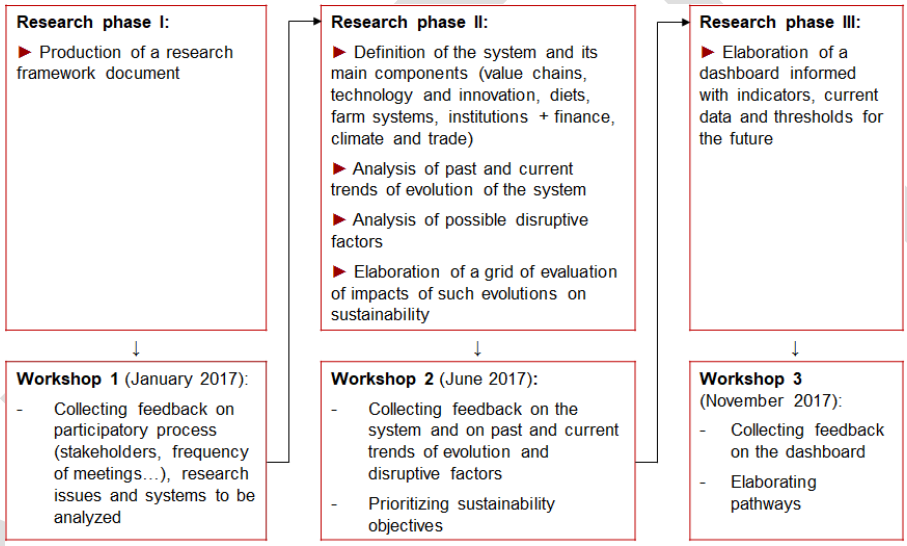

Figure 2: Example of alternating periods of dialogue and research (French case)

The second insight is linked to the kind of stakeholders that need to take part in participatory processes. Although stakeholders usually came from the government, from business circles and from civil society, the specific types of actors from within each sphere as well as the balance between stakeholders' types differed widely across countries. In Uruguay, a small country with a particularly good inter-institutional framework (the research team was well connected both to the people from the Ministry of Agriculture and to farmers on the ground), researchers and national government officials were particularly engaged in the dialogue, leading to the implementation of interesting trickle-down initiatives ("regional beef task forces") supported by the national government. In countries where the political context is more complicated (for instance in Tunisia), it proved particularly useful to engage local stakeholders (both from local public extension services and from the local farming sector). In France, where the possibility of farming practices to evolve towards more sustainable model highly depends on the other actors of the food chain, it was particularly key to engage stakeholders beyond the agricultural sector.

The final insight is linked to the participatory process in itself. Innovative participatory approaches were experimented to facilitate dialogues (small group discussions alternating with plenaries, assignment of clear goals to meetings and clear tasks to stakeholders…), make everyone express her or his own views (post-it methods followed by the sharing of synthetic analyses…) and foster consensus (iterations between research and exchange phases, making explicit the representation of the world behind everyone's comments…).


Figure 3: "Post-it" method in Tunisia

II. Engaging on transition pathways: key messages

Apart from the common methodological challenges encountered by the country teams, that the tools and methodological steps presented above partially address, common transition steps were usually discussed at one point or another. Regardless of the economic and biophysical situation of origin, national transformation pathways of agricultural systems tend to always include a reflection over the following topics: the closing of loops, the socio-economic dimensions of sustainability, and the issue of demand (Table 2).

A. Closing loops and re-diversify practices and land use

The state of soils and the pollution of water resources were two highly debated issues. In China, the deterioration of soil, water and air quality is critical and may become even more serious by 2030, when China's population, its urbanization rate and consumption of animal-derived food per capita is expected to peak (Ma et al., 2013). In France, high concerns about the degradation of agricultural soils and the potential consequences on productivity were expressed by farmers. In the Netherlands, nitrogen-leaching issues resulting from intensive livestock farming were also debated. In Tunisia, where water resources are even scarcer than anywhere else and where erosion has become critical, the protection of these resources were at the core of debates.

From an agronomic perspective, among the discussed solutions to preserve the quality of water resources and to prevent soil degradation, the necessity to "close loops" quite strongly emerged. Closing the nitrogen loop, in particular, through integrated farming, appeared as a key objective. Engaging in more diversified land use that would help maintain nutrients in soils was also mentioned by countries as opposed as Tunisia or New Zealand.

B. Going beyond the environment-agronomic perspective: the socio-economic dimensions of sustainability

Although the agronomic perspective was usually at the center of debates – due to the usually strong agronomic background of leading research teams – stakeholders' processes made quite strongly emerge sustainability issues that went beyond the environmental stakes. In particular, socio-economic dimensions of sustainability encompassing aspects wider than productivity, such as decent jobs, resilience, entrepreneurship, were highly debated.

In Tunisia, employment in the agricultural sector, but also socio-economic conditions of the farmers – especially in remote areas – were discussed. New Zealand: Rejuvenate rural communities, with a younger and more diverse work force in the primary sector ; Have a greater share of economic benefits going back to the producers. For France, the potential impacts of a transition towards a low-carbon agricultural sector on the income of farmers (especially livestock farmers) raised particular interests.

