Middle East North Africa Sustainable ELECtricity Trajectories

Energy Pathways for Sustainable Development in the MENA Region

WORKING PAPER

Designing a conflict-sensitive and sustainable energy transition in the MENA region

Towards a multi-stakeholder dialogue on energy planning

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EXECUTIVE SUMMARY

Energy transitions are more than just a process of replacing one type of electricity generation technology with another and eventually amending some market frameworks to support this switch economically. Energy transitions run deep into the fabric of social relations and require a fundamental change to how societies are built. They are complex problems of social change that unfolds on all levels of society. Societies, which seek to embark on a committed pathway to energy transitions to sustainability must learn that the complexity and contingency of energy transitions cannot be controlled by some groups of actors alone in a hierarchical power system. It is an undertaking of fundamental social change which concerns and affects everyone and is consequently subjected to diverse interests, objectives, attitudes, expectations, aspirations, and preferences. Managing energy transitions means, on the one hand, acknowledging the human inability to predict the future of decisions or control the outcomes. On the other, it means managing the conflicts of interests among different social interest groups constructively to avoid opposition to policies but instead, generate societal support. For societies to achieve their envisioned goals in energy transitions, all policies and initiatives must be harmonised to aim in the same direction of change. To do so, societies must become aware of how energy transitions will change them.

In this *Working Paper*, the authors first present a theoretical framework to deepen this understanding and then a conceptual approach of how to govern energy transitions in a horizontal and inclusive multi-stakeholder dialogue. The authors argue that energy transitions inevitably challenge existing power relations and practices and that energy transitions can only be sustainable and successful, if the underlying policies can balance the interests of contesting social stakeholder groups and if the generated benefits to these groups exceed the adverse impacts they will have to bear from the policies. Only then, energy policies to implement the energy transition are likely to receive societal support, which is needed to move forward and to prevent economically, socially and politically costly public opposition to energy policies. In the *Paper*, the authors show how a “niche of opportunity” for innovative, horizontal governance approaches was designed and tested within the framework of the “Middle East and North Africa – Sustainable ELECtricity Trajectories” (MENA SELECT) project in Morocco, Jordan and Tunisia.

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ABREVIATIONS AND ACRONYMS

BMZ	Bundesministerium für wirtschaftliche Zusammen-arbeit und Entwicklung
CAR	Cardinal ranking
DAD	Decide, announce, defend
DEAD	Decide, educate, announce, defend
EIA	Environmental impact assessment
GIS	Geographical information system
MAUT	Multi-attribute utility theory
MCDA	Multi-criteria decision analysis
MENA SELECT	Middle East and North Africa Sustainable ELECtricity Trajectories
MLP	Multi-level perspective on sustainability
NDC	Nationally determined contribution
NGO	Non-governmental organisation
NIMBY	Not-in-my-backyard
SDG	Sustainable Development Goals
SIA	Social impact Assessment
SLO	Social license to operate
TM	Transition management
UN	United Nations
VROM	Dutch Ministry for Housing, Spatial Planning and the Environment

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INTRODUCTION

Energy transitions are complex and interlinked alterations of social relations with a long-term perspective. Decisions taken today influence the future decades from now and initiate social transformations running deep in the socio-economic fabric of societies, change production and consumption patterns, alter lifestyles and social relations, thus affecting social norms, belief and values systems. Such fundamental shifts within society are potentially destabilizing as they give rise to conflicts of interests over power, resource allocation, visions and objectives, political and economic means, as well as a fair sharing of burdens and benefits. This makes energy transitions a sensitive, inherently conflictual process of social change that requires conflict-sensitive management and balance of interests. At the same time, the impacts on society of the decisions taken must be continually reassessed.

Many countries in the Middle East and North Africa (MENA) embark on an energy transition to unlock their dependency on fossil fuels. To that aim, national governments have set forth ambitious plans to quickly expand the share of renewable energy (RE) technologies in the electricity mix by 2030. Factors such as high national dependency on energy imports from fluctuating world markets and conflict-ridden neighbour states, steadily increasing domestic energy demands and heavily drained state budgets limiting strategic investments capabilities have raised the awareness among regional decision-makers of the non-sustainability of their current electricity generation system.[1] The uprisings in 2010/11 and the ever since continuing social tensions over people's political and economic deprivation have put Arab governments under pressure to urgently respond to long-neglected developmental needs of the people, demanding improved perspectives for their livelihood and a political voice. This places the respective governments' energy transition strategies in a high-risk context of socio-political volatility with the potential of further straining sensitive state–society-relations. Neglecting the necessity of managing conflict potential among different interest groups as well as the general public could excite opposition or even resistance against meaningful progress in the energy transition, thus putting the entire energy transition at risk of failing or ultimately harming the legitimation of the state as caretaker of public welfare.

1 In addition to domestic pressures, governments are committed to international obligations. The "Nationally Determined Contributions" (NDCs) define their share in mitigating global climate change under the Paris Agreement.

To better understand societal implications in the wake of energy transitions, qualitative social science in the field of energy research—a field currently dominated by economists, natural scientists, and engineers preferring quantitative methods (Sovacool, 2014), needs to be strengthened. The project "Middle East and North Africa—Sustainable ELECtricity Trajectories" (MENA SELECT) investigates the governance of energy transitions in Arab countries from a social science perspective. The project "Middle East and North Africa—Sustainable ELECtricity Trajectories" (MENA
SELECT) addresses both dimensions of the knowledge deficits through a transparent, inclusive and participatory research process implemented in Morocco, Jordan and Tunisia. The research aim was 1) to identify possible areas of contestation and lines of conflict among social interest groups and 2) to assess the potential of different selected electricity generation technologies to achieve societal support.

The theoretical framework is provided by the transition management (TM) approach from a perspective of social practice theory. TM is a governance approach introduced by the Dutch government in 2001 (VROM, 2001) to break with established practices in environmental policies. TM is about creating a safe space for more participatory, inclusive, and horizontal policy development in a "governance niche of opportunity" offside day-to-day political business (Rotmans, Loorbach, & Kemp, 2007, p. 5f). TM offers a suitable conceptual framework to inspire the proj-ect's research because it introduces an innovative format of multi-stakeholder dialogue, which is novel to the political culture in the MENA region.

To theoretically deepen the understanding of the social dimension of energy transitions and to underpin the TM-approach, in this *Paper*, the authors draw on social practice theory. It offers a critical perspective on how energy systems are intertwined with social relations and how the pathway of energy transitions is determined by attitudes and decision-making of social interest groups and power relations. Social practice theory in energy research is often used to understand attitudes, behaviour and choice (ABC approach) of individuals (Shove, 2010). Social change, however, can neither be fully comprehended in both theoretical and practical terms without taking into account collective patterns of thinking and acting that are expressed in social relations and determine collective decision-making. Social practice theory thus enhances capabilities to understand social change as regards energy transitions by first, embedding the role of technologies in social relations, and second, opening the perspective on knowledge and power in decision-making processes.

This *Working Paper* does not contain research results or further background analysis of the case countries. These are presented in distinct project publications. The purpose here is to demonstrate the project's theoretical and methodological underpinnings and an account of its mixed method approach. It mainly addresses the academic reader and exemplifies a more social science-driven approach to research on the social dimension in energy transitions. With the *Paper*, the authors also hope to appeal to decision-makers and raise awareness of the social meta-dimension of energy planning that goes well beyond questions of a mere project setting, but encompasses visions of a better life. Chapter 1 outlines the theory of social practice. It enables as a theoretical foundation an understanding of energy transitions as a process of social change involving technologies for electricity generation, while highlighting underlying power struggles and social conflict potential critical to conflict-sensitive transition governance. Chapter 2 outlines the concept of TM and carves out the critical issues taken up in the research. Chapter 3 continues with describing the workshop design, tools and methods applied in accordance with the theoretical and conceptual framework. Chapter 4 gives a brief outlook on data analysis, while Chapter 5 offers some concluding reflections on the workshops.

1 CONCEPTUAL APPROACH TO SUSTAINABLE AND CONFLICT-SENSITIVE ENERGY PLANNING

1.1 Understanding the social dimension of energy transitions

1.1.1 Energy transitions to sustainability

Socio-economic and human development challenges of today's societies cannot be adequately tackled without acknowledging the role of energy and how we produce it to power the devices we use for production, sustaining our livelihood, means of communication and information, personal and collective comfort as well as for prospects for economic and human development. As Wittmayer et al. (2017) put it, energy transitions are radical transformations of societies in response to persistent challenges in modern societies, which are global climate change, depletion of fossil resources and pollution. Energy technologies and social relations are closely intertwined in 'sociotechnicalregimes'. The term refers to the established structures and cognitive patterns along which people construct their social relations. Industrial and post-industrial societies are "locked-in" in unsustainable, fossil fuel-based energy systems. Energy transitions change a sociotechnicalregime to another, i.e., locking out of the structural dependency on fossil fuel for energy production (Elzen, Geels, & Green, 2004, p. 7) and switching to a more sustainable energy system. In each sphere, changes follow their trajectories at different speed, but still are connected to and influence each other (Rotmans, Kemp, & van Asselt, 2001, p. 16), which makes energy transitions "about interactions between technology, policy/power/politics, economics/business/markets, and culture/discourse/public opinion" (Geels, 2011, p. 25). Energy transitions to sustainability consist of many different social fields with their respective paces and trajectories. A national energy transition, thus, consists of a multitude of simultaneous, overlapping and mutually dependent processes of social change (Meadowcroft, 2009, p. 326ff).

To understand the mechanisms at work in energy transitions, Köhler (2009) suggests a multi-level perspective on sustainability (MLP) along three levels of analysis: Landscape (the macro level), regimes (meso level), and niches (micro level).

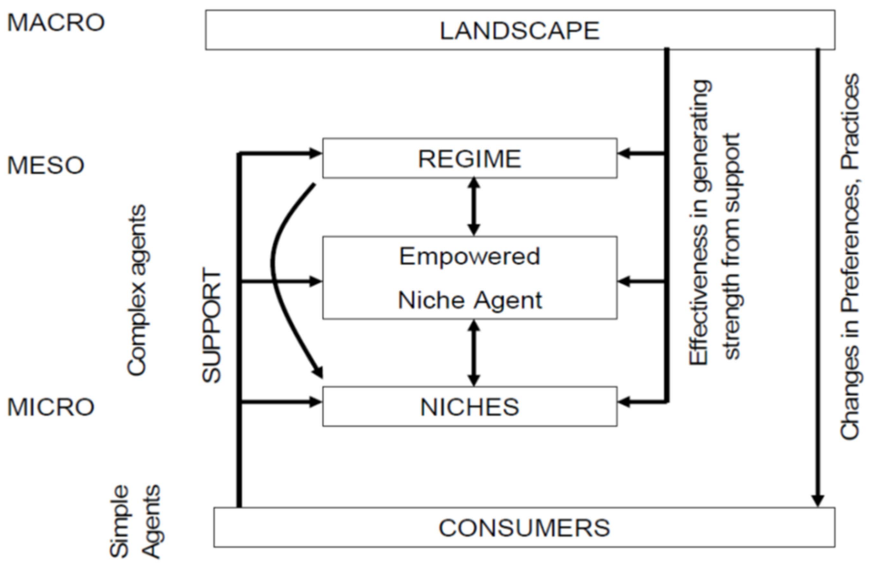

Figure 1: Multi-level model of transitions (Köhler, 2009).

