



Cities: Places of new European prosperity

Compendium of case studies on the socio-ecological transition of urban commons

Deliverable No. 6

**Authors: Thomas Sauer (EAH Jena), Susanne Elsen (UNIBZ),
Stefan Kuhn (ICLEI), Stephanie Barnebeck (EAH Jena),
Cristina Garzillo (ICLEI), Yannick Kalff (EAH Jena),
Judith Schicklinski (UNIBZ)**

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Authors: Thomas Sauer (EAH Jena), Susanne Elsen (UNIBZ), Stefan Kuhn (ICLEI),
Stephanie Barnebeck (EAH Jena), Cristina Garzillo (ICLEI),
Yannick Kalf (EAH Jena), Judith Schicklinski (UNIBZ)

Reviewed by: Niki Frantzeskaki (Dutch Research Institute for Transition),
Frank van Laerhoven (Utrecht University),
Anneke von Raggamby (Ecologic Institute)

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Abbreviations

CO ₂	Carbon dioxide
ECO	Related ecosystems
EU	European Union
EU13	Newer members of the European Union with the enlargements in 2004, 2007 and 2013
EU15	Members of the European Union prior to the eastward enlargement in 2004
GDP	Gross domestic product
GS	Governance system
I	Interactions
IAD	Institutional Analysis and Development
ICT	Information and Communication Technologies
NGO	Non-government organisation
O	Outcomes
ROCSET	The Role of Cities in the Socio-Ecological Transition of Europe
RS	Resource system
RU	Resource units
S	Variables of the social, economic, and political settings
SES	Socio-ecological system
SET	Socio-ecological transition
U	Users
WBGU	German Advisory Council on Global Change

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Abstract

Taking into account the potentially different starting and framework conditions of regions in different parts of the European Union, we will present a new approach for sustainability transition analysis. We hypothesise: favourable overall institutional conditions, such as a high degree of formal and informal local decision-making autonomy, are supportive for innovative institutional arrangements, like self-organised and co-operative forms of management of urban common pool resources. This report aims to explore these conditions systematically in the context of socio-ecological transitions with a special focus on the overarching research question: What is the transformative role of institutional diversification and innovation in the governance of core urban common pool resources? The role of the resource systems energy, urban green spaces and drinking water will be empirically analysed in the context of self-organisation and socio-ecological transition. Finally, policy recommendations based on these findings will be mapped.

Keywords:

Socio-ecological transition; Sustainable cities; Sustainable urban transitioning; Beyond GDP; Biophysical constraints; Multi-level governance

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All remaining errors are our own.

1. Motivation

Since the 1992 Earth Summit of Rio de Janeiro, the concept of sustainable development became more and more mainstream in global political thinking. The central question that arises concerning the implications of core planetary boundaries (Rockström et al. 2009) is, whether the problems of global warming and violation of planetary boundaries are unsolvable social dilemmas in economic reality. Not at all, if the economic sciences were to shift their focus from internalising the externalities towards the search for a more comprehensive economic approach regarding the governance of commons and the resilience of resource systems. Therefore, new institutional arrangements beyond the simple market-government dichotomy are also needed to enhance human prosperity without overstressing the earth's capacity to recover its resources. Such a transition towards a regime of strong sustainability presupposes the transition of the economic system towards a higher degree of institutional diversity. This would enable experiments with new forms of economic governance, which could be independent of the evergrowing consumption of natural resources.

There are strong reasons to look at such processes of institutional diversification and change, taking the multi-level character of governance of the global commons into account at the same time: "[...] while many of the effects of climate change are global, the causes of climate change are the actions undertaken by the individuals, families, firms and actors at a much smaller scale. [...] To solve climate change in the long run, the day-to-day activities of individuals, families, firms, communities and governments at multiple levels – particularly those in the more developed world – will need to change substantially" (Ostrom 2009a, S. 4). For research strategies regarding such social dilemmas, this entails a significant shift of perspective towards the behaviour of individuals and groups managing critical resource systems on a local scale. For climate-neutral and ecologically resilient policies, the option to choose a bottom-up approach would skip any excuse for persistent inaction. To solve social dilemmas at the global level it is therefore crucial to understand and first change the determinants of human economic behaviour at the local level in relation to the socio-ecological context.

Carbon intensity is probably a variable dependent on the growth rates of per capita GDP. The extraordinarily high per capita GDP growth rates of the 2000s coincided with the strongest increase of carbon intensity in the same decade. Market income growth, measured as per capita GDP, is thus the most severe risk for the resilience of key global resource systems. The profound entrenchment of the pursuit of economic growth in the institutional setting of current market economies is not easily resolved. However, there appears to be no other way to keep human development within the crash barriers of the planetary boundaries. It is extremely likely that neither the profit-driven business sector nor the tax-revenue-dependent government sector would emerge as a home of new, growth-ignoring institutions, even if it were possible to shift governance revenues towards a more tax independent financing by profits of state and private enterprises. If this is true, it makes sense to direct the focus of inquiry towards a third sector of not-for-profit economic activities born in civil society (Evers und Laville 2004; Moulaert und Ailenei 2005; Osborne 2008). This third sector is probably the home of new institutional arrangements like cooperatives, multi-stakeholder constructions, local-regional partnerships, and networks. We define the third sector as the sector of not-for-profit enterprises or the civil society sector, situated beyond the business and government sector. It can provide an organisational frame for sustainable development at the local and regional levels. These arrangements could also be considered laboratories for new forms of a more sustainable way to produce, consume, and coordinate these activities beyond the traditional market-government dichotomy. The perspective taken in this research tries to evolve a third option *beyond* this dichotomy and thus, open up the discursive closure that only allows for the two poles of resource governance in society.

This civil society sector embraces a multitude of initiatives, institutional arrangements, and experiments with the microeconomics of a growth-independent economy. There is an impressively long history of hands-on urbanism like community gardening and urban agriculture. These initiatives served not only as reactions to crisis situations, avoiding famine, and solving supply bottlenecks in urban areas, but as well as experimental laboratories for an alternative economy on urban green spaces (Krasny 2012). Another important civil society movement is formed by the renewable energy source cooperatives, which try to intervene in the transition of the European energy systems towards a low or even zero carbon regime. They organise on local, national, and as well on European level (REScoop.EU 2013). The European civil society campaign for a “Right to Water” collected 1,884,790 signatures in the EU countries for the first successful European Citizen Initiative urging that water supply and management of water resources should not be subject to internal market rules and that water services are excluded from liberalisation (Parks 2014). Finally all of these movements could agree with the insistence that the key resource systems as green spaces, energy, climate, and water should be regarded as commons (The Ecologist 1994; Helfrich 2012; Ostrom 2009a; Bollier und Helfrich 2012; Ostrom 1990), and not as traded goods.

We hypothesise: favourable overall institutional conditions, such as a high degree of formal and informal local decision-making autonomy, are supportive for innovative institutional arrangements, like self-organised and co-operative forms of management of urban common pool resources. This report aims to explore these conditions systematically in the context of socio-ecological transitions with a special focus on the overarching research question: What is the transformative role of institutional diversification and innovation in the governance of core urban common pool resources? This research question also implies the aim to find out how the governance of common pool resources in cities could be improved to better contribute to a transition to sustainable development.

2. Theoretical background

2.1 An institutional focus for transition analysis

In this chapter a new approach for sustainability transition analysis will be developed. A framework is required, which allows two things: (1) treating social and ecological systems with almost equal depth, (2) analysing the feedbacks between the resource conditions and the rules determining the harvesting rates of the resource. Aiming to identify the institutional changes required to improve the conditions of a more sustainable way to produce and consume inevitably directs the analytical focus to the determinants of these harvesting rules, being the key interfaces between societal and ecological systems. Thus, it is crucial to compare the ecological impact of the available rule sets and at the same time analyse the factors determining the evolution of these rule sets of human resource governance.

Commons are not ordinary goods, as they are construed in the imagination of neoclassical economics. From that perspective, the resilience of ecological systems such as the global climate, groundwater basins, lakes, fisheries, forests and so forth, is no good in the sense that people would buy more if they could afford to do so. Resilience defines the common wealth in the sense that human life depends on the existence of these ecological systems. In contrast to public goods, such common-pool resources are characterised by a high degree of subtractability, which may even lead towards a collapse of the overall ecological system. In contrast to private goods, it is highly difficult to exclude potential beneficiaries from using common-pool resources.

