

PATHWAYS project

Exploring transition pathways to sustainable, low carbon societies

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Country report 9: The Hungarian agro-food domain

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Preface

This report is produced in the context of work package 2 ('Dynamics of transition pathways') of the FP-7 funded PATHWAYS project ('Exploring transition pathways to sustainable, low carbon societies'). This report analyses the agro-food domain for Hungary, as the case study, for deliverable 2.3. ('Integrated analysis of D2.1 and D2.2 to assess the feasibility of different transition pathways').

The analysis in this report is based on a research template that is shared between the different contributors to WP2 to enable comparative analysis of findings between countries (UK, Netherlands, Sweden, Portugal, Germany, Hungary) and empirical domains (electricity, heat, mobility, agro-food and land-use).

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Executive summary

The report assessed the breakthrough feasibility of 4 agro-food niche-innovations (*localized food systems, community supported agriculture, organic agriculture, and vegetarianism*) and the chances of agro-food regime reorientation. The niche-innovations have some internal momentum, but it is only enough for experimentation. This means that a transition does not appear to be imminent in these domains without further strong policy support and broad stakeholder cooperation. The niche-innovations represent transition pathway B and their momentum is low on a five-point scale (very high, high, medium, low, and very low).

Niche-innovation	Internal momentum	Alignment with broader regime	Chance of breakthrough	Pathways
Local food systems	Low	Medium	Growing sector with potentials to break through	B
Community agriculture	Low	Medium	Growing sector with potentials to break through	B
Vegetarianism	Low	Low	Not growing, breakthrough not expected	B
Organic food	Low	Medium	Stabilized and not growing, breakthrough not expected	B

Table 1: Breakthrough analysis of niche-innovations in the agro-food domain in Hungary

The domain itself cannot be characterized by a single regime, but by multiple interlinked regimes (often along value chains ranging from farm to fork). As for the degrees of lock-ins and cracks in the agro-food domain in Hungary the *beef, pork and retail* regimes have been analysed as these are regarded as the most polluting sub-sectors, that create the highest environmental impact, and also these are the most embedded in the global food system and thus the most vulnerable to the global food crisis. In terms of a three point-scale (strong, moderate, weak) the stabilizing lock-in forces are ‘strong’ which means that incumbent actors are still committed to them and are not reorienting themselves towards any major transition towards sustainability. Some tensions/cracks are assessed as ‘strong’ only in the pork regime where conflicts are mainly economic, related to price squeezes, competition and struggles for economic survival by Hungarian pig farmers – and have not much to do with decarbonisation.

	Lock-in, stabilizing forces	Cracks, tensions, problems in regime	Orientation towards environmental problems	Main socio-technical regime problems
Beef regime	Strong	Moderate	Moderate (some incremental change)	Nudge factor can have some impact only on the long term
Pork regime	Moderate	Moderate	Moderate (some incremental change)	Embedded into a global value chain
Retail regime	Strong	Moderate	Very limited	Concentration of the sector is hard to change

Table 2: Assessment of regime trends in the agro-food domain in Hungary

Based on our analysis we can conclude that in the Hungarian agro-food domain we do not find green niche innovations that are about to breakthrough or affect the overall patterns of land use radically. The niche innovations in Pathway B (vegetarianism, local and organic food, community agriculture) seem to create a radically incremental (step-by-step) growing momentum. These social experiments are acting as *early market niches* in a stabilised agro-food regime and managed to gain recognition and policy acknowledgment for their socio-environmental achievements. Several factors have been identified that lock-in the development: concentration of land, investment and infrastructure need of the small-scale food enterprises, very limited consumer markets, etc. Transition pathways are expected to open in the future only when broader coalitions of stakeholders urge radical land use change, decarbonisation, and reduction of GHG emissions in the agro-food domain.

1. Introduction

This deliverable 2.3 aims at the integrated analysis of D2.1 and D2.2 to assess the feasibility of different transition pathways.

As a main question the deliverable asks if there is any (mis)match (like conflicts or synergies) between green niche-innovations (*re-localized food chains, community and organic agriculture, and vegetarianism niches*) and incumbent regimes (*the beef, pork and retail regimes*).

It also provides an interpretive assessment of the feasibility (practicality, achievability) of sustainability transitions in the present in the Hungarian agro-food domain by asking:

- Do the analyses of recent developments in green niche-innovations (D2.1) and regime (in) stability (D2.2) suggest that a transition is beginning to (or about to) take place?
- If so, does this transition look more like pathway A or pathway B (see Table 3)?
- If niche-innovations are not about to break through more widely, what are the dominant system/regime trends in the system (based on D2.2): a) are these trends continuing as Business as Usual (Pathway 0 in Table 3), with limited regime change to address environmental problems, or, b) are existing regime actors implementing incremental changes to address environmental problems.