'Regimes' of sociotechnicalsystems refer to the elements and linkages of social practices of social groups, through which sociotechnicalregimes are reproduced in a multi-actor network (Geels, 2004, p. 33f). Sociotechnicalregimes are generated through special interest groups, like engineers, policymakers, scientists, users and economic actors. These groups collectively, but from their very own scope of interest, reproduce and stabilize certain technological developments (Geels & Schot, 2007).

The social practices these groups cultivate are aligned and coordinated with each other through rules, processes, institutions, common framing, meanings and mentalities that aim at maintaining the sociotechnical regime. Bijker (1995, pp. 123ff, 264) calls this "technological frames", which stabilize sociotechnical regimes in all social relations. This means, the aggregation of different social practices within and among these groups for the regime level of sociotechnical regimes. Energy transitions, thus, require changes and innovation to social practices by all these actors and their interaction and cooperation among them. Though there is pressure on the regime level to adapt to broader societal developments (Geels, 2004, p. 64), there are considerable constraints to changes on the regime level. On the one hand, there are the actors who defend their vested interests against too radical changes that could harm their benefits. On the other, there are actors entrenched in their acting and thinking in their social practices, which makes it more challenging to "think outside the box".

Such radical innovations are developed on the micro level of 'niches', protected from the pressures of markets and regimes under different conditions. In the safe space of niches, pioneers of transitions get creative, engage with each other, produce new knowledge and engage in learning processes and experiments (Geels, 2004, p. 35; Loorbach & Rotmans, 2010, p. 7). Innovations present solutions to challenges or bottlenecks, which put regimes under tension (Berkhout, Smith, & Stirling, 2004, p. 55). It is difficult for innovations to break through from the niche since regimes impede sudden changes that do not match the prevalent practices in the sociotechnical system (cf. Geels, 2002, p. 1257). They successfully spread beyond the niche by linking up with the incumbent regimes and by recruiting regime actors and (Geels, 2002, p. 1261). The MLP model assumes that change flows in a bottom-up approach from niches to regimes, and not top-down from regimes to niches.

Sociotechnical systems are embedded in "deep structural trends" of 'landscapes'. A sociotechnical landscape contains, for one, slow-changing factors (spatial and material arrangements like cities, infrastructure and industry sites) and further, the cultural and normative values, broad political coalitions, long-term economic developments and environmental factors (Geels, 2004, p. 34). Landscapes also include sudden shocks like wars, financial or political crises, which can be seen as sudden outbursts of structural tensions that have accumulated over time. Geels & Schot (2007, p. 400) argue that landscapes lie beyond the immediate control of regime actors. While acknowledging that these structural factors are cumbersome and change only slowly, the counter-argument is that it is the very idea of energy transitions to redesign infrastructure in transport, the location of industrial and agrarian production as well as urban planning and architecture. Hence, the sociotechnical landscapes of a society should not be understood as an *externality* to energy transitions. It rather represents the manifestation of practices. Attitudes, perceptions, expectations, needs, desires, and human practices must be understood as located *within* and determined by the landscape (Shove, 2010, p. 1278).

The key to sociotechnical change is the transformation of regimes either through a gradual evolution or under the pressure of radical innovations. A sociotechnical landscape changes as a result of altered regimes. Smith, Stirling, & Berkhout (2005) identify three critical functional factors to regime transformation: First, regime actors need to articulate a particular problem which forces them to act, and they formulate the direction of change necessary to respond to the problem. Second, these actors need to have the resources to implement the needed change (knowledge, capabilities). Third, the responses of the various actors need to be coordinated. In other words, regime actors need to coordinate and harmonize their efforts to move into the same direction of social change.

1.1.2 How sociotechnical regimes shape social order

To understand the social dimension of energy transitions as social change, it is necessary to look at how sociotechnical regimes consist of social practices and how these practices emerge. Social practice theory elucidates the combined role of technologies, meaning and knowledge in the construction of social order. Social practices are routinized behaviour enacted in specific moments and contexts as a pattern of doing things, which transcends time and space of social relationships (Giddens, 1984, p. 80). The repetition of practices over time constructs a social reality which becomes manifested in symbols, speech, architecture, infrastructure and artefacts (Schmidt, 2012, p. 45f). As such, practices have the characteristic of being both a structural, systemic 'entity' and a momentary 'performance', i.e. how people do certain things in a particular social context (Schatzki, 1996, p. 41). The physical structure of societies is produced through social practices, e.g., like the energy infrastructure evolves from industrial and urban practices.

According to the model of Shove, Pantzar, & Watson (2012, p. 22ff), social practices consist of three *elements* that are linked to each other in mutual determination while each still posses its particular trajectories of evolution: Materials, competence and meaning. *Materials*, such as electricity generation technologies, are interwoven with social practices (Reckwitz, 2002, p. 149). They form the physical infrastructure to which social activities refer to, e.g., political decisions, industrial production and economic activities. As such, they carry social meaning (cf. Schmidt, 2012, p. 65), which

frames their purpose for society and how members of society problematize their present and future This is further expressed through the production of artificial materials, like technologies such as for electricity generation. *Competence* refers to the know-how that is needed to perform a particular practice, including the skills and understanding of the act itself. This goes beyond the mere execution of an action by comprising the shared knowledge of how to do it and how to do it 'right'. It implies a normative scheme to assess the correct and appropriate performance of a practice. This normative frame is justified and legitimized by the social *meaning* of a practice, which defines the social purpose of a practice and how it is supposed to be exercised. This meaning mirrors people's interpretation and social construction of their world, the social process of sense-making (Reckwitz, 2008, p. 191).

1.1.3 Social practices, power and knowledge: The conflict dimension to energy transitions

Social practices arrange people and things into a social order (Schatzki, 2002, pp. 38, 70). They construct power relations by stratifying societies into communities, classes and hierarchies through defining roles and identities along social practices, e.g., through division of labour, social functions, symbols or responsibilities (cf. Schatzki, 2002, p. 49; Schmidt, 2012, p. 48).[2] Along with these specific tasks or roles, the groups generate particular knowledge and competencies; they become experts in what they do, and they guard that knowledge as it legitimizes their social position. Shared practices generate 'insiders' and 'outsiders' to a group, positioning its members within society (Shove et al., 2012, p. 54). These insider groups have the "privilege of knowledge" (Foucault, 1982, p. 781), which they tend to keep within the group of actors, who benefit from that knowledge. Regarding power relations, this creates what Giddens (1984, p. 258) calls "structures of dominance", through which some groups exert control over the allocation of resources and the authority to do

so, while other interest groups are excluded. As social practices constitute the

[2] Scholars of social practice theory oppose the logic of dividing societies into functional systems as it is assumed in the TM-literature. To Schmidt (2012, p. 24), 'system' and 'functionality" are mere scientific constructs without empirical foundation in social relations. Related to the critique of system theory, Giddens (1984, p. 229) argues against an evolutionary model of social change, as this, too, presumes system functionality, which perceives society as a unified, coherent, biological system. It assumed that such alleged social systems have a clear boundary to an 'outside', which forms a context, to which systems adapt. From the perspective of practice theory, the term 'system' is already problematic as it assumes linkages of practice based on causality, where different acts follow each other in a logical term. To reconcile the TM-concept and social practice theory to a certain extent, it must be noted that TM is not an onthological concept, but a heuristic one seeking to grasp the complex dynamics of transitions (Geels, 2002, p. 1259).

perceived social reality of the individual and conditions people's mind and action (Schatzki, 2000, p. 103), established social stratification and power relations imposes itself as reality which is not actively opposed as long practices are reproduced uncritically (Mielke et al., 2011, p. 14). Social order, thus, is maintained by those included in a group controlling certain practice as well as those, who tacitly accept and submit to what that group does (Bourdieu, 1985, p. 728).

This exemplifies how power and knowledge are intrinsically intertwined (Foucault, 1991, p. 27) and how knowledge as an element to social practices draws social boundaries and power relations. Following the definition of power given by Giddens (1984, p. 14), those who are allowed to take part in generating knowledge and who are included in shared practices of political decision-making have the "capacity to make a difference". The insiders to decision-making have power over resource allocation, while the outsiders can only exert limited or indirect influence, e.g. through public pressure. A fundamental driver of social dynamics is the struggle between those in power and those who challenge them, for instance when citizens mobilize against corrupt elites or government policies. However, resistance or opposing existing power does not necessarily aim at the dissolution of the institution of power or the group holding power, nor does it aim at taking the resources under its control. Instead, opposition is often directed at the technique and form power takes in its execution and challenges the knowledge, competencies and qualification linked to it (Foucault, 1982, p. 781)—in other words, the way of how diverging social interests and the power struggles related to it are governed.

The tendency in these social conflicts is that power relations shift from the established centre of sociotechnical regimes—mirrored in dominant actors and monopolies in politics, administration, economy and science—to new actors. These shifts run along both the horizontal axis as well as the vertical, e.g., through the decentralization of infrastructures, decision-making processes, knowledge production and diffusion or discourses. Energy transitions implicate changes to the collective conception of social roles of certain actors, e.g., the role of the state, policymakers, administration, scientists, private businesses, or consumers. Since energy transitions alter the interaction among these social actors, social roles as such can be "in transition" (Wittmayer et al., 2017). In this process of change, contesting interests and expectations of social actors can collide, e.g. over the allocation of resources, defending decision hegemony against new players, exclusion of social groups, or agenda- and priority-setting. The uncertainty over this social conflict potential emphasises the necessity for conflict-sensitive governance with the ability to respond to and mitigate social conflict among stakeholder groups. Hence, the critical question, Geels & Schot (2007, p. 399) pose in reference to the technical dimension of grid stability, can be reformulated to apply to the social dimension: How can sociotechnical regimes of a society be transformed, without too much disruption to the social order?

1.2 Energy transitions as a challenge to governance

1.2.1 Problematizing the knowledge deficit

Energy transitions to sustainability require shifts in how people understand themselves and their societies in the context of a world of finite resources and, thus, re-interpret their collective and individual way of life and to change practices of production and consumption accordingly. According to Voß, Bauknecht, & Kemp (2006), sustainability is a "specific kind of problem framing which emphasises the interconnectedness of different problems." Solving such interconnected problems of sustainability, Voß et al. (2006) argue, requires to transgress cognitive, evaluative and institutional boundaries. Considering the closed circles of knowledge production and decision-making and how this limits collective capacities to address complex and contingent challenges, energy transitions to sustainability are concerned with their own conditions of decision-making on how to govern the social transformation (Voß & Bornemann, 2011). The challenge of how to govern energy transitions in a socially compatible way points directly to the nexus of power, knowledge production and the social practice of decision-making, to which policymaking is subjected (cf. Valkenburg & Cotella, 2016, p. 3). A closed circle of actors controls energy policies and the administration of their implementation. This has an implication for the kind of knowledge, attitudes and expectations that determine decision-making processes and results as well as the power relations among social actors.