For a long time, in standard textbooks, what Garret Hardin proclaimed in his seminal publication of 1968 was taken for granted: “Freedom in a commons brings ruin to all” (Hardin 1968, S. 1244). Thus, selling these commons as private property or keeping them public, but allocating

the right to use them appeared to him the only reasonable way to avoid such ruin. The “tragedy of the commons” is the inter-temporal problem of securing for the future the fodder of the cattle on common rural ground and was transferred to the feeding of humans in the face of an anticipated overpopulation. In the meantime, modern game theory has found that this class of social dilemmas builds on further assumptions, such as (1) complete and common information, (2) independent and simultaneous decisions, (3) no communication, and (4) no central authority. “When these assumptions are made for a game that is not repeated, or is finitely repeated, the theoretical prediction derived from non-cooperative game theory is unambiguous - zero cooperation” (Ostrom 2009a, S. 6). In contrast to this, many field studies have found that “local groups of resource users [...] have managed to create viable institutional arrangements for coping with common-pool resource problems” (Ostrom 2005, S. 221). Thus, it is very promising to explore such self-organised resource governance systems at the local level.

Institutions are defined in this study as “the prescriptions that humans use to organize all forms of repetitive and structured interactions [...] at all scales” (Ostrom 2005, S. 3). From this point of view, institutions are the “underlying rules of the game” (North 2009, S. 4–5). Regarding self-organisation, it makes sense to refer to the following description as a starting point: “Self-organized resource-governance systems [...] may be special districts, private associations, or parts of a local government. These are nested in several levels of general purpose governments that also provide civil, equity, as well as criminal courts” (Ostrom 2005, S. 283). Such resource-governance systems may be run by civil cooperatives in the energy and housing sectors, community groups caring for local green spaces, non-governmental organisations intervening into the management of water and other ecological resource systems or non-profit organisations managing urban farming initiatives.

Here, an important distinction between participation and self-organisation has to be made, according to the locus of initiative-taking. Whereas participation “refers to goals set by government bodies on which citizens can exert influence through procedures set by these government regimes themselves [...], self-organisation stands for the actual motives, networks, communities, processes and objectives of citizens themselves, at least initially independent of government policies and detached from participatory planning procedures” (Boostra und Boelens 2011, S. 109). Therefore, in contrast to participation, self-organisation can also emerge without intervention of the local government and even despite of it or citizens can deliberately start it as protest movement against political or administrative action. Self-organisation does not necessarily have to follow the ‘rules of the game’, viz. be organised via established formal institutions, but activities can happen in a more spontaneous, self-managed way.

2.2 General model of socio-ecological transition

The SES framework as presented in Poteete, Janssen, and Ostrom (2010) can be seen as an advancement of the Institutional Analysis and Development (IAD) framework. It focuses on institutions that are guiding social interaction between actors that either negotiate on markets via state laws or are self-organising their interactions (Ostrom 1990). The focus is on functioning of institutional settings in certain governance paradigms. For the self-organising capabilities of local entities, the special functional settings of diverse institutional frames are assessed, since diversification of the institutional framework fosters a wider possibility to solve any shortcomings of the other two paradigms—markets and states—by addressing the diversity of the social structure and its scenarios. A seminal way analyses “action arenas” (Ostrom 2005), where the social exchange takes place and is guided by three mayor sets of variables: institutions and rules, characteristics of the community and attributes of the physical environment (Ostrom 2005). Because this study aims to identify the institutional relations, which are crucial for a socio-ecological transition at the city level, the IAD framework seems to be appropriate for framing the research approach. It can be used for comparisons of the governance of different resource systems in different institutional settings in Europe in this study. The framework thus can be sepa-

Table 1: Variables that affect the likelihood of self-organisation

Resources	Governance
System	System
RS3 - Size of the resource system	GS6a - Local collective choice autonomy
RS5 - Productivity of the system	
RS5a - Indicators of the productivity of the system	
RS7 - Predictability of the system dynamics	
Units	Users
RU1 - Resource unit mobility	U1 - Number of users
	U2 - Socio-economic attributes of the users
	U5 - Leadership / entrepreneurship
	U6 - Norms / social capital
	U7 - Knowledge of the SES / mental models
	U8 - Importance of the resource

Source: Variables extracted from (Poteete, Janssen, and Ostrom 2010, 237)

rated into two distinct spheres, the social system, and the environmental system. The perspective focuses reciprocal interactions between the two systems, where the ecological system is perceived as anthropocentric (Binder et al. 2013). What is important at this point is an explicit link between this systemic approach and a normative perspective. Although it is foremost an analysis-oriented concept, the description of rules, their emergence, and practical implications describe a grasp on the normative interaction of the two systems.

To capture the institutional dynamics of socio-ecological transition, we assume that these kinds of transitions are driven by learning and norm-adopting individuals. These are capable of (1) developing critical levels of trust that other individuals involved in the governance of the resource systems are reciprocators, (2) developing levels of cooperation, which are necessary for solving social dilemmas like the “tragedy of the commons”, and (3) realising the net benefits of this cooperation (Ostrom 2009b, S. Poteete, Janssen, and Ostrom 2010, Chapter 9).

The action situation is a key concept of the framework. It can be used to describe a variety of diverse institutional settings such as markets, families, hierarchies, legislatures, corporations, neighbourhood associations, common-property regimes, and so on. In addition, formal games could be described, analysed and compared as action situations regulated by seven normative elements concerning “participants, positions, actions, outcomes, information, control, and cost/benefit” (Ostrom 2005, 188).

The broader context could be conceptually modelled as a socio-ecological system (SES), consisting of the variables describing the resource system (RS), the resource units (RU), the governance system (GS) and the users (U), which influence the interactions (I) and outcomes (O) of the action situation. External to this system are the variables of the social, economic, and political settings (S) as well as of the related ecosystems (ECO). Poteete et al. (2010, S. 237–238) identified a total of 53 variables describing the overall socio-ecological system, of which twelve variables are particularly relevant for the capabilities of the users to self-organise the governance of the resource system (Table 1).

“A social dilemma situation in which an individual has no information about who else is involved and makes an anonymous decision relieves many individual participants of the need to follow norms or value outcomes of others. [...] Overharvesting tends to occur when resource users do not know who is involved, do not have a foundation of trust and reciprocity, cannot communicate, have no established rules, and lack effective monitoring and sanctioning mechanisms” (Poteete et al. 2010, S. 228). It was possible to identify a set of micro-situational variables in repeated social dilemma experiments by relaxing such restrictive conditions that by definition lead to non-cooperative behaviour. These influence trust and positive outcomes in multiple social dilemmas (Table 2).

The socio-ecological context variables determine the capabilities of the users to self-organise the governance of the resource system, and the micro-situational context variables influence the feasible levels of trust and cooperative solutions in multiple social dilemmas. They are probably responsible for the diversification and change of the norms, ruling the action situation under consideration. Thus, they could be of crucial importance to the direction and success of socio-ecological transition. Linkages between the social and ecological dimension of the transition especially occur in the topics of information, boundaries, and decisions, since there a direct alignment takes place between social and ecological system—vice versa.

To summarise, we observe that the change of norms represented by this set of rules governing local action situations may be considered the central characteristic of socio-ecological system transitions. Successful norm-adoption could be decisive for approaching higher levels of trust and cooperation, and thus for the success of a self-organised and more sustainable governance of common-pool resources in general.