The report will assess first the breakthrough feasibility of 4 niche-innovations: localized food chains, community supported agriculture, organic agriculture, and vegetarianism (as defined by D2.1). In particular, it will look at internal momentum of niche innovation, alignment of the niche innovation with the wider regime developments, as well as possibilities and tensions for breakthrough. Finally, the chances of a regime reorientation will be assessed.

In the PATHWAYS project three pathways are distinguished (see table below).

	Pathway 0: Business Usual	as	Pathway A: Technical component substitution	Pathway B: Broader regime transformation
Departure from existing system performance	Minor (no transition)	(no)	Substantial	Substantial
Lead actors	Incumbent actors (often established industry and policy actors)		Incumbent actors (often established industry and policy actors)	New entrants, including new firms, social movements, civil society actors.
Depth of change	Incremental change		Radical technical change (substitution), but leaving other system elements mostly intact	Radical transformative change in entire system (fundamentally new ways of doing, new system architectures, new technologies)
Scope of change	Dynamic stability across multiple dimensions		1-2 dimensions: technical component and/or market change, with socio-cultural and consumer practices unchanged	Multi-dimensional change (technical base, markets, organisational, policy, social, cultural, consumer preferences, user practices)
Focus of transformation			Focus on replacing technologies and management types by better ones with the same function. Promoting active management and multifunctional land use in order to promote a wide range of ecosystem services.	Technological changes are combined with wider behavioural and cultural changes. For example promoting new economic activities associated with biodiversity conservation.

Table 3: Ideal-type transition pathways and their defining elements as conceptualized by the PATHWAYS project

The niche innovations are only incremental, primarily social in character (not technically oriented) and mainly target behaviour change, and thus heavily dependent on policy and wider societal support.

Four different phases in transitions can be distinguished (Geels, 2006):

1. **Predevelopment:** This phase is characterised by R&D support, subsidized small market niches. Novelty emerges in niches. There is not yet a dominant design and different options may compete with each other. There is not yet a match with the existing regime what makes it not easy for niche innovations to breakthrough.
2. **Early market niches:** In this phase the novelty is used in small market niches that may (still) benefit from subsidies and policy support. A community of dedicated people starts to emerge and activities are deployed to improve the niche innovation.
3. **Breakthrough, wider diffusion, and self-sustaining momentum:** In this phase the innovation is breaking through and gets more widely diffused. Both the internal drivers of the niche and the external circumstances at the regime and landscape level creating 'windows of opportunity' make it possible for niches to break through.
4. **Stabilization of new system:** When the innovation enters the mainstream market, and begins to replace the old regime, a new system stabilizes. This may be accompanied by wider changes in the regime and landscape developments.

The structure of the report is as follows. Section 2 will present the four niche innovations in the Hungarian agro-food domain with their internal momentum; then their feasibility to breakthrough, alignments with the wider regime and landscape developments will be assessed. Section 3 will present the dominant regime trends and assess to what extent regime reorientation is possible. Section 4 will conclude with an overall assessment of the niche innovations in the light of the PATHWAY framework.

2. Assessment of breakthrough feasibility of 4 niche-innovations

2.1. Localized food chains, regional food production

Localised food chains and regional food supply have often been investigated through the economic, social and cultural benefits created for farmers, consumers and rural areas in general (Balázs, 2012). The sustainability achievements are contested but the sector is growing across Europe to meet rising consumer demand (Kneafsey et al., 2013). In Hungary food re-localisation created an early market niche with increasing socio-economic opportunities in restoring relations between urban and rural areas and some environmental benefits as well. It represents a pathway B innovation, as it is heading towards a broader regime transformation in which new entrants are involved, including social movements, activists, chefs, food entrepreneurs, community groups. The focus of the niche innovation is primarily on self-sustainability and wider behavioural-cultural changes towards sustainable diet. The momentum is assessed as medium with considerable risk of remaining isolated and developing separately from the regime.

2.1.1. Internal momentum of niche innovation

The internal momentum of the niche-innovation is moderate: one third of the farms disappeared in the decade to 2013, according to figures from the EU's Farm Structure Survey. Still, with regard to the wider regime developments there is a window of opportunity to gain more finance for establishing new localized food chains through the rural development program. Such resources are available for real-world learning and specialization but specific enabling conditions (tax and competition policy) are not aligned. Since the economic crisis also raised the attention towards local sustainability issues, local food is covered positively by the media and in public or policy debates. What is missing is a broader policy adjustment that could help the niche-innovation diffuse. The already created market niche-innovations in themselves are not enough to bring about a transition, especially because of the high value added tax. Fulfilling a critical point in the professionalization of the sector a dedicated community of experts helps small scale producers to gradually improve their practices. Civic and community groups are getting more active in developing or introducing new standards, practices and institutions, such as the Certification of National Park Produce, Social Farming quality mark, labels for social cooperatives, etc.