The uncertainty and contingency of energy transition pose a significant knowledge deficit. Not only because it is impossible to predict the future outcome of today's decisions, but also because even knowledge available today is incomplete and too complex to be fully comprehended. Instead, experts in different domains try to approximate and make sound and well-founded assumptions to base their decisions on. In particular, in the dominant techno-economic perspective of energy transitions, the assumption prevails that the involvement of technical experts remedies the management problem of complex projects. Brix (2015) argues that if decision-makers neglect to include experts on the matter at hand to make decisions on a better-informed basis, projects are likely to fail. However, there are no technical fixes to social problems. That is why complex policy problems like designing energy transitions cannot be assumed to be solved through experts for two reasons.

First, even scientifically produced knowledge is incomplete and the product of an interpretation based on a selection of data. It further lacks critical reflection of the content of the knowledge, which is assumed to be profound, legitimate and correct. Expert knowledge and political and administrative control over decision-making processes alone neither ameliorate the primary knowledge deficit nor reduce the complexity of the process. The problem-solving skills of actors are limited to the cognitive routines they constructed in the socio-technological system they reproduce (Nelson & Winter, 1982, p. 86). This is a principal dilemma that needs to be acknowledged in decision-making processes.

Second, considering the intertwining of power and knowledge, it must be questioned, *whose* knowledge is regarded as being "expert knowledge" and is included in decision-making. The selection of whose knowledge and whose voices are included in a political process is already an exercise of power (Gaventa & Cornwall, 2008). Established practices have manifested power structures, in which some social groups benefit from the laws and regulations in place over others. Any attempt to reform these frameworks to the degree that it could harm vested interests of the benefiting groups will evoke powerful opposition to change (Loorbach & Rotmans, 2010; Nelson & Winter, 1982b, p. 134). Their objective is to control and model the pathway according to their interests and push back on more radical innovations emerging from niches. Bijker (1995, p. 4) uses the term "politics of technology" to describe how technologies and the knowledge, skills and meaning underlying it, become an artefact of power.

1.2.2 Energy transition management approach

Energy transitions are reflexive, since any decision today changes the world tomorrow, while the uncertainties about these outcomes "do not simply add up, but reinforce each other exponentially" (Valkenburg & Cotella, 2016, p. 3). This means that in the face of such a high level of contingency, the long-term policies cannot be defined ex-ante to guide the entire process of the transition, but need to be evaluated and adapted along the path (Voß et al., 2006, p. 19). "Transition management" (TM) is the attempt of multiple actors to collaboratively steer the process of switching from one sociotechnical regime to another as a purposeful evolutionary process along a desirable path through 'guided variation' and 'selection' (Meadowcroft, 2009, p. 324ff). TM is "not an attempt to control the future but an attempt to incorporate normative goals into evolutionary processes in a reflexive manner" (Kemp & Loorbach, 2006, p. 103). Reflexive governance means that decisions are subjected to a deliberate process of monitoring cause and effect of decision to assess the appropriateness of achieved outcomes to meet the defined objectives of the transition. Since not one actor or social group has the capacities or knowledge to assess effects in different social dimensions accurately, reflexive governance demands the inclusion of actors from all societal levels in integrated, transdisciplinary knowledge production. Consequently, governance processes need to become more inclusive, transparent and open to diverging perspectives, requiring stakeholders to manage the novel plurality of vested interests in a constructive dialogue to mitigate the potential friction to social peace, that could ultimately lead to public resistance against the implementation of energy transitions (Rotmans et al., 2001, p. 25).

To achieve more inclusive governance of energy transitions, policy instruments and procedures are needed that move from conventional, vertical top-down coercive modes towards more inclusive, horizontal and bottom-up formats (Valkenburg & Cotella, 2016, p. 8). This requires different practices of governance with a revised conception of the state in its dual role as being the most powerful actor and decision-maker concerning policies of the energy transition as well as conflict-sensitive intermediary between contesting societal actors to balance vested social interests and to ensure public welfare. Along with the shift in actors' roles and change to social practices, a society's established governance paradigm is as well under pressure to adapt.

The concept of a "niche of opportunity" can be applied here as well. A governance niche of opportunity provides societal interest groups with a stake in an inclusive multi-stakeholder format for initiating mutual learning and experiments with new ideas and joint approaches to tackling challenges of the energy transition. Niches of opportunity are not isolated from the real world like scientific laboratories are, nor are participants unbiased in how they engage with each other (Voß & Bornemann, 2011). Hence, interests collide, and conflicts arise in these niches as well, but they can be managed to lead to more constructive dialogue and compromise because no actual decisions or commitments with immediate political implications have to be made. Nonetheless, participants can carry the insights and knowledge generated as well as the personal and institutional networks emerging from this process beyond the niche into the regime level as a first step to change.

1.2.3 From where to where? A social vision to sustainability

In light of uncertainty and contingency of decision outcomes—regarding the potential benefits of techno-economic solutions as well as social conflict dynamics due to changes in power relations—energy transitions need a collectively shared vision to give orientation for policymaking as well as to society to reconstruct their worldview. Visions are "emotionally appealing descriptions" of the problem and the pathway to solving it (Lilliestam & Hanger, 2016). Based on beliefs, aspirations, attitudes and purposes, visions enshrine the expectations about how society would be better in the future compared to the challenges today. They are both normative and practical instructions as to how practices need to be changed (cf Berkhout, 2006). Visions function as a framework for formulating short-term term objectives and evaluating existing policies (Rotmans et al., 2001, p. 23), thus constitute the guiding reference point for multi-sectoral policy formation and decisions on intermediate steps on the roadmap to achieving the vision. The social vision for the energy transition is not rigid and final. Its evolution is contingent, too, because it is subjected to and advances with the energy transition. Visions get re-evaluated, and goals, milestones and measures get adapted according to the lessons learnt of previous decisions (Rotmans et al., 2001, p. 23). This requires, of course, a systematic, reflexive cause-effect-evaluation of policies designed for energy transition, including their implications on social relations. Consequently, visions are are the framework for evaluation for social change.

Visions in the social sense are a normative imagination of a better life in the future, behind which people can rally and to which they are willing to contribute. Generating a collectively shared vision is a contentious process among societal actors within a public debate, a constructive competition of different worldviews, attitudes and preferences. A contentious vision-building discourse is important to the process of energy transitions, as it helps to identify and frame today's challenges and to find a common language as a basis for strategic solutions. Energy planning policies, thus, must be concerted with a social discourse on where the transition is supposed to lead and how to make sure that the adequate steps are undertaken to move into that direction.

1.3 Conceptualizing societal support

Societal opposition against energy policies and energy infrastructure projects is a fundamental risk to the implementation of national policy objectives in energy planning (Cohen, Reichl, & Schmidthaler, 2014; Devine-Wright, 2007; Wüstenhagen, Wolsink, & Bürer, 2007). Since a national energy transition is a multi-actor process that alters social relations on all societal levels, social actors need to support the transition process from its strategic planning on the macro-level down to concrete local project implementation on the micro-level. Policymakers and project developers fear public mobilisation against projects. However, Devine-Wright et al. (2009) found that there appears to be much more potential for support of energy projects in communities than there is for resistance. So what determines public support for the implementation of energy transitions, especially when it comes to concrete local energy projects?

Cohen et al. (2014, p. 5) assume an increased potential for societal support when the aspects that *increase* welfare balance the impacts that *decrease* welfare. Apart from balancing interests and expectations of different social actors, this adds another layer of weighting to the equation on how to generate societal support. Benefits of a policy or a concrete energy project must exceed adverse impacts to the public. Rogers, Simmons, Convery, & Weatherall (2008) stress that willingness to actual local control over projects is significantly lower than the willingness to support projects through consultation provided the community stands to gain from them. The outcome-oriented perspective is only part of the puzzle.

Taking a process-oriented position, Boutilier (2014) emphasises the need for a "Social License to Operate" (SLO). Traditional top-down decision-making following DAD ('decide, announce, defend') or DEAD ('decide, educate, announce and defend') are no longer acceptable to communities and thus lack social sustainability (Vanclay, Esteves, Aucamp, & Franks, 2015, p. 20). The right to participate is enshrined in societies' constitutions and international agreements guaranteeing citizens a stake in local projects, e.g., through access to information laws, rights to participate in decision-making and to proceed legally on matters of environmental protection. Legitimate concerns and expectations on the part of affected communities towards the impacts of projects onto their living environment, including socio-cultural aspects concerning possible disruption of place attachment and local identities, need to be included (Devine-Wright et al., 2009, p. 10).

Yet, societal support cannot be solicited through measures like creating benefits to buy-in communities or through mechanisms of participation. Public opposition has been falsely framed in the NIMBY-discourse as an obstacle that needs to be overcome through participation in decision-making (Devine-Wright, 2005; van der Horst, 2007) as if achieving societal support was a matter of a single, materially, temporally or spatially confined measure. Contributing to public welfare or enabling participation in project implementation is no guarantee for achieving sustainable societal support. On the contrary, participation might well be an opportunity to increase effective resistance. In the theoretical framework of social practice theory, societal acceptance is the process of how people make sense of new energy technologies that are being introduced into their daily lives and their imagination of their future. Meaningful participation to generate societal support goes well beyond instrumental mechanisms on technical implementation.

To that end, meaningful participation and the result of this sense-making process is not teleologically determined. It is an open and contingent social process, in which expectations, attitudes, beliefs and preferences compete over the interpretation and shaping of the future. Policymakers and project developers must acknowledge that beyond energy planning and project implementation there is a more profound process of social transformation, which on each level and each case needs to be re-negotiated among different interest groups. The objective is to respond to a nexus of persisting problems with a socially compatible and sustainable solution. In line with Batel, Devine-Wright, & Tangeland (2013) and to strengthen the notion of a public actively imaging and shaping their lifeworld and expressing this either in opposition or support, we prefer the term "support" over the more commonly used term "acceptance".

2 ELICITING STAKEHOLDER PREFERENCES AS DETERMINANTS IN ENERGY PLANNING

2.1 Research objective and design

In accordance with the conceptualisation of societal support provided in Chapter 1.3, an assessment of the potential of different electricity technologies to gain societal support needs to evaluate their potential beneficial and detrimental impacts on public welfare and acknowledge contesting preferences, attitudes and perceptions of different social interest groups as critical co-determining factors. The overall research objective was to evaluate the multi-objective and value-biased complexity of future technology choices in the electricity sector of Morocco, Jordan and Tunisia against a) several sustainable development objectives and b) different societal preferences to identify the potential for societal support or opposition of selected electricity generation technologies.

As presented above, outcomes of the decision, i.e., the actual impacts the technologies cause once they have been deployed, are uncertain as is the potential of these technologies to indeed meet the defined objectives of the transition. To address these uncertainties, a Multi-criteria decision analysis (MCDA) was conducted in a series of seven participatory stakeholder workshops. MCDAs are software-based tools which facilitate complex decisions by providing the decision-maker with a performance analysis of the selected choices along a set of criteria. The objective of the workshops was to elicit stakeholder preferences of electricity generation technologies and to identify possible lines of divergence or convergence in discussing key challenges to sustainable development in energy transitions in their respective countries.[3] The outcome of the workshop process was a ranking of selected technologies according to their potential to achieve public support.