In our research, we focus on the interactions of the three different dimensions of resource system governance. Rules, socio-ecological context variables, and micro-situational context variables as an ensemble are assumed to determine the transition paths from one governance regime to another. For such an examination, the sets of rules regulating the action situation of an SES seem to be the appropriate starting point. They connect the resource system and its units on the one hand and the governance system and its units, the users, on the other. Assuming that these sets of rules define the governance regime of a socio-ecological system and defining transitions “as shifts from one regime to another regime” (Geels 2011, S. 26), implies that any transition could involve a change of at least some of the rules governing the action situation of a socio-ecological system (SES). Rules—in contrast to norms—are sanctionable. This means, that breaking of rules results in a kind of regulating response of a specific body that is capable

Table 2: Variables influencing trust and the solution of social dilemmas

Positive	Positive, or neutral, or negative impact	Negative
S1 - High marginal per capita return of cooperation	S7 - Size of group	S10 - Heterogeneity in benefits and costs
S2 - Security that contributions will be returned if not sufficient	S8 - Information about the average contribution is made available	
S3 - The reputations of participants are known	S9 - Sanctioning capabilities	
S4 - Longer time horizon		
S5 - Capability to choose to enter or exit from a group		
S6 - Communication is feasible with the full set of participants		

Source: (Poteete, Janssen, and Ostrom 2010, 229–30)

and eligible to sanction. However, the violation of a norm does not imply institutional corrections. The process of norm adoption precedes the transforming of rules, as it is a broader foundation of any rule and sanctioning mechanism. This change of rules might be induced externally by superior governance levels, or internally by learning and norm-adopting individuals who are involved in the local action situation. The internal way of learning and norm-adopting is crucial for a profound transition to strong sustainability, because it influences behaviour patterns in the action situation already before legal changes. Here, norms are considered the transition channels for the negative or positive feedback loops between SES and action situations. This is why they could be stabilised or destabilised by these feedback loops, the latter case urging a transition from one governance regime to another.

As developed in our socio-ecological systems transition model, we assume that, if self-organised and co-operative use of common pool resources emerge, this is due to a complex set of variables and norms. For the analysis, Figure 1 proposes modelling the socio-ecological transition as a sequence of rules set with increasing complexity and dynamics.

1. **Scope rules** affect the very basic issues and time horizon of known outcome variables of the sustainability strategy under consideration.

A commonly agreed understanding of the sustainability transition concept, including an agreement on the priorities of such transitions on the local level and strategies, enhances the possibility to grasp topics and fields the sustainability transition encloses. This tacit knowledge facilitates the initiation of transition processes of the socio-ecological systems towards stronger sustainability, since strategies and approaches refer to the same scope and allow consensual solutions.

2. **Information rules** affect the level of information available to each participant of the considered SES. Thus, they provide the basic precondition for citizens' participation and the possible starting point for developing higher levels of trust and cooperation.

Considering the information rules applied in the local context, the degree of citizen participation in the governance of local resource systems like energy, water, and green spaces might be the higher if better information is available for the citizens.

3. **Pay-off rules** assign awards or sanctions to actions regarding the outcomes, thus defining possible returns and the motivation to implement specific sustainability measures for a multitude of actors.

Another crucial precondition for the initiation of socio-ecological transition processes is the emergence of attractive opportunities to invest in new institutional arrangements, promising a sufficient per capita return for the cooperation of local actors. Investments as well as returns need not necessarily be monetary, but could rather be of other quality, like for instance resources, social acknowledgement or replenishment rates of resource units.

4. **Position rules** determine the actors who are authorised and capable to act, considering reputation gained and the possibilities to sanction by potential actors.

We assume that the existence of a certain degree of leadership, i.e. reputation gained by innovativeness, practical experience and trustworthiness in the urban action arena, is supportive for local self-organisation of common-pool resources. If these individuals gained a reputation as reciprocators this is particularly helpful for a cooperative approach towards the governance of local socio-ecological systems.

5. **Boundary rules** define criteria and processes for including and excluding actors in socio-ecological systems, the degree of overlap between resource and governance systems, as well as the size and heterogeneity of the actor group.

If such eminent people—established as reciprocators and specialists for the local resource system—exist, this will facilitate a kind of norm-adoption in favour of new institutional arrangements and their acceptance by the local citizenship. In the case that the

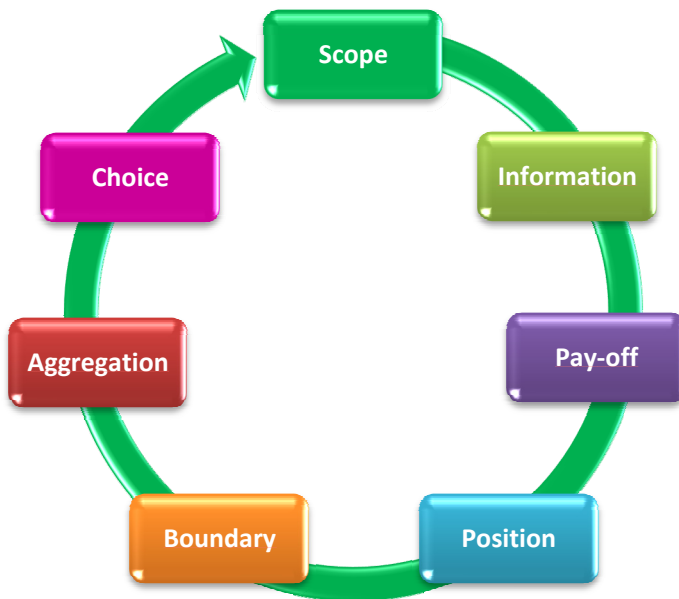


Figure 1: Socio-ecological systems transition model as a sequence of norm set adoption

local population accepts such trusted evolution of norms and their sanctioning, this transforms these new norms into rules. The shift of boundary, position, or choice rules thus follows lessons learned in the local action arenas.

6. **Aggregation rules** determine the degree of communication and participation of actors involved in the decision-making on the SES at the considered location. They depend very much on the level of local decision-making autonomy.

If norm-adoption shifted the boundary rules in favour of local action arenas, this could pave the way for a more autonomous decision-making on the local level, leading to a harmonisation of ecological and social boundaries. This implies an enhancement of the local decision-making autonomy.

7. **Choice rules** characterise the extent of power distribution and citizen empowerment in self-organising the governance of local resource systems.

Finally, unambiguous choice or decision-making rules are the most complex indicators of citizen involvement in the governance of local resource systems, either via delegation of power or full-fledged citizen control. We assume that a specific set of choice rules empowers local actors, and is especially productive if this power is distributed equally, to allow a thorough form of self-organisation.

Rather than reading the set of rules in Figure 1 as a cascade, it expresses a process of learning and norm-changes as a helix structure. Rules are altered in a complex and interconnected way. The cycle will repeat itself limitless and regularly reinforce itself.

To this point we have derived seven related assumptions from Ostrom's rule set to guide our research interest that imply a certain mode of influence on critical aspects of the socio-ecological transition process towards sustainability. As a result, these assumptions are compared to a detailed description of the case studies of the resource field. Therefore, it is mandatory to understand the research assumptions as a preliminary interpretation of the field, not as testable hypotheses. From these assumptions, research questions are derived that are indi-



Figure 2: Research questions derived from the SES transition model

cated an exploratory approach to the field. The strength of the framework lies in its openness to produce explorative insights in the field, which later can be assessed by other scientific means.

In detail the seven research questions, derived from the seven rules and assumptions, are as follows:

1. Is the urban governance of ecological resource systems observed in the European cities framed by a common understanding of *sustainability transition*?
2. Which kinds of citizen participation and user *self-organisation* can be observed in local urban resource systems like energy, water, and green spaces?
3. Who are the *actors* and *what factors* motivate them to pursue a socio-ecological transition in these urban resource systems?
4. What are the *lessons learned* and the reputations gained from leadership in local resource management?
5. Could we observe transitional socio-ecological *norm-adoption* towards trust and cooperation in the urban context?
6. Does *local decision-making* autonomy matter in socio-ecological transitions in relation to superior governance levels?
7. To what extent do citizens have an equal voice in the governance of urban resource systems in terms of delegated power and *citizen control*?

Based on the preceding theoretical concept, Figure 2 specifies the connection between the foundational assumptions on the effects of rules and the main direction of the respective research questions.

2.3 Research strategy and research design

For the research, a mix of quantitative and qualitative methods appears to be appropriate in addressing the outlined theory. This mix offers a glance at normative shifts, which lead to institutional changes in the sphere of common-pool resource governance. As explained above, it makes sense to focus on the questions of whether, how and in which directions shared strategies, norms, and rules change over time, because norm-adopting behaviour is expected to be the main driver of transformative change. A comparative research design enables the identification of specific institutional settings, external to the urban action arena. These might influence the results of the success or failure of self-organisation and cooperation processes regarding the governance of the local socio-ecological resource systems. Thus, the research considers the following variables:

- in demographic and economic terms: size and growth rates of the city in relation to the country where the city is located regarding population and total GDP
- in geographic and cultural terms regarding the country's location in Northern, Southern, Eastern and Western Europe
- regarding the national government structure as defining the degree of administrative decentralisation and the degrees of local decision-making autonomy
- regarding the welfare regime of the nation, where the city is located as a determinant for the type and degree of heterogeneity of local user groups relevant to the governance of urban common-pool resources.