The techno-economic characteristics

Local food system development is relatively at an early stage in Hungary (Benedek & Balázs, 2015). This also implies that the present level of local food activity and future prospects mismatch. Eastern regions have the highest potential for further development as they have intensive local food production activity. The few small-scale farmers operating in Budapest area have been already engaged in short food supply chains to enjoy the various benefits (and higher profit). Currently the most frequent and popular of all SFSCs, market

purchases account for a 5% portion of daily household consumption in Hungary – farmers markets even less, though the figures probably increasing; a telling figure which is indicative of future challenges from the perspective of influencing consumer behaviour. Moreover, local/regional food is not available for everyone as financial and social costs are also involved. The real techno-economic challenge in Hungary is that various local food chain forms aiming for sustainability are not necessarily sustainable in the economic sense (Balázs, 2014).

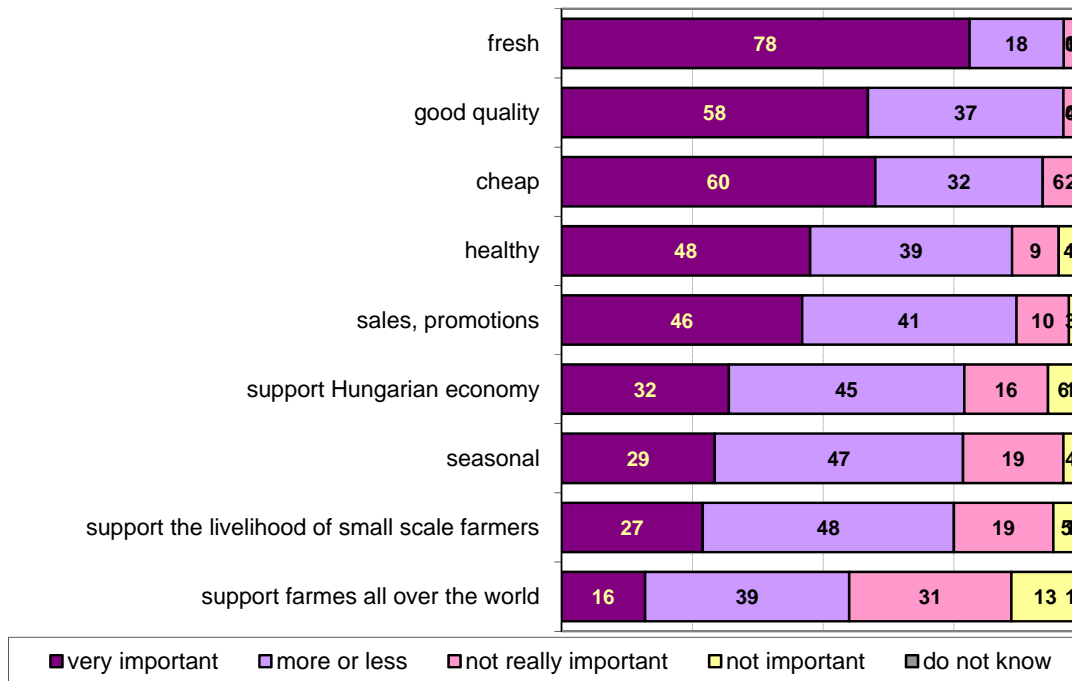


Figure 1: Importance of factors when buying food (percentage) (Balázs, 2012)

Socio-cognitive factors

The media creates a very favourable context for the local food movement. Also the niche gained considerable acknowledgment and public awareness in Hungary from various stakeholders, policymakers, citizens, farmers and retailers with regard to its multiple sustainability potentials. However, such prospects for sustainability are not easy to realize. The socio-cognitive challenge in Hungary is still to elaborate agro-food alternatives that truly reflect the original (alternative) sustainability values but can be integrated into existing supply systems and at the same time, easily reaching economic sustainability and viability.

Governance and policy

Alternative food initiatives and localised food chains will continue to grow but remain marginal for the immediate future partly as a result of dominant market forces: global

competition for inputs (e.g. seed, feed) and direct product competition. Their ability of to endure long enough to begin the transformation from niche to norm will depend on effective support and favourable policy framework conditions, along with a continuing increase in interest from the domestic consumer base. The government initiated several regulatory exemptions for small-scale farmers, and to some extent lowered the barriers to access land for the benefit of localized food chains. As short food supply chains are being further promoted in the 2014-2020 EU financing period, policy can generate some growth in the future in this sector (Benedek & Balázs, 2015).