The workshop series of the MENA SELECT project was designed as a participatory multi-stakeholder dialogue to bring stakeholders relevant to discourses on societal support of a sustainable energy transition in the case country. In line with the theoretical and conceptual framework on practices of reflexive governance and energy transition management presented in this *Paper*, the workshops constitute an experimental simulation of an inclusive governance approach with-

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3 The workshops described here were part of a workshop process conducted in the MENA SELECT project in each country. The evaluation of the different electricity generation technologies was followed by a multi-stakeholder workshop led by the Europa Universität Flensburg on modelling electricity scenarios for the respective country in 2050. From these scenarios, the stakeholders selected their most preferred one in a third workshop conducted by Wuppertal Institute for Climate, Environment, Energy.

in a "niche of opportunity". The workshops provided a transparent, open, safe and moderated space for sharing knowledge and mutual learning, in which underlying power relations were attempted to be mitigated as far as possible through participatory and inclusive scientific methods based on equal voice for each stakeholder. An additional aspect to the workshops was to enhance networking among stakeholders. Networks influence actors' ability for innovation and learning (Chan & Liebowitz, 2006; Freeman, 1979; Ibarra, 1993; Nelson & Winter, 1982a; Powell, Koput, & Smith-Doerr, 1996; Rowley, 1997). The workshops sought to offer stakeholders the opportunity to get recognised and connected beyond their usual circles.

The workshop methods were designed to prepare participants for being able to conduct the MCDA, following a carefully designed sequence of steps and methods, building up step-by-step the required knowledge and capacities among the participants to understand the complexity of the matter, to reflect and form an opinion and to facilitate a critical and constructive dialogue. The methodology and a description of the methods applied in the workshop are presented in the following chapters. The entire workshops series was prepared and conducted in collaboration with two local partners in each country, who brought a technical background in energy planning policies or research into the research teams[4] and were capable of implementing
social science methods. The local partners were intentionally chosen to moderate the workshops to capitalize on their expertise on the domestic context and present it to the participants as well as to increase local ownership of the project activities and acceptability of the workshop process to the heterogeneous mix of participants.

2.2 Stakeholder selection

The innovative aspect of MENA SELECT was to include a broad range of societal actors as representatives of key social interests. Different stakeholders were invited to critically engage with each other in a process of knowledge sharing and mutual learning guided by scientific methods. Hence, for many participants, the participatory multi-stakeholder format of the workshops was a novel experience. To ensure the reflection of different societal interests, perspectives and attitudes, a broad range of societal actors was invited to one-day-workshops. The research team categorized six stakeholder groups:

[4] Henceforth, the members of the MENA SELECT partner institutes in work package 2 are referred to as "project team". The group of project researchers and local partners in each of the case countries are called "research teams".

- **Policymakers and utility operators**, including representatives e.g., from the different ministries and agencies responsible for the national energy planning and implementation as well as the major grid operator;
- **Academia**, including researchers with backgrounds in engineering, social science, environment, economy and developmental studies;
- **Industry & finance**, including domestic project developers, domestic industries with vested interests in energy policies, supply and service companies, and project funders;
- **Civil society/National non-governmental organizations (NGOs)**, including NGOs active on the national level working on energy, climate change, environmental protection, social and economic rights, major unions;
- **Local communities**, including representatives from communities in the vicinity of existing or planned large energy infrastructures.[5]
- **Future leaders**, including young activists from university or civil society.

These six categories were created for organizational purposes and do not assume homogeneity in beliefs, interests, attitudes or perceptions among the participants. A series of seven one-day-workshops in each case country took place: One workshop for each stakeholder group, following the same concept and design and one final mixed workshop, to which two participants from each stakeholder workshop were invited to represent their group.

The stakeholders were selected through purposeful sampling (Palinkas et al., 2015) relying on the networks of the local partners.[6] The participatory research

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5 The aim was to give local experiences with different electricity technologies a strong voice in the process, since—contrary to the initial project plans—it was impossible to conduct research on the local level. Getting connected to local communities was particularly challenging in those cases where project partners had no networks from previous work in the country. Furthermore, not all technologies are deployed in every country, so there are no local experiences about such technologies' impacts on community life. Consequently, research teams in each country had to be quite practical about this group. In Tunisia, e.g., the team relied on their network with local NGOs working on loca sustainability and development in the areas with existing or planned large-scale electricty projects.

6 It must be acknowleded that even under most careful designs, there is the risk of neglecting social groups or misrepresenting their interests. MENA SELECT attempted to be as inclusive as possible as well as transparent about it, but selection inevitably entails exclusion. Exclusion not only stems from practical or logistical reasons, but again from a knowledge deficit. The general challenge to such experimental research is that stakeholders cannot be identified *ex ante* with absolute certainty about the prospective roles and level of contribution to the process they are about to embark on (Valkenburg & Cotella, 2016, p. 6). Those actors invited to the MENA SELECT workshops might cease their involvement in energy transition processes, while others, who were neglected, become more active.

process and the results are sensitive to the composition of the groups. To reduce the selection bias, additional criteria were set up to guide the invitation process:

\ Balancing presumed supporters of RE, fossil and nuclear technologies based on their field of activity and profession;

\ Drawing from different institutional and professional backgrounds to avoid the domination of particular disciplines, attitudes, interests or mentalities;

\ The organization's or individual's relevance in the respective fields;

\ Fair geographical representation from different parts of the countries;

\ Balancing representation from political, administrative and economic centres and peripheries;

\ Gender balance.

Despite considerable effort on the part of the research teams, it was impossible to always meet the criteria. Representatives had to be selected in the best interest of the project and the integrity of the workshops. One crucial determining factor was the size of the workshops. To safeguard overall workshop time-management, the feasibility of the different methods as well as considering the moderators' demanding task to facilitate such heterogeneous groups, the number of participants was limited to a maximum of ten. Unfortunately, considering male domination of certain social, public and professional positions, we had difficulties to ensure gender balance in the workshops. Reaching out to senior officials was particularly challenging. The invitation process required the research teams to intensively follow-up with the invitees on a personal basis to ensure their presence and participation. However, in some cases, confirmed participants cancelled on short-notice or were absent without prior notice.

2.3 Multi-criteria decision analysis and the potential for societal support

Multi-criteria decision analyses (MCDA) are integrated tools to support decision-makers in dealing with complex problems in the face of an overburdening scope of information to process and uncertainty and thus a knowledge deficit regarding the decision outcome. In MCDA's, the performance of selected decision alternatives is evaluated along a set of criteria according to stakeholders' preferences. The decision alternatives (electricity generation technologies) are measured through quantitative or qualitative indicators (attribute values) in each criterion. Each criterion in itself presents a sub-goal, which the decision-makers seek to either *minimize* (avoid adverse impacts) or to *maximize* (increase welfare benefits). However, sub-goals can be contradictory and have to be weighed against each other. Stakeholders thus rank and weigh the criteria according to their importance for achieving the defined decision goal (vision). Figure 2 shows the research framework built around the MCDA.

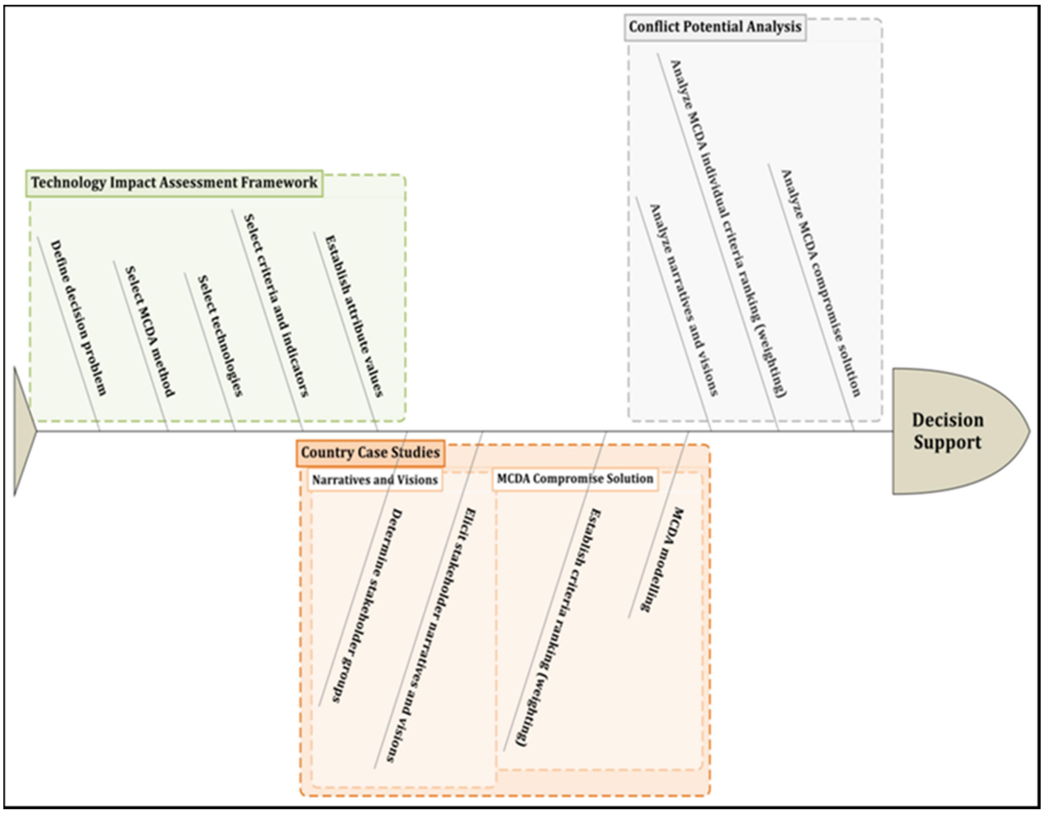

Figure 2: Research framework followed in MENA SELECT work package 2 (Schinke et al., 2017)

The decision-making challenge was defined as: *How can different electricity generation technologies contribute to sustainable development in Morocco, Jordan and Tunisia?*

The selected decision alternatives were

1. Utility-scale photovoltaic (PV);
2. Concentrated solar power (CSP);
3. Onshore wind;
4. Utility-scale hydro-electric power[7];
5. Nuclear power;
6. Bituminous coal;
7. Natural gas;
8. Heavy fuel oil;

[7] Hydro-electric power plants are distinguished according to their size (pico-hydro: < 5 kW; micro-hydro: 5 kW to 100 kW; mini-hydro 100 kW to 1 MW; small-hydro 1 MW to 20 MW; medium-hydro 20 MW to 100 MW; large-hydro > 100 MW). Utility-scale hydro-electric power plants are considered in this study to be all stations above the size of small-hydro that feed into the national grid.

9. *Rooftop PV*[8];
10. *Shale oil*[9].