In the end, a two-phase selection process produced a country selection with 14 countries (12 EU and 2 non-EU). Within these countries, 40 cities were selected according to the set criteria. The sample covers a broad representation of over- and underperforming cities (concerning GDP growth) in the respective countries as well as shrinking to growing cities.

After the selection, the actual field research was conducted by local researchers in the domestic language and later on translated into English. To achieve thorough insight into the local arenas, a quantitative inquiry was conducted as well as qualitative expert interviews with local actors from three distinct sectors (government, business, and civil society). It is thus possible to contrast the empirical reality from the perspective of the experts with a broader assessment of the action arena from the inquiry.

3. Summary of the empirical findings

This chapter presents the results of the quantitative and qualitative research on the energy, green spaces, and water systems' transitions towards sustainability in 40 cities. The insights for this research are drawn from a quantitative inquiry of 480 key actors as well as interviews with 154 experts in the field of urban socio-ecological transition. The roles of the resource systems in the context of self-organisation and socio-ecological transition are discussed. More detailed information can be found in Sauer et al. (2015, chapters 4 - 6, forthcoming). Alongside the six research questions on *sustainability transition*, *self-organisation capabilities*, *actors and factors*, *lessons learnt*, as well as *norm adoption* and *local decision-making*, the conditions, under which new institutional arrangements like cooperatives, multi-stakeholder-constructions, local-regional partnerships and networks as organisational frame for sustainable development on the city level can emerge and establish themselves are analysed. The research in the three resource systems will be brought together by answering the seventh research question on *delegated power and citizen control*.

3.1 Socio-ecological transitions in the energy system

The energy sector is the foremost leverage to bring forward transitions towards sustainability, since a central aspect of climate change relates to CO₂ emissions, energy use, and global warming. As a main system in urban contexts, the energy system is highly influenceable to reach sustainability goals. On a technical level, this is achieved by actively changing the means of energy production to renewable ones, and passively by increasing the efficiency of either the energy production or the energy consumption. Central developments that occur beside to spatially recoupled energy production are the constructions of ‘smart grids’ that aim at a combination of production, consumption, and infrastructure for the distribution, especially in respect to provision fluctuations due to an uncertain availability of renewable energy sources.

Is the urban governance of ecological resource systems observed in the European cities framed by a common understanding of sustainability transition?

The interviewees assess diverse and heterogeneous transition processes in the energy system for their cities and refer to similar definitions and concepts of sustainability. Challenges are anticipated and expected in socio-structural constitutions of the cities and in social effects that transitions might produce, such as gentrification, energy poverty, etc. In the cities, a common understanding of sustainability is given, which is derived from the United Nations definition that has been well known since the Rio Earth Summit 1992 and its Agenda 21. Additionally, the interviewees refer to the three-pillar model (profit, people, planet), occasionally including a fourth pillar about governance and institutional sustainability. The local estimates on how far the socio-ecological transition has advanced are heterogeneous and tied to the installation of action plans, coming from Agenda 21 or the like. The assessment of the local resource system is problematic, as it has no clear boundaries and the perceived size of the energy system differs significantly, even within the same cities. However, with respect to energy efficiency all cities have undertaken steps towards improving levels of efficiency, especially by relying on the concepts of SMART cities¹ (Giffinger et al. 2007, S. 10–12; for a critique Sennett 2012). The assessment of overall energy efficiency was as well difficult for the actors.

Which kinds of citizen participation and user self-organisation can be observed in the local urban energy system?

Participation and self-organisation are contested and sometimes problematic aspects. As a foundation for integrating citizens in political processes, information is required and its distribution to the citizenry urgent. This is realised on several channels by administrative and political processes and considered a first and valuable goal. However, in most cities, participation remains at the stage of information sharing and excludes citizens from decision-making, whereas other actors deemed more important are included. Self-organisation—the instalment of own energy infrastructure parallel to private or governmental—is quite uncommon. Citizens usually do not initiate or take part in endeavours to create an own energy provider or cooperatives. However, on several occasions, self-organising capabilities were mistaken for citizen participation. This means that political and administrative actors refer to self-organisation as a distinct way of getting involved in political proceedings. The differentiation between taking part in institutional procedures and establishing own processes outside of legislative structures is not realised or accepted. An active civil society that involves itself in socio-ecological transition is thought of only at the individual level. In particular, individual sustainable behaviour and sustainable consumption choices are the transition factors, thus reducing the self-organisation ca-

¹ The concept of SMART cities is a holistic approach that includes different development dimensions. For example, social inclusive aspects are as well part of it, as technological innovations towards increased energy efficiency, economic and social innovation, and ecologic sustainability.

pabilities of local cooperation and initiatives to individual responsibility. The reasons for this are diverse; they include the contested sovereignty of governmental structures as well as the lack of a political public sphere that engages in a productive conflict with governmental institutions.

Who are the actors and what factors motivate them to pursue a socio-ecological transition in this urban resource system?

In general, a broad selection of diverse actors takes part in socio-ecologic transitions, and the role of research centres and universities is emphasised. Their contribution reaches from plain research in renewable energy and energy efficiency to providing 'counter knowledge' in a contested discursive field. The role of citizens is often seen as the main driving force behind socio-ecological transitions in terms of self-responsibility. Within this logic, their aggregated individual decisions produce transitional change by shifting supply and demand towards sustainability criteria. However, in the quantitative inquiry, the influence on the local renewable energy mix by households is considered non-existent, contradicting the argument that individual behaviour alone brings about change. In the energy sector, most actions that are undertaken consider informing the local actors and raising their awareness of sustainable behaviour. Additionally, a broad reference to planning procedures was made. These are some of the most important actions in a transition process. In the cities, individual and heterogeneous factors influence the transition and show that a 'one size fits all' solution is not possible. Structural uniqueness and an individual mix of local and non-local factors construct individual settings in which actors have to find solutions for problems.

What are the lessons learned and the reputations gained from leadership in local resource management?

National and European governments need to foster local processes and structures that allow for a successful socio-ecological transition, since frameworks on several levels assist in local-level decisions and policies. What could be retrieved from the empirical analysis are insights that financing programmes in particular can assist local plans and strategies and that local administrations need free space to act on their own behalf. Governments can achieve this by promoting consistent legal frameworks and laws to bring forward regional or local-level actions. The sphere of influence of national government or the European Union is felt in some places and needs to be channelled accordingly. It can be argued that the local levels have the most insight and knowledge of the resource system at hand. Practical experience is more common at the level that is involved with the system's transition. Therefore, it can be argued that this level should take important decisions about production and consumption. Another important insight is the interconnectedness of the social dimension to themes of sustainability. As it has been indicated, any socio-ecologic transition must keep a keen eye on social sustainability. Unless it wants to become an exclusive and elitist endeavour, a broad society has to be integrated. Especially questions on energy pricing and financing models that touch the individual level are prone to exceed individual budgets and produce energy poverty.

Could we observe transitional socio-ecological norm-adoption towards trust and cooperation in the urban context?

A broad number of interviewed actors stated for the overall process of norm adoption that especially administrative procedures should be simplified. The complex nature of European bureaucracy makes financial support and distribution difficult for local actors. This directly relates to the finding that financial programmes and funding operations are important assets in local socio-ecological transitions of energy systems. The role of administrative structures sustains transition processes, either by enforcing or encouraging sustainable behaviour at the individual level or the European level by providing a tight legal framework that is adapted locally. The EU should focus more on social and ecological aspects and use its position to compel sustainable devel-

opment. For this goal, the use of available strategies and programmes has to be increased, since for example Agenda 21 or the European sustainability indicators (Eurostat 2013) provide a productive framework applicable on all levels. Furthermore, as a more general point, cities as modern institutions should be scrutinised.

Does local decision-making autonomy matter in socio-ecological transitions in relation to superior governance levels?