2.1.2. Alignment of niche-innovation with wider regime and landscape developments

Localized food systems are influenced by and influencing several regimes beyond the agro-food domain (such as health, employment, local development). Several positive alignments could be identified, however the sectors development can best rely on a broad coalition of stakeholders and support from the public. As a reaction to positive public perceptions policy already created a new window of opportunity in the rural development program specifically targeting short food supply chains in a special subprogram. Beyond the real political will to move towards food re-localisation from the existing regimes the development in the sector depends on the investments of small scale farmers themselves, who do not easily cooperate and target markets.

2.1.3. Possibilities and tensions for niche innovation to break through

For creating an internal momentum, the sector requires more policy support, e.g. clear political will to enable 'access to land'. Transformation is highly dependent on the most important players of the broader existing regime. Some of the new entrants in the sector (mainly small scale enterprises with considerable capacity to risk taking and handling uncertainties) take the lead in shaping socio-technological changes reflecting wider behavioural and cultural changes in the consumption patterns.

2.2. Community Supported Agriculture

2.2.1. Internal momentum of niche innovation

Community Supported Agriculture is built on the idea of sharing the economic risk in agriculture between producers and consumers through advance payment system. With increasing numbers of consumers and widening social network the internal momentum of this early market niche-innovation is moderate. The demand for locally produced food is new and anticipated to increase as more sustainable consumption routines emerge; thus the CSA sector is likely to expand in Hungary (Balázs, 2014).

The techno-economic characteristics

Farmers create a niche market by relying on external financial resources and reaching out to trust based personal networks or ethical consumers to create new food communities and establish market segments. Initiatives need to strengthen their socio-political or economic bases to expand in the future. Box schemes keep produce out of the logic of market economy, and deprive vegetables of their commodity nature. CSA box systems practically re-code the meaning attached to such products by the culture of trade. Under such circumstances what makes these farmer-led CSAs unique is their potential to catalyse changes in dominant food systems, and reconnect consumers with producers by fostering a collaborative culture of sharing, gifting, bartering and donating. As an obvious techno-economic challenge recurring price anomaly weakens the economic momentum.

Socio-cognitive factors

CSAs were practically unknown in Hungary until a decade ago, whereas today various types of state, market and civic actors have joined up to create a number of new CSAs. Farmer-led CSAs can launch niche innovations through facilitating learning processes by educating members in adhering to healthier diets, and procuring food in a more environmentally friendly way on the one hand, while also assisting the development of community relations and solidarity feeling on the other.

CSAs in Hungary almost exclusively target young, wealthy, self-reflexive, extrovert, urban, conscious consumers with high levels of education, who in most cases have a family and strongly resist the dominant consumption culture. More and more actors are joining every year and the majority of members joined their CSA primarily for a convenient supply of fresh, healthy, local, organic produce from a producer they personally know. Though they tend to mention environmental protection issues (such as environmentally friendly production methods and less packaging), they rarely emphasize explicitly broader sustainability concerns as reason for pursuing box schemes.

Governance and policy

Policy makers at national and municipal levels now explicitly encourage operators to start community food programs acknowledging CSAs' transformative potential for food-system localization. The new rural development regulation explicitly mentions CSAs and promotes measures that help small-scale agro-ecological investments and various forms of producer co-operation.

Similar to their reflection in public policy, CSAs have been regarded as a form of direct sale at the community level and a tool for local economic development. The National Agricultural Advisory, Educational and Rural Development Institute, as the main body to implement the Rural Development Strategy financed the organisation of the Hungarian CSA platform in 2012 and 2013. Initiated by the Association of Conscious Customers, the Research Institute of Organic Agriculture and the Environmental Social Science Research

Group, the CSA platform provides networking opportunities, media/marketing services and policy advocacy to CSAs in Hungary.

2.2.2. Alignment of niche-innovation with wider regime and landscape developments

The popular press and advocacy literature helped such production and distribution systems, founded on the mutual commitment of producers and consumers to get wide recognition. CSAs have been depicted as some of the hot food trends in the last few years that provide a socially innovative solution to interlocking ecological, food and energy crises. Most articles emphasized how CSAs support a group of farmers by providing them with a fair wage for healthy food.

Some positive alignments happened in the recent years. Local, national and European policymakers and policy instruments, policy communities have been already committed to CSAs and provide a prominent place for community agriculture in identifying new policy development pathways (through regulations, subsidies, infrastructure programs). In the European Union's new agricultural and rural development policy 2014-20, SFSCs may be targeted by thematic sub-programmes within rural development programmes and CSAs expect to get further public funding to extend their services (Kneafsey et al., 2013). This clearly creates a window of opportunity to regime problems and offer better conditions in financing and investing into community agriculture.