The development of the analytical framework to support the prioritization of objectives and the selection of indicators highlighted that there was a clear gap in existing databases or few consensus on indicators that would enable the tracking of progress towards the achievement of objectives linked to the socio-economic impacts on farm systems. For instance, categories such as the income of poor and small farmers lack disaggregated data that would enable the accurate assessment of the prevalence of low-income farmers. As for resilience and entrepreneurship categories, they lack comprehensive indicators and data. These indicators do not only lack data because it does not exist, but also because there is a high level of controversy on how to track progress on these issues. These results illustrate that there is a necessity to go out of the productivity paradigm and to dedicate more thoughts to a more comprehensive list of "well-being" indicators.

C. Restructuring food chains and food demand

Finally, the fundamental importance of consumption, as a necessary lever for change towards more sustainability, was repeatedly brought to the discussions. Dietary changes were mentioned as a potential solution to decrease GHG emissions from the agricultural sector and have positive impacts on health, such as in France. In other countries, such as in Tunisia, the slowing down of the "westernization of diets" (towards an increased consumption of bread made out of common wheat, of which Tunisia imports 70% to answer its national demand) has also been mentioned to improve the food security of the country. The issue was not so strongly framed in the Netherlands, as a particularly difficult political issue, but is slowly emerging.

Linked to this issue of the food demand, the restructuring of food chains has also repeatedly been mentioned, in developing countries (in Tunisia, the olive processing industry has been pointed as key to transform the production sector) as well as in developed countries (in France and in New Zealand, debates were particularly articulated around the issue of distribution of the added value along the chain; in Uruguay, the stakeholders of the beef processing industry were seen as key actors in the evolution of practices towards more sustainability).

	Closing loops / engage in more diversified land use	**Socio-economic dimensions**	**Food chains and demand**
China	▪ Use Integrated Soil-crop System Management as a way to increase fertilizer use efficiency ▪ Improve manure management (in particular through tougher regulations) to reduce N losses by 50% ▪ Valorize uncultivated grassland to close the feed loop	▪ Work with farmers to study, optimize and exchange agricultural knowledge, and to help farmers adopt new technology	▪ Implement policies and education strategies that promote a healthy diet and reduction in food waste ▪ Conduct sociological research linking nutrition, diet, food waste and behavior
France	▪ Optimize the nitrogen loop ▪ Improve the feed autonomy of livestock farms	▪ Compensate the decrease in production by an increase in the quality of products that are paid higher prices	▪ Reduce food waste across the whole food chain; ▪ Spread information on healthy diets and nutritional recommendations
New Zealand	▪ Use a greater variety	▪ Rejuvenate rural	▪ (The share consumed

	of species in farms and forestry	communities, with a younger and more diverse work force in the primary sector ▪ Have a greater share of economic benefits going back to the producers	in New Zealand is not so relevant to the country's ability to reduce hunger globally)
The Netherlands	▪ Reduce nitrogen leaching	▪ Protect farmers' competitiveness	▪ Adapt diets
The United Kingdom	▪ (Processing results)	▪ (Processing results)	▪ (Processing results)
Tunisia	▪ Move away from standardized technical packages inherited from the green revolution and adopt more diversified technical packages, adapted to the variety of local situations, as a way to protect or restore soils	▪ Improve the income of farmers, especially in remote areas	▪ Slow down the evolution of Tunisian diets towards Western diets (e.g. bread), to maintain national food security (durum wheat)
Uruguay	▪ Use of improved pastures sown with a variety of leguminous ▪ Develop trees for shade on pastures ▪ Scale-up the use of nitrification inhibitors	▪ Bridge the gap between best performing farmers and the rest of the farmers ▪ Improve knowledge exchange through regional beef task forces	▪ (The share consumed in Uruguay (3 million people) is not so relevant to the country's ability to reduce hunger globally)

Table 2 : Extracts from stakeholder processes, illustrating the importance of the three levers

Conclusion

Thinking through a real transformation of current agricultural systems has become necessary for these latest to address both the degradation of natural resources and the changing food demand. Altering ongoing trajectories will though not be feasible without involving a wide community of actors in the development of alternative pathways at the national and subnational levels. Since 2015, the Agricultural Transformation Pathways Initiative has been building on participatory foresight approaches to support seven country teams in the development and implementation of national transformation pathways towards SDG-compatible systems, in Uruguay, China, the United Kingdom, New Zealand, France, the Netherlands and Tunisia. The community of actors from within these countries has developed a methodology based on participatory backcasting approaches stemming from the energy, climate and economics literature, as well as additional tools to tackle the complexity of developing transformative scenarios towards more sustainable agricultural systems.

We first presented how participatory backcasting exercises were practically conducted in the different countries, by presenting the different methodological steps, which include 1) analyzing the current situation and challenges that are specific to the country; 2) developing a shared vision of the future informed by prioritized objectives and selected indicators and targets; 3) developing pathways for change, that are explicit on the course of action and the theory of change (levers and roadblocks). Various tools were presented as well, that might support the country teams at the different steps (an SDG-based analytical framework for prioritizing objectives and select indicators; approaches to set targets; participatory tools, etc.).

This paper also wishes to provide insight on common transition steps that were discussed by the different countries, regardless of the economic and biophysical situation of origin. In particular, the ATP initiative shows that national transformation pathways of agricultural systems tend to always include a reflection over the following topics: the closing of loops, the socio-economic dimensions of sustainability, and the issue of demand.

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