The selection of technologies was made by the research team before the workshops during the preparatory phase under consideration of the national energy plans until 2030 of the respective case countries. Biomass and geothermic power were excluded during that assessment since they were not or only to a neglectable share part of the energy strategies. The time horizon of MENA SELECT goes beyond 2030 since current strategic technology choices made by governments had to be considered as intermediate determinants of the energy pathways until 2050. However, participants repeatedly requested to include both technologies in energy planning considerations. The selected technologies were only expanded explicitly to rooftop PV in Tunisia and to oil shale in Jordan to adapt the technology selection to the current energy plans in both countries.

The technologies were evaluated against a set of 11 socio-economic and environmental criteria[10], measured through 20 indicators, of which nine are quantitative and 11 quantitative[11] (presented in Figure 3). All data, sources and methods have been published in Schinke et al. (2017) and are available for free use. The project team selected the criteria in a process that included scientific literature review, a study of national energy policy frameworks of the case countries and the project team's prioritization. Ideally, the stakeholders themselves should have selected and defined the criteria according to which aspects of performance they deem important for their decision. However, this would have required a preparatory series of stakeholder workshops only to select the criteria followed by an operationalisation of the definition into indicators and the data collection. Such an approach, however, would have been significantly more complex and time-consuming and would have drained the project's resources. Furthermore, it would have posed the risk of stakeholder fatigue since the same participants would have to be engaged in the process for a lengthy period. To compensate for this methodological shortcoming to a certain degree, the pre-selected criteria were verified during each stakeholder workshop, and a gap analysis was conducted. Discussions and questionnaire results collected during the workshops showed that the suggested set of criteria was approved as satisfying and sufficient to the workshops' purpose.

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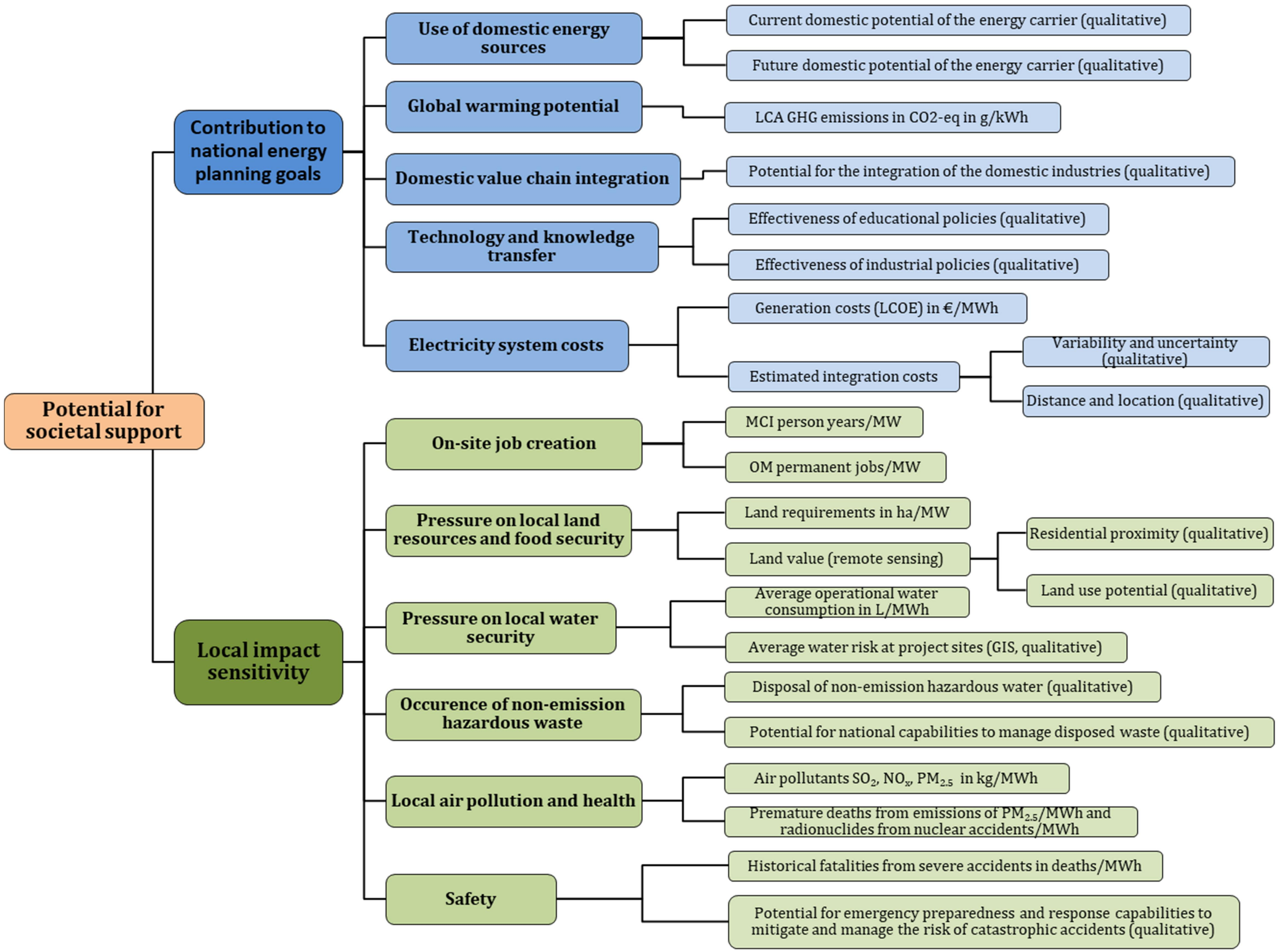
[8] Only considered in Tunisia.

[9] Only considered in Jordan.

[10] Critical techno-economic criteria of electricity grids usually prominent in MCDAs were excluded in work package two in line with its focus on socio-economic and environmental aspects to determine the potential for societal support. The techno-economic criteria were considered in MENA SELECT work packages1 and 3 instead.

[11] The technologies' attribute values were collected through an extensive review of academic papers, grey literature, industry reports as well as own data collection, e.g. through Geographical Information System (GIS) and expert surveys in all three countries.


Potential for societal support
Contribution to national energy planning goals
Use of domestic energy sources
Current domestic potential of the energy carrier (qualitative)
Future domestic potential of the energy carrier (qualitative)
Global warming potential
LCA GHG emissions in CO2-eq in g/kWh
Domestic value chain integration
Potential for the integration of the domestic industries (qualitative)
Technology and knowledge transfer
Effectiveness of educational policies (qualitative)
Effectiveness of industrial policies (qualitative)
Electricity system costs
Generation costs (LCOE) in €/MWh
Estimated integration costs
Variability and uncertainty (qualitative)
Distance and location (qualitative)
Local impact sensitivity
On-site job creation
MCI person years/MW
OM permanent jobs/MW
Pressure on local land resources and food security
Land requirements in ha/MW
Land value (remote sensing)
Residential proximity (qualitative)
Land use potential (qualitative)
Pressure on local water security
Average operational water consumption in L/MWh
Average water risk at project sites (GIS, qualitative)
Occurence of non-emission hazardous waste
Disposal of non-emission hazardous water (qualitative)
Potential for national capabilities to manage disposed waste (qualitative)
Local air pollution and health
Air pollutants SO_2, NO_x, $PM_{2.5}$ in kg/MWh
Premature deaths from emissions of $PM_{2.5}$/MWh and radionuclides from nuclear accidents/MWh
Safety
Historical fatalities from severe accidents in deaths/MWh
Potential for emergency preparedness and response capabilities to mitigate and manage the risk of catastrophic accidents (qualitative)

Two additional criteria, which are the most critical managerial elements to societal support, were addressed in the workshops:

\ *Procedural justice*, comprising access to information and meaningful participation in decision-making;

\ *Distributive justice* referring to benefit-sharing and compensation for adverse impacts.

Contrary to the eleven sustainability criteria, these additional indicators cannot be measured. For that reason, they were framed as the need for procedural and distributive justice and discussed separately in the concluding section of the stakeholder workshops.

In line with the conceptualisation of the potential for societal support as an effort to balance beneficial and adverse impacts of electricity-generation technologies, the criteria set was divided into two dimensions:

\ National level: The technologies' ability to contribute to national energy planning goals;

\ Local level: The technologies' ability to avoid adverse impacts on neighbouring communities on the local level.

The assumption is that the potential for societal support for a given technology increases according to the capacity of that technology to have a high contribution to national energy planning goals and low local adverse impacts. Societal support—usually framed as an evaluation criterion in MCDAs (Wang, Jing, Zhang, & Zhao, 2009)—is treated as output instead of input variable based on a set of eleven sustainability criteria. The MCDA uses the software DecideIT 2.101[12]. DecideIT is built on the multi-attribute utility theory (MAUT) based on the Delta method allowing to include uncertainty and imprecision of data and weights (Borking et al., 2011; Danielson, 2005; Danielson & Ekenberg, 2007; Danielson, Ekenberg, Idefeldt, & Larsson, 2007; Danielson, Ekenberg, Johansson, & Larsson, 2003).

For computational reasons, DecideIT 2.101 requires a so-called "most likely point", which describes the outcomes that are assumed to be most likely given the empirical evidence today. The most likely point was chosen to be the average for quantitative data and the median for qualitative data. Technologies are compared regarding the relative difference in performance of one alternative to

12 A license for academic use and intensive support to train the project team on the tool and to adjust the software to project needs were kindly provided free of charge by the company *Preference* through Love Ekenberg, Aron Larsson and Kjell Borking.

the average performance of all others by subtracting the sum of all alternative values divided by the number of all alternatives from the final maximum and the final minimum score. Taking the entire range of possible outcomes into account, technologies might show similar outcomes under certain circumstances. This makes a confident decision very difficult. Sundgren, Danielson, & Ekenberg (2009, p. 2) suggest a process, in which the comparison between two alternatives is gradually narrowed down towards the most likely outcome to identify the point at which one alternative outperforms the other under any circumstance. This contraction process is used in the analysis to determine the robustness of the MCDA result.

2.1 Stakeholder workshop structure and methods

The one-day workshops started by introducing the participants to the research team, to MENA SELECT framework, the work package objectives and the workshop agenda. Additionally, participants were given a presentation on the energy challenges and the status of the current energy plans in their respective countries. This was considered necessary to bring participants on par with the current level of knowledge about the energy situation. For the process of the MCDA, however, it was imperative that all participants shared the same minimum information on the decision context and were sensitized for the nexus of energy planning and sustainable development. Throughout the workshop, participants were provided with information critical to fostering the understanding of the issues discussed as well as to preparing the next methodological step. Participants were further provided with a 10-page handout containing the information necessary for following the workshop sections and discussions. Table 1 presents the basic structure of the stakeholder workshops.

	AGENDA ITEM	ACTIVITY
MORNING SESSION	Introduction to the workshop and energy planning for sustainable development	Presentation by the moderator
	Building a vision of sustainability for 2050	Participatory method
	Technology introduction	Presentation by the moderator
	Aspirations and concerns regarding the technologies in the context of the vision 2050	Participatory method
	Technology perceptions	Moderated round of discussion
	Introduction of evaluation criteria and gap analysis	Presentation by the moderator/open discussion
	Joint lunch	
AFTERNOON SESSION	Silent negotiation: criteria ranking and weighting	Participatory method
	Addressing critical issues (e.g., procedural and distributive justice, policy steps)	Participatory method/open discussion
	Presentation of MCDA-results, synthesis and workshop conclusion	Presentation by research team/open discussion

Table 1: Basic structure of the stakeholder workshops.