2.2.3. Possibilities and tensions for niche innovation to break through

The internal momentum of the niche-innovation is moderate; with positive alignments to the wider regime developments. The CSA sector started to create its own supply market niche which is also positioned in a unique consumer market. Policy support for training and learning would be desirable such as the further specialization of initiatives. The financial, fuel and food crisis also helped to raise the profile of CSAs as pathways towards sustainability.

CSAs recently started to create a common statute which regulates agreement between farmers and consumers based on the French AMAP contracts¹. Such contracts are often seasonally adjusted to track production costs, accompanied by practical arrangements to diversify the range of products. The platform for facilitating the wider diffusion of the CSA philosophy, learning and networking among CSAs consists of farmers, conscious consumers, community developers, social movements, helping new entrants to professionalize their work.

¹ AMAP stand for Associations pour le maintien d'une agriculture paysanne (Associations for maintaining peasant agriculture) which is the French version of community supported agriculture.

2.3. Organic agriculture (including consumption / demand side)

2.3.1. Internal momentum of niche innovation

Internal momentum of the niche-innovation is low; especially without further price/performance improvements it stagnates in an early market niche. Indeed, domestic demand for formally certified organic products has not yet risen to a level which has encouraged growth in the sector.

The techno-economic characteristics

Research recorded the marginalization of Hungarian organically produced fresh and processed products within the EU market (see figures below). While foreign demand for raw organic commodities initially sparked the spread of organic production, a corresponding increase in domestic consumption has never accompanied this trend, consequentially handcuffing Hungarian organic producers to high risk, low reward export-driven production, only feasible for large producers specializing in raw commodity production. The consequence is a saturation of foreign organic imports in the most popular domestic food retail chains, low recognition of Hungarian organics in the domestic market; and 85% of total organic production is still exported to foreign markets (Drexler & Dezsényi, 2013).

Organic Production Profile of Hungary: 1998-2010					
Year	Number of Farms	% inc. from previous year	Organically farmed hectares	% inc. from previous year	% total HU agricultural land
1998	401	249	22501	17	0.4
1999	475	18	35979	60	0.6
2000	762	60	53649	49	0.9
2001	1119	47	79178	48	1.4
2002	1517	36	103700	31	1.8
2003	1775	17	116535	12	2.0
2004	1842	4	133009	14	2.3
2005	1935	5	128576	-3	2.2
2006	1974	2	122766	-5	2.1
2007	2024	3	122270	0	2.1
2008	2066	2	122817	0	2.1
2009	2292	11	145942	19	2.3
2010	2062	-10	130717	-10	2.2
2011	1961	-5	130343	-0.3	2.2

Figure 2: (Willer et. al 2013, Solti 2012)

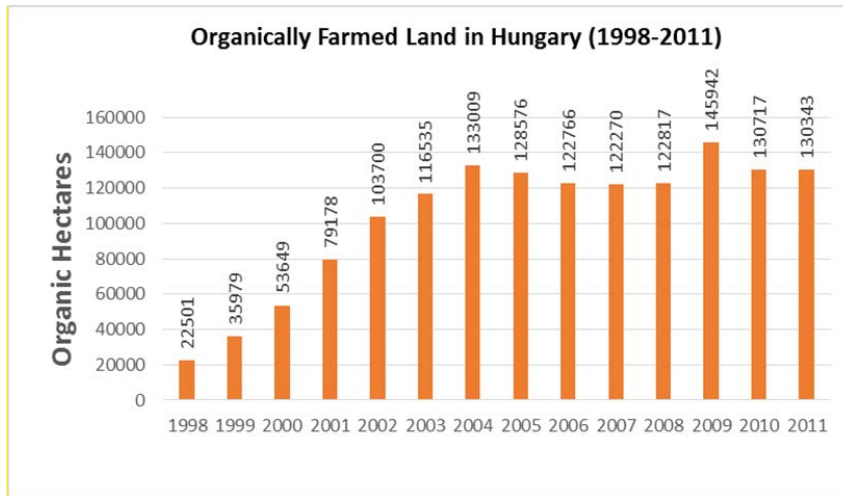


Figure 3: (Solti 2012)

Socio-cognitive factors

The primary socio-cognitive factor is the lack of consumer understanding of the difference between organic and conventional products. The sector has relatively weak representation in the public awareness, in the political sphere. The main obstacles for growth in domestic consumption of organics in Hungary have been cited as: low consumer demand; a limited capacity and willingness to pay price premiums for organics; the limited availability of organic products; and a lack of consumer confidence in organic certification.

Governance and policy

In the last decade, the organic movement has become important in framing an image for agricultural transition and a dedication to ecologically sensitive land management in Hungary. Ambitious sounding, but sparsely implemented strategies, with little impact on the plight of most organic producers and small scale producers in particular, have not provided functional incentive to encourage organic conversions or development in the sector to date. Direct farmer support programs have the reputation of being uninventive, incredibly bureaucratic, and difficult or impossible to manage for smaller farming operations, while favouring larger farming operations who have been the benefactors of past programs. Additionally, marketing and promotional programs which make a distinction for the value of Hungarian organic products have not materialized as a priority within top-down support schemes.