Concerning local decision-making autonomy, the results vary according to the national contexts and the national degree of decentralisation: Germany in particular has a high degree of decentralisation and a strong local decision-making autonomy, while France is highly centralised. In addition, recent administrative reforms, especially in Greece, had an impact on the strengthening of the local level, although the results are not yet fully determined. The cities usually feel that their possibilities for autonomous decision-making are constrained, which results from other local sectors and actors that intervene with decisions and have diverging interests. Here, the economy is one of the most influential sectors limiting the possibility to make decisions. Another impact on decision-making autonomy is financial resources and especially the ability of local communities to dispose of financial means. Since decisions also imply costs, the autonomy has to reflect on financial aspects. Overall, decision-making autonomy with respect to energy depends on the constitution of the energy system. Since energy policies are usually a national concern, local autonomy is constrained. A way to interfere with energy issues is thus to influence energy consumption and efficiency of usage. The requirement that is also stated for norm adaption is that cities should be granted more autonomy in general and that this should be supplemented by a higher degree of financial autonomy, e. g. by leaving a higher share of locally raised tax revenues for the cities.

3.2 Socio-ecological transition in the resource system green spaces

To ultimately better understand the role of self-organisation in the governance of the green space resource system in the socio-ecological transition, the use of the urban common good of land, such as fallow land, green spaces and forest areas, within city boundaries is examined. By their mitigation and adaptation capacities, urban green spaces play an important role in building climate-resilient cities. Preserving urban bio-diversity by means of green spaces is crucial for the socio-ecological transition of cities. These spaces provide recreational opportunities for city dwellers, yield essential ecological benefits from cleaning the air to reducing noise, provide habitat for many species and plants and reduce local vulnerabilities to extreme climate events. Yet, especially in growing cities, urban development pressures threaten green spaces. Therefore, the question arises as to how they can be kept available and accessible for all and possibly be expanded, whilst assuring their biodiversity and allowing for diverse use at the same time.

Is the urban governance of ecological resource systems observed in the European cities framed by a common understanding of sustainability transition?

A common understanding of such a transition facilitates its implementation. Having only been “a topic of environmentalists” some decades ago, the mainstreaming of sustainability has partly been achieved. However, sometimes administration representatives generally assume a lack of common understanding of sustainability transition with their citizenry, whereas civil society actors stress the existence of difficulties and conflicts, especially on the use and accessibility of existing green spaces or on preservation of green spaces contra building and infrastructure development, which in some cities heavily reduce green spaces. The majority of actors expect a

long time horizon to realise sustainability goals. This is due to the difficulty of changing mentality and habits and of reaching financial feasibility.

Which kinds of citizen participation and user self-organisation can be observed in the local urban green spaces system?

Self-organisation and participation emerge more easily and occur more often in the field of green spaces than in the other two resource systems. This is due to a comparatively high degree of local autonomy in this field and to the tangibility of green spaces. They are visibly situated in the citizens' living environment, and trials to reduce them immediately affect their daily quality of life. It is also easier for citizens' associations to gather support for concrete issues, such as the protection of a green space, than it is to lobby for the more complicated logic of self-sufficiency in the energy system or the introduction of an integrated water cycle. These initiatives show that city dwellers become more and more aware of the need to protect urban green spaces in the face of ongoing urbanisation producing urban sprawl and the decimation of green spaces. They have understood that these spaces are not only essential in ecological but also in social terms, and they are willing to fight for their preservation. Thus, self-organised and cooperative forms of management of green spaces emerge to tackle local challenges, highly differing in terms of numbers, shares, duration, and growth rates according to different urban contexts. Civil society actors are becoming active players in local governance processes, showing that the self-organised management of green spaces in cooperation with or beyond state and market forces is possible. The examples of participation and self-organisation from cities across Europe demonstrate that people are able to cooperate, to organise themselves, and to take on responsibility for green spaces, while also introducing new practices that support sustainability transitions. They contribute to the maintenance of existing green spaces, which are available and accessible for all, whilst assuring biodiversity, and allowing diverse use for local needs. In some cities, civil society actors have fought for their influence, whereas in others it has been granted to them by local authorities, steered from above. However, in the majority of cities these are still niche projects. As a minority, they have become important players in green space governance, meeting public authorities at eye level and cooperating with a wide range of actors. Yet in all cities the responsibility for local green space governance remains with the local authorities, on whose cooperation self-organised, bottom-up actors are highly dependent.

Who are the actors and what factors motivate them to pursue a socio-ecological transition in this urban resource system?

The resource system of green spaces is, more than the energy and water system, determined by local factors, yet not exclusively, as the influence of the European Union's and national environmental regulations on local green spaces governance shows. Cities that manage to include a wide range of stakeholders in governance, for example via citizen participation, are more advanced in the transition. As most significant factors in further improving and expanding green spaces, local political commitment, local building codes and sectoral plans, capacity of the local government, and availability of un-built land have been identified. Civil society activities are accelerated by advantageous framework conditions, for example highly motivated innovative experts working as civil servants in the local government, who are little bound by bureaucracy and dispose of a sufficient budget. Cities advanced in the transition run innovative projects with citizens' involvement, which are then continued on a voluntary basis, or they take up and support ideas emerging from self-organised citizens' groups. For the development of such initiatives, an enabling, innovative, and fostering local policy framework is necessary, allowing for constructive interaction with local authorities.

What are the lessons learned and the reputations gained from leadership in local resource management?

Learning is an essential element of each transition. The necessity of collaboration and networking has been realised by many actors. They are aware of the need for citizen participation for a successful transition, seen as an indispensable complement to top-down policymaking. Cities already advanced in the transition allow innovative experiments that are only scaled up if successful on a small scale. Primarily, civil society actors stress the need of a high degree of stamina to drive the transition systematically. In this process, education is crucial to raising awareness and—finally—changing mentalities.

Could we observe transitional socio-ecological norm-adoption towards trust and cooperation in the urban context?

Policy instruments indicate whether norm-adoption towards trust and cooperation exists. Plans and strategies as well as citizen participation are widely considered to support the socio-ecological transition. The legal framework can be obstructive if it is too complex or inflexible, yet also if it is too flexible or non-existent. Steering tools at the city level are often insufficient or missing. As additional policy instruments most often a more thorough legal framework and increased citizen participation are mentioned. Sector thinking instead of following cross-sector interdisciplinary strategies is still widespread, being one of the causes for an existing implementation gap. Successful examples of collaboration between all stakeholders have emerged out of collective learning processes, in which changing and new rules have been internalised. Committed key persons very often drive these processes from all sectors that have first adopted changing and newly evolving norms and significantly pushed for their manifestation in rules. Here, successful norm-adoption has led to higher levels of trust and cooperation between stakeholders and to vivid institutionalised interaction processes with the joint goal of a socio-ecological transition.

Does local decision-making autonomy matter in socio-ecological transitions in relation to superior governance levels?

Generally, a high level of autonomy for the governance of green spaces is stated. Yet, in practice, it is often limited by a lack of financial resources. The local level of the city is the most important governance level for ensuring available high-quality green spaces, followed by the district and neighbourhood levels. Local autonomy generally promotes the transition and actors in several cities call for a higher degree of it. Missing local autonomy is seen as a major obstacle to reaching sustainability.

3.3 Socio-ecological transitions in the water system

The water system is in many regards special as natural, and cultural functions of the resource are diverse and strongly influence each other. In contrast to the energy system, the geographical boundaries of the water system seem to be well defined, but it is strongly linked to other resource systems like energy and green spaces and disturbances within adjacent ecosystems. Impacts on the hydrological cycle can for example result from land-use changes, water withdrawals and discharges or climatic changes. Nitrates and pesticides through intensive agricultural land usage, industrial production practices, high shares of urban sealed soil, and pollution due to dense settlement in urban areas directly threaten the drinking water system. All elements of the urban water cycle—water supply, sewage and storm water—need to be understood as interlinked components. Protection and sustainable use of freshwater can often be attained efficiently at the local level. Infrastructural modernisation is one chance for local water suppliers to take a step towards a more sustainable water management.

Is the urban governance of ecological resource systems observed in the European cities framed by a common understanding of sustainability transition?