2.1.1 Vision-building 2050 and the role of technologies

In line with the concept of Transition Management (TM), complex decision-making such as the choice of electricity-generating technologies requires a vision describing the desired outcome of the decision. Vision-building exercises give a snapshot of the collective vision at that moment in time. As such it ought to be a reoccurring collective exercise. This is an important aspect of the needed reflexivity in the transition management process. Accordingly, the first step for the stakeholders was to build a collective vision of sustainable development until 2050. The common three-dimensional framework of sustainability was used, distinguishing society, economy and environment. Despite its conceptual limitations (cf. Seghezzo, 2009; Smythe, 2014), it was chosen due to its prominence and easy application to the method. The purpose of this method was for the participants to imagine the country in the year 2050, to build a common understanding of the transition objective and gain insights into the participants' interpretation, values, narratives and worldviews concerning sustainable development in their respective country. The question posed to the participants was

If you think of the situation in [Morocco, Jordan, Tunisa] *today, how do you envision your country in the year 2050?*

Each sustainability dimension was assigned a colour, and participants were handed a set of cards in the respective colours of the dimensions. They were asked to write down attributes of the envisioned future in keywords or short sentences. The moderator collected the cards and tentatively pinned them to the respective dimensions. In a joint discussion, the cards were discussed and clustered according to common themes. In the example depicted in Picture 1, society was assigned blue, economy yellow and environment green.

Picture 1: Vision-building 2050 (example).

Following the vision-building, the selected electricity generation technologies and some key facts regarding their technical and impact-related characteristics were explained to the participants, along pictures and schematics of the technologies.

After the technology introduction, the task to the participants was to imagine and discuss the role of the selected technologies in their vision 2050 socially, economically and environmentally. Following social practice theory, technologies are assigned certain meanings, values and expectations, which either change over time or become replaced by other interpretations. Expectations, needs, desires, beliefs, values and interests that underly aspirations and concerns about the future are not an *outcome* of transitions; they are instead a critical driver of change, which makes them an essential component of understanding stakeholders' preferences. The question posed to the participants was

How can electricity-generation technologies hamper or promote this vision 2050?

Participants again were given a set of two distinctly coloured or shaped cards to note down their aspirations on one and their concerns on the other, either in key words or short sentences. In the example shown in Picture 2, round white cards were used for aspirations and round red cards for concerns.

Picture 2: Completed vision 2050 including aspirations & concerns (example).

The exercise around building a vision for 2050 and eliciting the role of technologies in that vision was concluded with an open round of discussion on technology perceptions. Participants engaged in a moderated discussion on their attitude and view towards the selected technologies. At this point, participants had the opportunity to express their opinion on the selection of technologies.

2.1.2 Criteria introduction and gap analysis

In the next workshop step, participants were introduced to the set of sustainability criteria used to evaluate the performance of technologies in the MCDA (see Figure 3 on p. 26). The definition of each criteria was explained by the moderator and discussed with the participants. To enhance their understanding, some indicators of measurement and methods of data collection were briefly explained. Criteria can be understood and defined differently depending on the individual mindset and logical approach. Participants were invited to share their understanding of the criteria as far as it differed from the description used in the project. However, it is imperative to an MCDA process that all involved stakeholders use the same definition, since this has an immediate effect on the degree of importance they put on each criterion in the following ranking and weighting exercise. Therefore, particular attention was paid to explaining and justifying the criteria definition to achieve the participants' approval. During the discussion, the moderator pinned the criteria to the respective clusters on the vision 2050-board to show, how the participants' vision, aspirations and concerns are reflected in the set of criteria (oval white cards in Picture 2).

As mentioned before, one shortcoming of the MENA SELECT work package 2 was that the criteria had to be selected and defined before the field research. In the gap analysis following the criteria introduction, participants were asked if any aspect important to them is missing from the list of criteria. The additional criteria were duly noted. However, it was explained to the participants that their suggestions cannot be integrated into the research at that late stage in the process and must be recommended to be considered in future research. The research teams were very transparent concerning the limits of criteria selection, the assumptions underlying the definition and operationalisation as well as the collected data behind the MCDA. This transparency and critical self-reflection aimed to increase the participants' understanding that a scientific approach to decision-making and the expert knowledge behind it, is incomplete and uncertain. Scientific approaches cannot capture the entire complexity of decision problems, nor can they offer a technical fix or present a definite solution.

2.1.3 Criteria ranking and surrogate weights

To introduce stakeholder preferences into the MCDA, the selected criteria were ranked and weighted by the stakeholders as a group. To manage a group compromise among heterogeneous stakeholders in a collective ranking and weighting of criteria, a combination of the revised Simos method adopted from Figueira & Roy (2002) and silent negotiation proposed by Pictet & Bollinger (2005) was conducted. Surrogate weights were calculated from the criteria ranking using the CAR method (CArdinal Ranking) (Danielson & Ekenberg, 2016). The question to the participants was

How do you rank the criteria according to their relative importance to achieving the vision 2050?

Picture 3: Using cards to rank and weight criteria (example).

The Simos method is a card-based cardinal ranking method for eliciting weights for non-compensatory out-ranking MCDA-methods allowing for indecisiveness and incomparability in the judgement of the relative importance of criteria to the envisioned decision outcome. By moving the cards up or down on the table, the decision-maker can indicate the degree of importance of the criteria. The relative weight distance between two criteria can be illustrated by placing a certain number of blank cards in between them. The procedure's simple concept and visualisation make it easy to understand and implement. It provides a structured process which allows workshop participants to gradually develop their preferences along reflecting on the complexity of the decision problem.

This Simos procedure was conducted in a silent negotiation, during which participants were not allowed to talk to each other except for a brief round of open discussion. The silent negotiation approach is a transparent, inclusive and democratic method, in which each participant has an equal voice. Through the ban on speaking, rather timid participants are protected from more vocal personalities who are likely to hog the process and dominate the discussion. Hence, power relations are mitigated to a certain degree, yet not entirely, since personal, positional and institutional power imbalances still influence participants' behaviour. By taking turns in moving the cards through several rounds, participants were encouraged to acknowledge the preferences of the others and integrate them into their own ranking suggestions. Through observing the movements of others closely, participants were able to see who they potentially agree or disagree with. Herein lies, however, a sensitive spot. Knowing the others' preferences, participants can use their position in the order and their movements strategically to limit the degree of influence the next person has on the ranking. This enables individuals to exert power and even spoil the entire process. To eliminate at least the factor of order, the beginner of each round was drawn by lot.

The method was applied as described in the following. Each criterion was written on a coloured card. The description of the criterion was noted on the back for participants to look it up and reassure them of the applied definition. The cards were lined up in a horizontal row on a table to indicate their equal importance. Participants were asked to group around the table and to organise the criteria collectively according to their importance in an ordinal ranking from the most important criterion at the top to the least important at the bottom of the table. Criteria were allowed to be put on the same rank to express their equal importance. The ranking exercise was conducted in four rounds. The number of individual moves was reduced in each round:

- 1st round: eight moves;
- 2nd round: five moves;
- 3rd round: three moves;
- Open discussion;
- Final round: two moves.

The reduced possibilities to move criteria forced participants towards the end of the silent negotiation. Between the third and the fourth round, participants were given the floor to exchange arguments, express opinions and make statements about their preferences to convince others and to reflect once again before using their two last moves presumably on those criteria that most important to them. In consequence, the group result does not balance out all involved stakeholder preferences in a consensus. It is a methodologically generated compromise.

After the completion of the ranking, the blank cards were introduced. At this point, the task was to indicate the degree of importance between the criteria (except those on the same rank with equal importance). However, the degree of importance between criteria might differ making it necessary to introduce a method to distinguish varying distance between the ranks. The question to the participants was:

Is it necessary to distinguish the degree of importance between any two criteria ranks?

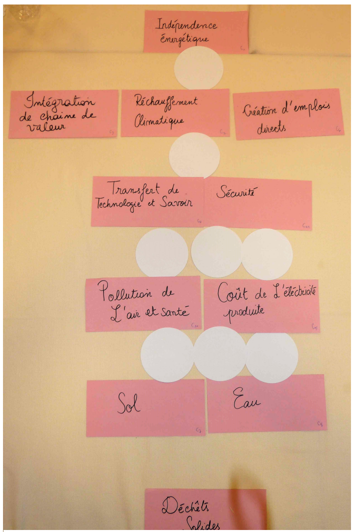
People have different ideas of weight, so quantifying these in numbers is only one option, an option that may not necessarily suit everyone. To at least not restrict participants in how they translate their idea of weight into numbers, the number of blank cards that can be inserted between two criteria is supposed to be infinite
(theoretically). Since this is impractical for many reasons, the project team decided to limit the maximum number of blank cards between two criteria to three. To describe the meaning of the distance between two criteria, the participants were told the following:.

- No blank card: slightly more important;
- One blank card: considerably more important;
- Two blank cards: much more important;
- Three blank cards: extremely more important.

One move consists of either inserting or removing one blank card. The ranking of the criteria cannot be altered at this point anymore. Participants were again asked to group around the table to conduct the method in silent negotiation in three rounds again with reducing moves:

- 1st round: three moves;
- 2nd round: two moves;
- Open discussion;
- Final round: one move.

To convert the criteria ranking and weighting generated through the Simos method (see Picture 4) into surrogate weights, the CAR method was used (Danielson & Ekenberg, 2016, pp. 784–787).[13] The CAR method uses ordinal ranking of criteria, in which preference strengths between criteria are represented in a meaningful way, e.g., through the placing blank cards to symbolize degree of importance. It computes the surrogate weights based on the total ranks of cards, which represent the scale of importance. Danielson & Ekenberg (2016, p. 785) describe the calculation process as follows. The weight value of a criterion w_i^{CAR} is calcultated through first assigning an ordinal number to each rank, or importance scale. Q is the number of importance scales set by the stakeholders, whereby $p(i) \in \{1, \ldots, Q\}$ is the position on this importance scale. Each criterion i has a position on that importance scale $p(i)$, such that for every two criteria ci and cj, whenever $c_i >_{s_i} c_j, s_i = |p(i) - p(j)|$. The position $p(i)$ then denotes the importance of that criterion stated by the stakeholders. The surrogate weight values are computed through the following formula.



Picture 4: Final result of cardinal criteria ranking (example).

$$w_i^{CAR} = \frac{\frac{1}{p(i)} + \frac{Q + 1 - p(i)}{Q}}{\sum_{j=1}^{N} \left(\frac{1}{p(j)} + \frac{Q + 1 - p(j)}{Q} \right)}$$

In the final mixed workshop with representatives of all stakeholder groups, the research team systematically recorded the movements of the criteria during each round of the silent negotiation for later identification of the most contested criteria and potential issues of conflict between stakeholder groups.