2.3.2. Alignment of niche-innovation with wider regime and landscape developments

Not many positive alignments could be traced in the sector. However, the outlook is likely greater now than any point within the last decade. Innovative cooperation between organic growers, consumers and sustainable agriculture advocates (from the public and government sector) has provided a glimmer of hope in any otherwise discouraging field. To better address the wider regime stakeholders promote research funding for regionally

specific innovations in organic growing, financial support and policy adjustments for the development of domestic processing capacity, help cooperation of growers, policy makers, certifying bodies and advocacy groups; and on-farm educational programs for the public.

2.3.3. Possibilities and tensions for niche innovation to break through

There are currently not too many new entrants in the sector. For creating an internal momentum, the sector requires more concentrated policy support for the cooperation of farmers, indispensable for creating farmers-led organic food chains. Niche innovations are dependent on the most important players of the broader existing regime who are holding back organic actors to reach decisive behavioural and cultural changes in the consumption patterns.

2.4. Vegetarianism / lowering meat consumption

2.4.1. Internal momentum of niche innovation

Focused on wider behavioural and cultural changes the momentum for vegetarianism is low. Despite the predevelopment phase of vegetarianism and the counter-interest of dominant actors around food policy, there is still a broadening network and niche-market of the health conscious through restaurants and food-delivery enterprises as well as gradually increasing demand for meatless diet from consumers.

The techno-economic characteristics

The slight expansions in vegetarianism already helped to create a niche market of organic and health food stores, web shops, eco-farms, vegetarian restaurants. Almost all retail chains (Spar, Aldi, DM, Lidl, Auchan) began to provide more products typical in vegetarian diets and accepted as meat substitutes. Most products are made in Hungary, often by small enterprises or family firms (Biopont). The present situation is most favourable for importers of vegetarian products.

Socio-cognitive factors

Meat is considered as the central part of the 'traditional' local culture, an indispensable element of main dishes. Meat dishes are moreover central parts of family gatherings and other great social events: 'Sunday-lunches', community events and festivities are unimaginable without them. 'Hungarikum' products (cornerstones of the Hungarian culture) impregnated in the national character are also mostly meat products, such as goose-liver, salami and different smoked sausages. The wide-spread mentality hinders the promotion of vegetarianism in Hungary but meat consumption is decreasing while meatless diets are still growing (see table below).

Year	Pork	Beef	Sheep	Total	Intestines	Poultry	Total meat
	With bones						
2004	25,9	3,2	0,1	29,2	3,0	27,7	60,9
2005	26,7	3,1	0,1	30,0	2,7	29,8	63,5
2006	27,9	3,4	0,1	31,4	2,8	30,8	65,9
2007	27,6	3,3	0,1	31,0	2,5	28,7	63,2
2008	25,8	2,8	0,1	28,7	2,8	28,7	61,5
2009	27,0	2,6	0,1	29,7	2,7	27,8	61,7
2010	25,3	2,5	0,1	27,9	2,7	24,6	56,7
2011	24,8	2,7	0,2	27,6	2,2	24,4	55,8

Table 4: Meat consumption in Hungary between 2004 and 2011 (kg per capita).

Governance and policy

Policy does not promote vegetarianism and does not connect it with sustainable development. Subsidies available under the Young Farmer program are paid only to those who practice mixed farming, while those who only grow crops are not eligible. A similar preference for a meat-based diet is illustrated by the intention to reduce the VAT on pork, poultry, cattle and lamb.

2.4.2. Alignment of niche-innovation with wider regime and landscape developments

Examined from a wider regime perspective there are not any window of opportunity related to vegetarianism in the existing meat regime. Policy frameworks indicate that the role of meat as basic foodstuff is considered vital above all. It is also indicative, that there is no coherent programme to introduce vegetarianism in public administration. A significant and constituent obstacle in this framework is the regulating decree on health, diet and nutrition in mass catering, indicating that „Every main meal should contain sources of protein of animal origin, let it even be a small meal in case of nurseries.”

2.4.3. Possibilities and tensions for niche innovation to break through

The internal momentum is low and mostly maintained by a broadening niche markets around a flourishing vegetarian culture and extending health conscious consumer markets. Still the counterproductive tendencies are more dominant and predictable share growth is fairly limited in the vegetarian markets.