Water is usually not a top priority for the cities in sustainability transition and ranges behind energy and mobility. Nonetheless, cities are working on present and future solutions for existing and forthcoming challenges. Their concept of sustainability not only includes the resource water, but also social inclusion and environmental protection in general. Challenges for the drinking water systems of the cities are, for example, pollution and scarcity of water resources, as well as the lack of financial capabilities to maintain and modernise the water infrastructure. Environmental sustainability and social objectives sometimes collide, as water transition goes along with investments and sometimes with increasing prices. Many cities' actors understand that problems concerning water availability and quality will emerge in the future and action to prevent these must be taken now. The status of the water and sewage water system is very different throughout the four researched European regions. Particularly in Eastern Europe, awareness of (potential) problems among public authorities is low. In the South, problems are already present, the most serious in Europe. There are high water losses due to poor infrastructure as well as high water consumption (Garzillo und Ulrich 2015, forthcoming). Thus, the perceived challenges and urgencies are quite heterogeneous. The reuse of wastewater with appropriate methods helps to safeguard water quantity and quality and to reduce the pressure on the ecosystem, but it is not yet implemented in all cities.

Which kinds of citizen participation and user self-organisation can be observed in the local urban water system?

Self-organisation in terms of water management is usually understood misleadingly as the private monitoring of water use and quality and the creation of environmental awareness by NGOs and other civil society groups. Transparency and political willingness to involve consumers in decision-making processes are lacking. Legal obstacles come together with the complexity of the resource system and the absence of citizens' awareness. Water issues are far from generally present. The more problems a region faces and the more citizens are aware of these, the more commitment can be observed. Thus, visible harms to the resource system, such as surface water pollution, are more likely to be issues of public interest and civil society's commitment. It is more difficult to create awareness and commitment for the invisible part of the system. Few local citizens' initiatives have been initiated to deal with drinking water quality and availability. For a public, technical aspects are quite difficult to understand and thus participation is difficult due to the complex character of many decisions connected with the drinking water system. Nonetheless, social aspects like the pricing of drinking water and privatisation frequently bring people to action. We cannot talk about a water transition process through active participation or even self-organisation, as participation options, society's motivation, and the current state of self-organisation are still relatively modest in this resource systems' management. The option of self-organised monitoring of water quality and availability and sanctioning is nevertheless used. Potentials are far from being fully exploited and self-organisation is no strong transition driver in drinking water management.

Who are the actors and what factors motivate them to pursue a socio-ecological transition in this urban resource system?

Actors involved in the local water transition are mainly water utilities. In addition, the local administration is quite important in most cities. Higher government levels as well as local universities and research institutions only show medium leadership. Local NGOs, associations, and civil society groups are of little importance. Factors driving the local water transition are diverse and derive from the challenges the cities face locally. Apart from natural and human threats to the availability and quality of drinking water resources, cultural habits, drinking water prices, the

cooperation of involved stakeholders, and funding are important factors. In particular, financial problems repeatedly play a major role for the cities.

What are the lessons learned and the reputations gained from leadership in local resource management?

The cities assess no severe difficulties in developing a common understanding with respect to a joint strategy for the provision of drinking water. In general, the common understanding seems to be present, but the overall awareness of the issues still seems low. Change has to come from all sides, consumers, businesses, governments and administrations, as well as from all levels, such as the regional, national and supra national. Networking and collaboration of public and private actors is supposed to make the water resource system function better. Various actors stated that a more comprehensible language in discussions on water management would help create awareness and stimulate commitment. The promotion of water issues by the media was described as biased towards pricing and consumption patterns. These aspects of information and awareness are connected with the need for a good educational system, including sustainability issues at all levels of education, from kindergarten to adult education. For the implementation of projects, political and financial support is needed. Still, short-term profit and quick success are often put before sustainability, while sustainability would provide long-term financial stability. Thus, it was argued that long-term plans should be more independent from changes in the political scene.

Could we observe transitional socio-ecological norm-adoption towards trust and cooperation in the urban context?

The value of clean drinking water and general access to it is commonly high. System boundaries are clear and local autonomy is essentially given. The monitoring and sanctioning of water pollution mostly work well and are effective. The over-abstraction of water is much harder to monitor and sanctions are not effective. The local water provider, local government's administration, and higher government representatives contribute most to sanctioning misuse and/or the pollution of water. Local environmental NGOs play the next most important role. The function of civil society as an instrument of control is clearly visible here. Formal norms expressed in the legal framework as well as informal norms are important bases for sustainability transition. Discrepancies between laws, concepts, and strategies on the one hand and their implementation practice on the other can be observed. In several cities, sustainability concepts exist only on paper and are poorly executed or not at all. Cooperation between institutions and other stakeholders on water issues is not always satisfying. Norm-adoption is very different depending on regional, political, and economic factors.

Does local decision-making autonomy matter in socio-ecological transitions in relation to superior governance levels?

Local decision-making autonomy is not present in the same way in all observed cities. Some cities have full autonomy; others do not and are involved equally together with other actors. Especially, water supply by private companies leaves the cities out of many decisions. The cities' financial capacities play an important role. Many cities' financial problems are reasons for sustainability drawbacks in the water system, as their scope of action is very narrow. Financial autonomy is sometimes described as 'real autonomy'. Especially in big projects, decision-making autonomy is thus constrained by other partners' co-financing. Total autonomy; however, does not seem to be desirable for several reasons. A joint treatment by national and local powers is described as more suitable for the water and sewage system.

3.4 Institutional diversity

The extent to which citizens have equal access to the governance of urban resource systems in terms of delegated power and citizen control depends on the system's characteristics. Institutional diversity in the sense of self-organisation and citizen participation depends on the tangibility and clarity of the subject, as well as on the governance levels regarded as appropriate.

In the energy system, the main topic is the decentralisation of energy production. New technology must be efficient, but no longer needs to be large-scale and centralised. This technological transition entails an institutional transition. Cooperative, decentralised, and small-scale organisational forms should be further supported and developed. In any case, the urban spatial limitation makes the urban energy system's size larger than the expansion of the city. Cities need to collaborate with neighbouring regions to cover their energy demand. The steering of the energy system is also complex and requires some level of centrality. Smart grids and virtual power plants help to synchronise the production of and demand for energy. Citizen control and delegated power can be complementary in this resource system. Still, the infrastructure needed for energy supply requires a certain amount of centralised control.

The urban green spaces system serves as a good example of emerging institutional arrangements based on self-organisation and citizen control. The high tangibility and the strong local context support citizen involvement. Projects can be realised within a relatively short time horizon, without complex technological requirements and with low financial commitment. Local autonomy is generally given and the cities can create proper legal frameworks. Nevertheless, the municipalities should still assume their responsibility, and privatisation and enclosure should be avoided. The topic of boundary rules is quite visible here, as entrance to and size of a group play a major role in the capacity to self-organise at the local level.

In the example of the urban water system, the impact of complex technology, long-time horizons of investments and the system's indivisibility lead to strong technological and institutional constraints. Citizens value the 'social aspects' of drinking water supply—such as affordability and access—very highly, but mostly lack the ability and scope to participate in planning processes. Thus, the governance of the resource system is typically delegated to the local, national or European representatives and citizen control plays a minor role. Nevertheless, citizens want their representatives to act in accordance to their needs and use their influence through public opinion formation.

4. Policy Recommendations

In the discussion of the findings of the current research, it emerges that there is a growing lack of trust in government. In many countries, democratic engagement and citizenship are shrinking. At the same time, transition processes are taking place in many urban systems and opportunities are visible in new social movements, new technologies, other civil society groups and networks. Particularly, cities and networks of cities play an important role in this process, as well as bottom-up initiatives that emerge from citizenry in response to the urgent transition needs.

Varieties of connective processes acting on different scales are fundamental attributes for cities. A concerted strategy is needed to make things possible. It is supportive in ensuring institutional rules in favour of local sustainability, enabling access to technologies and allowing their impact on the status quo in which cities operate, and stimulating community-led bottom-up approaches, including a self-organising community of interest among residents, landowners, infrastructure companies, businesses, social enterprises, NGOs and community organisations. This allows governments to act in pursuit of change.