13 The revised Simos method requires the elicitation of additional information from the stakeholders, who need to indicate by how many times more important the most important criterion is compared to the least one. This ratio is called *z-value* (Figueira & Roy, 2002, p. 322). Simulations in the project team and trial application in workshops in Morocco have shown difficulties among participants to understand the concept of the z-value and, consequently, to apply it with confidence. If participants are not confident in using a method to reflect their preferences, the result lacks validity. For that reason, the revised Simos computation was replaced by the more robust and valid CAR-method.

The project team had prepared the DecideIT 2.101 files before their respective field trips so that they were able to present the resulting technology ranking to the participants. This was an important benefit of having pre-selected the criteria and collected the attribute values (see Chapter 2.3) for four reasons. First, it increased local ownership and transparency of the workshop results. Second, participants were shown how their preferences matter in the technology evaluation. Third, participants were enabled to understand the logic and relevance of the workshop's approach and methods. Fourth, participants were able to comment on the result and discuss whether or not the suggested technology ranking actually matches their technology preferences.

2.1.4 Procedural and distributive justice

The final part of the workshop was designed as an open discussion on the need for procedural and distributive justice. Contrary to the previous methodologically structured sections of the stakeholder workshops, it was left to the research teams how to design the concluding discussion and cannot be generally described here. This allowed for a more flexible approach to these critical issues according to the respective country context, the workshop conditions and the composition of the participants. In Morocco, the criteria were discussed along a card-based ranking of the technologies, where participants were first asked to rank the technologies according to the need for procedural and distributive justice. In a second step, participants were requested to introduce the two criteria into the cardinal ranking to relate their importance to the other evaluation criteria (Schinke et al., 2017). In Jordan, the aspects were discussed in an open discussion (Komendantova et al., 2018). In Tunisia, the research teams framed the aspects into a set of questions specifically designed to each stakeholder group, focussing on their respective roles and expectations in energy planning and their assessment of how to achieve more inclusive and impact-sensitive energy transition management (Döring et al., 2018).

3 METHODOLOGICAL REFLECTIONS

3.1 Limits to the MCDA

Multi-criteria decision analysis (MCDA) provides a tool to support decision-making under conditions of uncertainty. It does not solve the problem of the contingency of outcomes, but promotes a vision-driven elaboration of possible compromises to address complex challenges and to uncover underlying perceptions, rationales, expectations and preferences as a basis for multi-stakeholder dialogue. At the same time, the exercise of prioritizing challenges and sub-goals provides a guideline to developing a transition strategy and roadmap, from which concrete milestones can be derived.

While MCDAs have significant practical advantages, there are methodological limitations, which need to be considered from a scientific perspective. The final technology ranking is not a direct reflection of stakeholders' technology preferences. The outcome of an MCDA is a mere suggestion as to which of the electricity-generation technologies would most probably best serve the decision-makers' needs and objectives. The expectations and objectives, formulated in the vision, are expressed in the criteria weighting. Herein lies the first determination of the MCDA approach. MCDAs require the input of exact preference weights, requiring to reduce complex individual inclinations and attitudes into numbers and treating these numbers like they were a true reflection of a person's preferences as mathematical co-efficient. This highlights the inherent problem of eliciting surrogate weights. There are several methods available to elicit decision-makers preferences.[14] Regardless of the methods applied, surrogate weights, even the cardinal ranking they were derived from, are only an artificially generated abstraction of personal preferences. This includes the premise that decision-makers are even fully aware of their preferences and are able to translate them into accurate statements. This project's research approach has critically engaged with this problematic premise and designed the workshops in a way that allows participants to take in the necessary information step by step, to develop their preferences and to use the cardinal ranking method to indicate them. To test the validity of the MCDA technology ranking, participants were asked during the presentation of the results, whether or not they agree to the ranking and whether it is consistent with their priorities. This was the case for the majority of participants. Though some raised objections concerning the relative position of particular technologies, these objections were never a principal rejection of the total ranking. In the cases of Jordan and Tunisia, the validity of the MCDA results was further tested with questionnaires.

The second limitation concerns the uncertainty of attribute values. MCDA data sets are incomplete, because chosen criteria and indicators are only a selection of aspects or dimensions to a decision problem, but cannot possibly reflect the entire complexity or all possible empirical outcomes. Theoretically, the criteria and indicators must be completely independent of one another, and they are thus treated under this assumption in the MCDA process. But things in real life are interconnected, which is the reason for the complexity of problems. Indicators might well be subject to co-linearity and interdependence. However, simplifying real life interdependencies like this is an inevitable effect of trying to make a problem manageable.

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[14] For an overview and more detailed discussions on eliciting surrogate weights see Danielson & Ekenberg (2016, 2017), Riabacke, Danielson, Ekenberg, & Larsson (2009), and Siskos & Tsotsolas (2015).

3.2 Evaluation of the research design

The research process was sensitive to two factors: stakeholder selection bias and drop-out of participants. The composition of focus groups is critical to generating balanced and robust insights. It has proven difficult to meet all the necessary criteria, which were set by the project team. While local partners and preparatory networking ensured access to the envisioned stakeholders in the respective countries, non-responsiveness, unannounced absence and drop-out of key actors were major challenges to the composition of the focus groups. There were participants who had to leave early or temporarily for reasons of work commitments. Gender parity was another challenge, since relevant fields of occupation and the general social context in the MENA region is male-dominated. Still, a wide range of stakeholders with contesting viewpoints was mobilised for the workshop series to reflect social interests, and more women took part than expected so that the research results remain valid.

The methodological cornerstone of the workshop series was the MCDA. Since the MCDA itself is a rather technical, quantitative and outcome-oriented method, it does not capture attitudes, perceptions and expectations, which are necessary to understand motives and rationales behind stakeholders' preferences and to identify lines of agreement and contestation or even conflicts of interests. Therefore, the workshops were designed with a focus on qualitative methods to capture necessary data in line with the theoretical and conceptual framework and to enable to mitigate the shortcomings of the MCDA through triangulation (see Table 2). Apart from methodological reasons, the qualitative methods and open discussion were necessary to facilitate mutual learning and knowledge-sharing. Furthermore, the methods facilitated the MCDA process by preparing the participants step-by-step, giving them time, structure and feedback to process information and develop their position in the process. The focus group format and the applied workshop design were suitable and valuable approaches to fulfilling the research objectives as well as to facilitating the multi-stakeholder dialogue.

Since the project was commissioned to cross boundaries between academic research, policy advice and facilitating immediate policy impact, the challenge was to balance academic research interest and practical approaches. There was a trade-off that constrains the extent of capturing qualitative data. To ensure the safe space and confidentiality to the participants, the workshops were not recorded. Instead, a minute-taker followed the discussions and documented participants' contributions. Minuting lively discussions is challenging and leads to a reduction of content in the process of documentation, thus data losses. The research team that conducted the workshops collaborated closely and followed the discussions a far as possible. But due to the design of the workshop series, there was a considerable load of logistical, organisational and technical background work to attend to (preparing the different methods during the workshop, supervising the exercise of the participatory methods to ensure implementation in line with the methodology, conducting the MCDA computation and preparing the visualisations to be presented immediately to the participants).

	QUANTITATIVE DATA	QUALITATIVE DATA	ANALYSIS
CONTEXTUAL-ISATION		Discussion on the energy situation in the case country	Contextualisation of stakeholder attitudes and mindset
		Vision 2050	Identifcation of the challenges to sustainability and definition of the transition goal
		Aspirations & concerns	Reflexion on technologies' role for societal development
TECHNOLOGY PREFER-	MCDA technology ranking based on attribute values and surrogate weights for stakeholder preferences	Technology perceptions	Identification of stakeholder attitudes and narratives
		Criteria discussion and gap analysis	Reasons for criteria evaluation and priorities
		Concluding discussion on the ranking result	Adjusted ranking of technologies
GROUP CONFLICTS		Visions 2050, aspirations & concerns	Eliciting differences in defining the social problems through comparison
	Surrogate weights	Comparison of initial criteria rankings	Comparing degree of importance among groups
	Silent negotiation movement records	Discussions during the silent negotiation and afterwards	Identifying contradicting preferences/importance evaluation as well as joint argumentation and alliances
		Discussion on procedural and distributive justice	Identification of needs, expectations and divergent attitudes and mindsets concerning transitions management

Table 2: Summary of data collected during stakeholder workshops.

4 CONCLUSION

Energy transitions towards sustainability require a fundamental paradigm shift to roles and practices among all actors to modify current modes of top-down, elitist governance towards more bottom-up, horizontal and inclusive forms. Inclusive governance modes that rely on multi-stakeholder involvement generate a broader knowledge base to monitor the impacts of the energy transition on society. Moreover, it builds social ownership and can harness the potential for societal support through process legitimization. Inclusive governance unveils contestation and conflicts over power, resources and expectations, which, if left unaddressed and unmitigated, could incite public resistance which endangers not only energy projects but public trust in the state in general. Instead, conflicts of interests must be addressed transparently and managed in a constructive way to find robust compromises through fair and meaningful participation of affected social interest groups.

By embarking on energy transitions to sustainability, governments of MENA countries in particular are called upon opening the strictly centralised, state-controlled governance system. The "niche of opportunity" approach that was applied in the MENA SELECT project proved to be a suitable concept to bring together different stakeholders to controversially, but constructively engage with each other. The multi-stakeholder dialogue format, which followed a methodologically structured process for exchanging viewpoints and facilitating a compromise concerning policy priorities, provided an innovative framework to experiment with such horizontal and inclusive modes of governance. Participants from all stakeholder groups responded very well to the format and proactively and passionately engaged with each other in a spirit of commitment to tackling the persisting environmental, social and economic challenges in their respective societies. The majority appreciated the opportunity to test new practices of interaction and dialogue that enabled them to mutually learn and reflect upon different perspectives on the challenges of energy transitions.

The MCDA process and the methods that were applied have proven to be a useful framework for structuring a multi-stakeholder dialogue and for giving impulses for debate. In particular, the discussions around the vision of sustainability and the links to the evaluation criteria incited lively discussions and exchange of views. The objective was, to facilitate a compromise among stakeholders over the priorities of the energy transition. Though some participants were not satisfied with the final result of the criteria ranking, all participants highly appreciated the inclusive and participatory approach to discussing it. Despite controversies, the spirit and the atmosphere was constructive and serene, even jovial at times. The project in its design as "niche of opportunity" has revealed to participants that a more profound understanding of the social dimension of energy transitions requires new practices of governance and knowledge production. For a society to face the entire scope of social changes, which are implicated in energy planning for transitions to sustainability, requires a governance approach that addresses conflict caused by such fundamental changes to social relations. Designing regular and overlapping niches of opportunity like the workshop series of MENA SELECT can help to strengthen the social perspective to energy transitions in MENA countries and amend energy policies to be more socially compatible and outline a pathway to a sustainable future.

REFERENCES

Batel, S., Devine-Wright, P., & Tangeland, T. (2013). Social acceptance of low carbon energy and associated infrastructures: A critical discussion. *Energy Policy*, *58*, 1–5. https://doi.org/10.1016/j.enpol.2013.03.018

Berkhout, F. (2006). Normative expectations in systems innovation. *Technology Analysis & Strategic Management*, *18*(3–4), 299–311. https://doi.org/10.1080/09537320600777010

Berkhout, F., Smith, A., & Stirling, A. (2004). Sociotechnicalregimes and transition contexts. In *System innovation and the transition to sustainability. Theory, evidence and policy* (pp. 48–75). Northampton, MA: Edward Elgar.