3 Assessment of regime reorientation

The dominant system/regime trend in Hungary is business as usual that is also creating opportunities for gradual and cumulative regime transformation. Several windows of opportunity could be identified for niche-innovations and social innovation that address environmental problems. Most niche innovations emerge in the *hybrid space* among researchers, civic movements, small scale businesses, and policy actors. However, the impact of these innovations on the reduction of environmental problems is most often only very limited.

The agro-food regime features the characteristics of '*radical incrementalism*', gradual transformation on a relatively small scale, without the necessary wider public support. In the agro-food domain the beef, pork and retail regimes have the highest environmental impact, as these are the most polluting sub-sectors, most embedded in global food system and most vulnerable to the global food crisis. The financial crisis badly affected these regimes, by decreasing demand, austerity policies and overall dominance of food price. This results only in instrumental efficiency changes targeting higher productivity and less waste; that in turn contributes to decarbonisation.

In fact, the *political salience* of these agro-food regimes is very high, and we recorded an active interventionist governance style to upgrade technologies and develop capacities although the economic significance of the regimes has declined substantially.

Several technological innovations are imminent in the regimes with special regard to feed and food ingredients, processing, packaging and transport. Beyond the obvious good practice already present in the regimes (domestic protein based feed, recycling, biodegradable materials, CSR, and coordination among sectorial stakeholders on sustainability issues, etc.) the agro-food domain as a whole is not expected to build on any break-through technologies or innovations in the future that could significantly speed up decarbonisation, decrease the impact on biodiversity or GHG emissions.

Behavioural change and capability to act on the consumers' side is an important prerequisite of any incremental change and mitigation of environmental impacts. Therefore, radical innovation is not to be expected within the agro-food sector. Moreover, from an ecological footprint perspective green consumption can be problematic, as green attitudes and pro-environmental behaviour do not in fact reduce negative environmental impacts of consumption (attitude-behaviour-impact gap). Additionally, food safety concerns and culturally habituated tastes, preferences of consumers hinder the transition.

Over-dependence on subsidies creates a fairly stable domain, with (most) actors focusing only on gradual and slow change starting from the margins. Economic tensions started to increase only after the food-fuel-financial crisis in 2009. Regimes started to create some spaces where niche innovation start to fight for survival, then can gradually get incorporated into the regime.

The broad consensus behind the cutback of VAT in the food sector can also rely on the political target to decrease the reliance on import and achieve self-sufficiency of the regimes. Political conceptualisations and strategies on food and farming often refer

rhetorically to build on capacities that extend beyond the market solutions. However, the main manifest landscape pressure is price squeeze, competition and economic survival.

Due to the continuous policy support the pork regime is stable and resilient. It also gives way to quality production and consumption. In contrast with meat consumption trends in the EU in Hungary the contraction of the pork regime might contribute to desirable environmental tendencies. Most environmental harm is created by global actors in the regime (especially boosting export-import). The new pig strategy creates alliance of policymakers and pig production players by offering a very small window of opportunity for renewal in the regime. Financial subsidies can channel innovation into developing sustainable feeding (protein programme); long neglected structural changes in the sector, financing infrastructural investments into high value added vertically integrated quality pork production. In sum, a planned transformation is expected in the regime as actors would gradually reorient themselves by adjusting their beliefs and strategies.

As for the beef sector the agro-ecological conditions (grasslands, by-products) coupled with external market demand and rural development policy objectives create a favourable hotbed for the development. Conventional beef production technology involves the most negative externalities (artificial inputs, manure spills) while extensive and ecological beef farming creates environmentally more desirable arrangements, such as e.g. utilising green energy, less imported feed.

Finally, food retail is a highly competitive regime with fast expansion of the retailers and low purchasing power, high consumer price-sensitivity. Value of food retail sales and profitability is relatively low and decreasing since the crisis. Profitability is a key concern of retailers to engage into low carbon food supply (fresh and seasonal food sections, quality products). The active and conflict-generating government policy targeting large, foreign-owned supermarket chains ('crisis tax', 'plaza stop', 'Sabbath Law') has not generated much public support or taken into account environmental performance assessment.

In sum, one can argue that due to the global economic crisis the political salience and strategic importance of food security became very high. This also generates the momentum for neo-traditional food provisioning (organic, vegetarian, community agriculture and local food) as policy creates windows of opportunities.