In the course of finding new institutional arrays with which to govern local urban common pool resources, different actors are equally important. In self-organising these resource systems in a sustainable way, the interaction and negotiation between government, business actors, and civil

Table 3: Findings and recommended options

Rules	Issue	Area	Policy Option
1 Scope	Tangibility of resource systems and influences on it	All	A common understanding of sustainability is required to allow a collective undertaking towards set-out goals in congruent time frames.
2 Informa-tion	Complex constitution of the resource system	Participation, self-organisation	A holistic approach is necessary and, with it, transparent information as well as education. Open access to transparent information is a basis for involvement.
3 Payoff	Individual responsibility for transition	Politics, education, participation, self-organisation	Seeing SET as individual responsibility negates its complexity. Communal solutions must be collective efforts. Local cooperation strengthens mutual and individual benefits.
4 Position	Lack of education, awareness and understanding, as well as lack of trust	Cooperation	Complex processes are hard to grasp. To create an understanding of SET, education is important. It is no expert topic and concerns everybody. Everybody should be able to comprehend the basic concepts. Cooperation produces mutual trust and reputation for further developments in the long term.
5 Bounda-ries	Spatial limitation for socio-ecological transition	Planning, self-organisation	Urban areas cannot be decoupled from close rural areas. Production needs to be in the vicinity and still de-centralised. In addition, production and consumption need to be efficient enough to optimise the ratio of production to spatial size.
6 Aggrega-tion	Coherent legal frame-works for a maximum of local autonomy and bottom-up governance	Governance, politics, laws	To enforce a SET to sustainability, a binding overarching legal framework is necessary that guarantees decision-making processes at the local level. National political decisions and laws cannot interfere with local level politics. Rather, governance must be thought 'bottom-up'.
7 Choice	Sustainable socio-ecological transition needs an active public sphere	Participation, self-organisation, public dis-course	Transitions cannot be enacted; they need a broad coalition, involving all affected actors. These actors need to be empowered to act as transition players.
7 Choice	Social cohesion	Politics	To prevent the effects of gentrification and rising living costs due to sustainability processes, a coherent social policy is needed.

society is vital to providing a healthy socio-economic transition for the profit of all. The commitment of local actors brings forth a sustainable governance of local resources that need not end in a “tragedy of the commons”, as Hardin (1968) puts it. Local cooperation produces a wide variety of social innovations that are adapted to the local context they concern (Franz et al. 2012; Reinstaller 2013; Miege und Töpfer 2013; Mulgan et al. 2007; Phills, Jr. et al. 2008).

This new perspective of collective changing and (re-)aligning institutional settings shows that transitions, rather than being managed, can be influenced, supported, and accelerated. By allowing openness, exchange, stimulation of differences and contradictory conditions to occur at the same time, local urban actors can play an important part in these dynamics. Their insight and knowledge of their own local urban features allows for a thorough assessment and promo-

tion of socio-ecological transitions. According to the socio-ecological transition approach developed here, a sequence of norm-adaptation should be considered as steps towards strong sustainability.

4.1 Moving targets: Develop a common understanding of sustainability transition

According to the sequential sustainability transition model developed and explored by our field research, the common understanding of the scope and time-horizon of sustainability is the alpha and omega of every transition strategy. Every human action starts within a contextual horizon defined by its life-world and natural habitat (alpha), but every effective action changes the life-world and natural habitat of humans as well (omega). Thus, permanent feedback can be assumed between the social and ecological systems, driven by the human motivations, actions, learning processes and norm adoptions. As a result, sustainable development goals are moving targets, and the speed of this move depends on the speed of human learning.

To achieve a socio-ecological transition the approach needs to consider the city and the resource systems in a comprehensive, holistic way. Complex resource systems and transitions towards sustainability themselves can only be grasped in a way that reflects manifold influencing aspects. Especially social aspects cannot be neglected when dealing with a transition. By interfering with one resource system, feedbacks are created that emit to other systems and induce side effects. Cities are a complex ecology where changes in one feature provoke resonance in others. Coherent policies must reflect this complex entangled field and cannot be restricted to one resource system; they have to include the city as a unity and with it all resource systems.

Thus, the already existing European sustainable development goals are a good starting point for defining such sustainability objectives on the sub-national, regional and urban levels as well. They are available measures on the level of the EU member states and should be broken down to the ground (local) level as well. This is a highly participatory and not simply administrative task, because these objectives and the measurement of their implementation will only guide every-day behaviour if everybody has a voice in formulating them.

The time horizon of goal attainment influences the extent to which politicians and citizens are willing to change or modify systems, regulations, and norms that pose barriers to actions. *Long-term visions can unify even diverse groups, generate new ideas and experiments, and serve as a compass for the daily work* (In Context Policy Brief 2013, S. 1). The lack of distant, long-term objectives reported in particular by many Eastern cities may be due to political instability and high turnover in strategic management positions, relatively poor infrastructure conditions and deficits of financial resources for sustainability projects. *A long-term perspective is essential to guide sustainability transition processes.* Political decision-making has to realise and surpass the one-dimensional logics of single sectors and provide an integrating narrative.

Another issue in defining the scope of transition is to agree in Europe on the key sustainability objectives. An example is the definition of a sustainable European energy strategy. In order to empower the decisive local action level, it should be entirely clear that a *“low-carbon” strategy is not enough. Neither a fossil nor a nuclear driven energy policy is the appropriate instrument to facilitate the responsible co-creation of sustainable energy services at the local level.* Substantial endeavours to reduce carbon emissions by investing in renewable energy systems are implemented locally. Yet currently the general picture is that these projects remain isolated initiatives, lacking in strategic coherence and with no agreed perspective on where to focus investment and how to scale them up. The new opportunities for transitions in the energy system call for concerted visions, strategies and actions between the economy, the policy system, civil society, media and science focusing on the accelerated implementation of renewable energy systems. Cities and regions play an important role in this process and more integrated approaches

are needed between energy systems, climate systems, and land use options (Berg et al. 2014). Coherent strategies that are ‘translated’ into local action plans significantly aid this process.

4.2 Smart inclusion: improve the information basis for everyone

A close monitoring of the attainment of commonly agreed sustainability objectives on the local level as well as the open access to that data for every citizen is an essential precondition for the democratic, participative steering of local transition processes. At the same time, new forms of communication and networking are emerging, and the amount of information manageable is one of the biggest transformation challenges. Citizens and enterprises could benefit from an extended economisation of time, improved individual mobility, and facilitated access to information and services, which simplify participation in the urban decision-making process by opening up new communication channels, and by creating and promoting an aware public (Kunzmann 2014, S. 12).

Against this backdrop, *the accelerated integration and miniaturizing of ICT (Information and Communication Technologies) could become a valuable instrument of civil society self-organisation, giving practically everyone access to information and participation.* New forms of shared use or re-use of goods, spontaneous conventions of people, co-creation, crowd sourcing and funding, to name just a few, will add collaboration and cooperation to the former trends of individualisation and competition—and could counterpoise them.

Thus, ICTs bear a potential for self-organising bottom-up initiatives as well as allocating financial resources via crowd funding. A broad aspect of informing citizens is already realised. However, ‘Smart City’ approaches have yet to prove that they are socially inclusive and that they can increase participation for more than just an elite social milieu and at the same time contribute to considerable reductions in the use of natural resources.

However, many forms of governance are still slow, inefficient and obsolete (Ravetz 2011). ICT-based cities are only part of the change happening in local communities. Citizens’ initiatives, networks, community structures and their synergies with local governments, spatial planning and built environment can improve urban governance. From some cities inquired by the ROCSET project came the urge to adapt ‘sustainable governance structures’, which means that urban governance needs to evolve to a coherent 21st century form of city planning and politics. In addition, coherent sustainable government structures foster socio-ecological transitions by providing adequate representation of local actors from all spheres.

4.3 Equal payoff: motivate the striving for transition towards strong sustainability

Transition justice is a crucial issue, because social heterogeneity is a severe impediment for the public support of sustainability transformations. The envisaged socio-ecological transition will only happen if “no one is left behind” and in regard of the rules of social inclusion. Therefore, for example, electricity prices for private households could easily be manipulated and used as an instrument for the mobilisation against the transition to renewable energy, if social heterogeneity is high and energy poverty a severe issue. *In a well-developed welfare regime it appears to be much easier to distribute the gains of self-organised investments in urban socio-ecological systems in an equal way, and thus to make the high returns of cooperation visible and accessible to everyone.*

Furthermore, socio-ecological transition justice is also an issue of regional cohesion. In this research, it became apparent that the cities in the EU13 member states with significantly lower income level compared to the EU15 countries had different priorities regarding sustainable development. The provision of the basic services of general interest took a higher priority than

safeguarding climate stability and the transition to renewable energy sources. This could lead to lock-in effects, freezing a conventional energy policy in these countries as well as—via the European Council—in the EU.

Finally yet importantly, *socio-ecological transition in Europe will only happen if inter-temporal justice in this transition is taken into consideration. This excludes European energy strategies, which are built on the use of nuclear energy for two simple core reasons: the operative security of nuclear plants is not guaranteed, even in advanced industrial countries, as the tragedy of Fukushima has demonstrated, and the problem of permanent disposal of nuclear waste is not solvable. Thus, shifting these problems to future generations of the European population is no sustainable option. If anything, the transition towards a responsible European energy policy has to be built on the transition towards renewable energy sources, excluding any option for both fossil and nuclear fuels alike.*

4.4 Transformative learning: develop trust and reputation in joint transition

One important benefit of a co-creative approach to a sustainability transition is that it increases trust between the citizens and the government. Balancing the needs and fears of different community groups establishes reputation and trust in political leadership towards sustainability. On the other hand, lack of participation and low-quality governance create a vicious cycle, in which trust in government breaks down. At this point, self-organisation might substitute insufficient influence on political processes by civil society. However, the interactions of effects are complex. Our research shows that there is a significant lack of participation above the level of becoming informed. Top-down decision-making usually excludes citizens and civil society and thus hinders trust-building in politics. Particularly with a continuing crisis and rejection of institutionalised politics, this is considerably harmful. Thus, *European sustainability policies have to focus on emancipative forms of politics, which are enabling the citizens to take control of these transition processes.*

The role of local universities and scientific institutions is substantial one in providing knowledge and technical assistance or upholding a counter-discourse for sustainability issues. The connection between scientific research and local-level issues and practices must be advanced; science should play a transformative role and assist local practitioners in the transition at hand. Scientific and academic expertise serves to promote knowledge and exemplary pilot projects for other transition processes. However, community and scientific initiatives will usually remain limited in scope and impact without the partnership of local government, regardless of their innovative potential.

In addition, partnerships among cities and communities play an important role in promoting sustainable development and are regarded as an important channel for knowledge-sharing on sustainability. Potentially, they play an important role in the learning process at the sub-national level. In fact, many of those networks and campaigns have the ambition to build the capacity of their members to engage in sustainable development. While networks support knowledge exchange and the sharing of practical experiences, they also foster the specific collaboration of cities and regions. The cross-cutting nature of governance and local sustainability means that various forms of expertise must work hand in hand. *Elaborate networks that institutionalise collaboration are particularly important.* Within these collaboration networks, extended numbers of actors bringing socio-ecological transitions forward are involved, such as NGOs, education, trade unions, ethnic groups, faith groups, etc., especially to address ecological and social topics. Forms of local representation of affected actors are necessary to initiate dialogue, discussion, and cooperation on an institutionalised level. Policies should consider infrastructures for local exchange as well as communication between cities.

4.5 Congruent boundaries: bringing in line social and ecological systems in urban spaces

There is a strong need to readjust the boundaries of social and ecological systems to secure a better spatial overlap between them. This is particularly true for the transition towards renewable energy resources, which could technologically enable such spatial re-coupling of energy production and energy use, and the co-creation of a new, sustainable energy system by the close interaction of providers and users of this resource system on a local level. Whether this becomes true or not is neither a purely technological nor a purely economic decision, but a matter of socio-ecological performativity, in other words, a participatory bottom-up decision process will deliver different results than a top-down decision, ignoring the potential of decentralised renewable energy systems. More generally, what is needed is a new way of thinking about their interdependencies and interactions, enhancing the spaces of flows (Castells 1996) as well as the circulation of people, capital, resources and identities. Beyond that, the *decision-making process has to be opened up for local actors* that are affected by these local decisions.

4.6 Participatory transitions: think bottom-up governance

Democratic engagement and citizenship is shrinking in many countries. In response, active community groups are emerging that are working on a wide range of issues, primarily on green spaces as well as social inclusion and migrants' rights. The range of citizen participation varies according to local context, as well as to the particular problem, issue and policy at hand. Attention tends to be more focused on green spaces, allotment gardens, urban food growth, urban regeneration, and local neighbourhood planning, and less on heavy infrastructure such as metro expansion, energy and water. Local civil society can hardly be observed on drinking water issues, perhaps due to the complexity of the subject and new governance networks involved in water systems. Any transition movement needs its ways to participate in governmental decision-making processes or the chance to establish parallel structures in self-organising. When referring to participation and self-organisation, the two are easily mixed up, but should be strictly separated. Participation concerns the ability to inform oneself of, take part in and influence political processes. Self-organisation reflects the ability to cooperate and organise resource systems and the socio-ecological transition in self-reliance. For both, appropriate institutional pre-conditions must be granted.

European local governments have become more autonomous over the past 50 years. However, there is still a variety of ways to define and frame autonomy and numerous challenges related to how autonomy is operationalised. Most cities reported that progress towards decentralisation is slow because of routine operations, bureaucratic inertia, ineffectiveness and the resistance to change of long-established routines and structures. Reducing bureaucracy and making official procedures easier and more accessible positively influences socio-ecological transitions. Thus, *the degree of administrative decentralisation directly influences the degree of independent decision-making. It should be supported by a significant enhancement of local financial autonomy as well.*

Local participation has to be fostered and has to exceed mere opportunities to become informed about decisions. The right to participate in decisions about local level resources should be institutionally anchored and concern every stage of the political decision-making process. Hence, local government autonomy does not mean autonomy from citizens, but should reflect possibilities to make local decisions independently of economic interests or political agendas from higher levels—in consensus with all affected actors.

4.7 Citizen control: empowering the transition agents

A proactive state with extended opportunities for participation is correctly understood elsewhere as a crucial precondition for a Great Transformation towards sustainability (WBGU - German Advisory Council on Global Change 2011). This is not only about enhancing the legitimacy of decisions via delegated power, but about enhancing direct citizen control over central issues of socio-ecological transition, i.e. the enabling and support for the introduction of decentralised systems of renewable energy sources by energy co-operatives or the provision of innovative governance structures for urban green spaces in cooperation with community groups. This also entails a preference for realising the economies of scope of urban co-creation structures in the use of ecological resource systems, instead of favouring huge technological structures prevailing in the fossil and nuclear energy systems, which have blocked citizen control in the past.

4.8 The European Urban Agenda: sustainability transition is the key issue

With the instalment of a European Urban Agenda, the EU multi-level governance of transition processes will undergo a significant re-definition. Each level has its particular strengths, and only if these strengths are wisely combined will they mutually support each other and develop more power together than each level on its own. However, for example in the energy sector, part of this combination might factually consist of shifts of power from one level to another, breaking up some remainders of close corporate connections in the energy sector. The systemic changes necessary for a transition of socio-ecological systems will thus supplement the architecture of current multi-level governance by introducing the urban level, and it is unlikely that the related shifts in responsibility and power will occur without conflict or resistance.

The importance of improving relations between different levels of government was recognised by the European Union's Committee of the Regions through the Charter for Multilevel Governance, calling public authorities of all levels of governance (local, national and European) to use and promote multi-level governance in their future undertakings. This includes experiments with innovative policy solutions in adherence to principles of subsidiarity, proportionality, and partnership, and the promotion of the use of multi-level partnerships and instruments for joint policy action. However, in terms of energy transitions, *a considerable amount of actors suggested that the EU should be in charge of regulating legal frameworks that directly enable local levels to realise the set-out goals in the frameworks.*

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Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 34 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

Contact for information

Kristin Smeral

WWWforEurope – Project Management Office
WIFO – Austrian Institute of Economic Research
Arsenal, Objekt 20
1030 Vienna

wwwforeurope-office@wifo.ac.at

T: +43 1 7982601 332

Domenico Rossetti di Valdalbero

DG Research and Innovation
European Commission

Domenico.Rossetti-di-Valdalbero@ec.europa.eu

Partners

	Austrian Institute of Economic Research	WIFO	Austria
	Budapest Institute	Budapest Institute	Hungary
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