Regimes	Lock-in, stabilizing forces	Cracks, tensions, problems in regime	Orientation towards environmental problems	Main socio-technical regime problems
Pork	<ul style="list-style-type: none"> • Enormous policy and political support and infrastructural investments. • Boosting export-import. 	<ul style="list-style-type: none"> • Undesirable image of the dominant pig farming sector • Radical contraction of the pork consumption 	<ul style="list-style-type: none"> • Consumption habits change resulting in desirable environmental impacts. • Programs on sustainable 	<ul style="list-style-type: none"> • Alliance of policymakers and pig production players not enough for transformation.

			feeding (protein), long neglected structural changes started.	
Beef	<ul style="list-style-type: none"> • Conventional production technology still over-subsidized 	<ul style="list-style-type: none"> • Negative externalities (artificial inputs, manure spills) 	<ul style="list-style-type: none"> • Reorientation to desirable agro-ecological conditions (grasslands, by-products) in extensive and ecological beef farming. 	<ul style="list-style-type: none"> • Missing coalition of policymakers and production players.
Retail	<ul style="list-style-type: none"> • Fast expansion of retailers. • Low profitability. 	<ul style="list-style-type: none"> • Low purchasing power, high consumer price-sensitivity, minor demand for quality. 	<ul style="list-style-type: none"> • Only minimal low carbon food supply (fresh and seasonal food sections, quality products). 	<ul style="list-style-type: none"> • Conflict-generating government policy targeting big retailers and supermarkets without broad public support.

Table 5: Assessment of regime reorientation: lock-ins, cracks, environmental orientation, socio-technical regime problems.

4. Conclusions and wider discussion

Niche innovations with the potentials to break thorough could not be identified. It all seems that transition is presently unfolding on pathway B and still often manages to incorporate some lower level sustainability goals. Therefore, transition is not regarded as imminent and green niche-innovations do not reach the momentum. Further policy support would be desirable to change this. All niche-innovations represent transition pathway B and their momentum is medium-low on a five-point scale (very high, high, medium, low, and very low).

	Pathway B	
Hungarian agro-food	Localized food chains:	Medium
	Community-Supported Agriculture:	Medium
	Organic agriculture:	Low
	Vegetarianism/less meat:	Low

Table 6: Momentum of green niche-innovations

The domain cannot be characterized by a single regime, but by multiple regimes. As for the degrees of lock in and degree of cracks in the agro-food domain in Hungary the beef, pork and retail regimes have been analysed as these are regarded as the most polluting sub-sectors, that create the highest environmental impact, and also the most embedded in global food system and vulnerable to the global food crisis. In terms of a three point-scale (strong, moderate, weak) the stabilizing lock-in forces are 'strong' which means that incumbent actors are still committed to them and are not reorienting themselves towards any major transition. Tensions/cracks are assessed as 'strong' only in the Hungarian pork regime (tensions are mainly economic, related to price squeezes, competition and struggles for economic survival by Hungarian pig farmers).

	Lock-in, stabilizing forces	Cracks, tensions, problems
Hungarian pork regime	Strong	Strong
Hungarian beef regime	Strong	Weak
Hungarian retail regime	Strong	Weak

Table 7: Regime lock-ins and cracks

Wider discussion

The scale of the transition challenge is broad and developments do not necessarily address the sustainability goals, or do not appropriately address them, e.g. without any the sense of urgency.

Multiple stakeholder (including policymakers, citizens' groups, enterprises) are mobilizing themselves to change this situation, which only occasionally result in novel policies beyond the usual socioeconomic (job and growth) targets.

Sustainability goals are often targeted explicitly without further evidence of real ecological benefits, such as in case of local food networks.

In Hungary the government is mostly very actively interventionist and this can create opportunities for innovation but also hinders planned transition due to constant changes in the institutional and regulatory frameworks.

The scheme below is a summary of the findings for the different niches.

	Local food	Organic food	Vegetarianism	Community agriculture
Investments needed?	yes	minor	yes	yes
Positive widespread public debate?	yes	minor	minor	minor
Broader policy adjustments?	yes	yes	no	minor
Tackling within the existing regimes?	yes	yes	yes	yes
What is the internal momentum?	medium	low	low	medium
Pathway	B	B	B	B

Table 8 Summary of findings niche innovations

Further lessons can be drawn on what is actually missing for a transition to take place. The existing niches do not have yet the critical mass for providing a complete alternative for food provisioning. On the other hand, we do not find enough cracks in the regimes. Relying only on active interventionist government policy can have positive and negative impacts on niche innovations. In re-localising the food sector, policy managed to actively open windows of opportunities for the regime actors but that was very far from enough to boost sales. As for organic food from the very start it was the EU and national policy that successfully created a market niche by providing increasing subsidies for the organic sector; however due to increasing bureaucratization this is less and less desirable for new small scale entrants. It all seems that niche innovations in themselves often follow an exclusionist strategy to challenge the existing regime and try to insulate themselves from the existing regimes (as in the case of community agriculture, vegetarianism). Other niches

live together in harmony with the existing regime without challenging the system (local and organic food). In fact, the momentum is most actively shaped by socio-cognitive factors related to sustainable diets: all niches in the early market phase have favourable context for promoting their values and propositions related to environmental impacts. Sustainability is, however, only indirectly targeted, often without considering real opportunities in decarbonisation.

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