Bijker, W. E. (1995). *Of bicycles, bakelites, and bulbs.Toward a theory of sociotechnical change*. Cambridge and London: The MIT Press.

Borking, K., Danielson, M., Davies, G., Ekenberg, L., Idefeldt, J., & Larsson, A. (2011). *Transcending Business Intelligence*. Stockholm: Sine Metu Productions.

Bourdieu, P. (1985). The Social Space and the Genesis of Groups. *Theory and Society*, *14*(6), 723–744.

Boutilier, R. G. (2014). Frequently asked questions about the social licence to operate. *Impact Assessment and Project Appraisal*, *32*(4), 263–272. https://doi.org/10.1080/14615517.2014.941141

Brix, J. (2015). Fail forward: Mitigating failure in energy research and innovation. *Energy Research & Social Science*, *7*, 66–77.

Chan, K., & Liebowitz, J. (2006). The synergy of social network analysis and knowledge mapping: A case study. *International Journal Management and Decision Making*, *7*(1), 19–35.

Cohen, J. J., Reichl, J., & Schmidthaler, M. (2014). Re-focussing research efforts on the public acceptance of energy infrastructure: A critical review. *Energy*, *76*, 4–9. https://doi.org/10.1016/j.energy.2013.12.056

Danielson, M. (2005). Generalized evaluation in decision analysis. *European Journal of Operational Research*, *162*(2), 442–449. https://doi.org/10.1016/j.ejor.2003.08.056

Danielson, M., & Ekenberg, L. (2007). Computing upper and lower bounds in interval decision trees. *European Journal of Operational Research*, *181*(2), 808–816. https://doi.org/10.1016/j.ejor.2006.06.030

Danielson, M., & Ekenberg, L. (2016). The CAR Method for Using Preference Strength in Multi-criteria Decision Making. *Group Decision and Negotiation*, *25*(4), 775–797. https://doi.org/10.1007/s10726-015-9460-8

Danielson, M., & Ekenberg, L. (2017). A Robustness Study of State-of-the-Art Surrogate Weights for MCDM. *Group Decision and Negotiation*, *26*(4), 677–691. https://doi.org/10.1007/s10726-016-9494-6

Danielson, M., Ekenberg, L., Idefeldt, J., & Larsson, A. (2007). Using a Software Tool for Public Decision Analysis: The Case of Nacka Municipality. *Decision Analysis*, *4*(2), 76–90. https://doi.org/10.1287/deca.1070.0088

Danielson, M., Ekenberg, L., Johansson, J., & Larsson, A. (2003). The DecideIT Decision Tool. In *Proceedings of the Third International Symposium on Imprecise Probabilities and Their Applications* (pp. 204–217). New York: Carleton Scientific.

Devine-Wright, P. (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*, *8*(2), 125–139. https://doi.org/10.1002/we.124

Devine-Wright, P. (2007). *Reconsidering public attitudes and public acceptance of renewable energy technologies: a critical review* (Working Paper No. 1.4). Manchester: School of Environment and Development, University of Manchester.

Devine-Wright, P., Walker, G., Barnett, J., Burningham, K., Infield, D., Devine-Wright, H., … Wheatley, A. (2009). *Beyond Nimbyism: A multisidciplinary investigation of public engagement with renewable energy technologies: Full research report.* (ESRC End of Award Report No. RES-152-25-1008-A). Swindon: ESRC.

Döring, M., Far, S., Marrouki, S., & El-Golli, R. (2018). *Energy for the Future. Evaluating different electricity generation technologies against selected performance characteristics and stakeholder preferences: Insights from the case study Tunisia* (MENA SELECT Working Paper). Bonn.

Elzen, B., Geels, F. W., & Green, K. (Eds.). (2004). *System innovation and the transition to sustainability. Theory, evidence and policy*. Northampton, MA: Edward Elgar.

Figueira, J., & Roy, B. (2002). Determining the weights of criteria in the ELECTRE type methods with a revised Simos' procedure. *European Journal of Operational Research*, *139*(2), 317–326. https://doi.org/10.1016/S0377-2217(01)00370-8

Foucault, M. (1982). The subject and power. *Critical Inquiry*, *8*(4), 777–795.

Foucault, M. (1991). *Discipline and punish. The birth of the prison*. New York: Vintage Books.

Freeman, L. C. (1979). Centrality in social networks: Conceptual clarification. *Social Networks*, *1*, 215–239.

Gaventa, J., & Cornwall, A. (2008). Power and knowledge. In *The SAGE Handbook of action research. Participative inquiry and practice* (2nd ed., pp. 172–189). London, Thousand Oaks: SAGE Publications.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, *31*, 1257–1274.

Geels, F. W. (2004). Understanding system innovations: a critical literature review and a conceptual synthesis. In *System innovation and the transition to sustainability. Theory, evidence and policy* (pp. 19–47). Northampton, MA: Edward Elgar.

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, *1*(1), 24–40. https://doi.org/10.1016/j.eist.2011.02.002

Geels, F. W., & Schot, J. (2007). Typology of sociotechnical transition pathways. *Research Policy*, *36*(3), 399–417. https://doi.org/10.1016/j.respol.2007.01.003

Giddens, A. (1984). *The constitution of society. Outline of the theory of structuration*. Cambridge and Oxford: Polity Press and Basil Blackwell.

Ibarra, H. (1993). Network centrality, power, and innovation involvement: Determinants of technical and administrative roles. *Academy of Management Journal*, *36*(3), 471–501. https://doi.org/10.2307/256589

Kemp, R., & Loorbach, D. (2006). Transition management: a reflexive governance approach. In *Reflexive governance for sustainable development* (pp. 103–130). Cheltenham, Glos, UK ; Northampton, MA: Edward Elgar.

Köhler, J. (2009). *What is a niche?* Presented at the ESCR Complexity and sustainability workshop, Leeds.

Komendantova, N., Ekenberg, L., Marashdeh, L., Al-Salaymeh, A., Danielson, M., Irshaid, J., … Linnerooth-Bayer, J. (2018). *Energy for the Future. Evaluating different electricity generation technologies against selected performance characteristics and stakeholder preferences: Insights from the case study Jordan*. Bonn: BICC.

Lilliestam, J., & Hanger, S. (2016). Shades of green: Centralisation, decentralisation and controversy among European renewable electricity visions. *Energy Research & Social Science*, *17*, 20–29. https://doi.org/10.1016/j.erss.2016.03.011

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. *Futures*, *42*(3), 237–246. https://doi.org/10.1016/j.futures.2009.11.009

Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sciences*, *42*(4), 323–340. https://doi.org/10.1007/s11077-009-9097-z

Mielke, K., Schetter, C., & Wilde, A. (2011). *Dimensions of social order: Empirical fact, analystical framework and boundary concept* (Working Paper Series No. 78). Bonn: Center for Development Research.

Nelson, R. R., & Winter, S. G. (1982a). *An evolutionary theory of economic change*. Cambridge and London: The Belknap Press of Harvard University Press.

Nelson, R. R., & Winter, S. G. (1982b). *An evolutionary theory of economic change*. Cambridge and London: The Belknap Press of Harvard University Press.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533–544. https://doi.org/10.1007/s10488-013-0528-y

Pictet, J., & Bollinger, D. (2005). The silent negotiation or how to elicit collective information for group MCDA without excessive discussion. *Journal of Multi-Criteria Decision Analysis*, *13*(5–6), 199–211. https://doi.org/10.1002/mcda.392

Powell, W. W., Koput, K. W., & Smith-Doerr, L. (1996). Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology.

Administrative Science Quarterly, *41*(1), 116. https://doi.org/10.2307/2393988

Reckwitz, A. (2002). Toward a theory of social practices. A development in culturalist theorizing. *European Journal of Social Theory*, *5*(2), 243–263.

Reckwitz, A. (2008). Praktiken und Diskurse. Eine sozialtheoretische und methodologische Relation. In *Theoretische Empirie. Zur Relevanz qualitativer Forschung* (pp. 188–209). Frankfurt a.M.: Suhrkamp.

Riabacke, M., Danielson, M., Ekenberg, L., & Larsson, A. (2009). A Prescriptive Approach for Eliciting Imprecise Weight Statements in an MCDA Process. In F. Rossi & A. Tsoukias (Eds.), *Algorithmic Decision Theory* (Vol. 5783, pp. 168–179). Berlin, Heidelberg: Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-04428-1_15

Rogers, J. C., Simmons, E. A., Convery, I., & Weatherall, A. (2008). Public perceptions of opportunities for community-based renewable energy projects. *Energy Policy*, *36*(11), 4217–4226. https://doi.org/10.1016/j.enpol.2008.07.028

Rotmans, J., Kemp, R., & van Asselt, M. (2001). More evolution than revolution: transition management in public policy. *Foresight*, *3*(1), 15–31. https://doi.org/10.1108/14636680110803003

Rotmans, J., Loorbach, D., & Kemp, R. (2007). *Transition management: Its origin, evolution and critique* (Workshop on "Politics and governance in sustainable sociotechnicaltransitions', 19-21 September 2007, Schloss Blankensee Germany) (p. 28). Berlin: Dutch Research Institute for Transitions, Drif Erasmus University Rotterdam.

Rowley, T. (1997). Moving beyond dyadic ties: A network theory of stakeholder influences. *The Academy of Management Review*, *22*(4), 887–910.

Schatzki, T. R. (1996). *Social practice. A Wittgensteinian approach to human activity and the social*. Cambridge: Cambridge University Press.

Schatzki, T. R. (2000). Wittgenstein and the social context of an individual life. *History of the Human Sciences*, *13*(1), 93–107.

Schatzki, T. R. (2002). *The site of the social : a philosophical account of the constitution of social life and change*. University Park: Pennsylvania State University Press.

Schinke, B., Klawitter, J., Barradi, T., & Zejli, D. (2017). *Energy for the Future. Evaluating different electricity generation technologies against selected performance characteristics and stakeholder preferences: Insights from the case study Morocco*. Bonn: BICC.

Schinke, B., Klawitter, J., Döring, M., Komendantova, N., Irshaid, J., & Bayer, J. (2017). *Electricity Planning for Sustainable Development in the MENA Region Criteria and indicators for conducting a sustainability assessment of different electricity generation technologies in Morocco, Jordan and Tunisia*. Bonn: BICC.

Schmidt, R. (2012). *Soziologie der Praktiken. Konzeptionelle Studien und empirische Analysen*. Berlin: Suhrkamp.

Seghezzo, L. (2009). The five dimensions of sustainability. *Environmental Politics*, *18*(4), 539–556. https://doi.org/10.1080/09644010903063669

Shove, E. (2010). Beyond the ABC: climate change policy and theories of social change. *Enironment and Planning A*, *42*, 1273–1285.

Shove, E., Pantzar, M., & Watson, M. (2012). *The dynamics of social practice: everyday life and how it changes*. Los Angeles: SAGE.

Siskos, E., & Tsotsolas, N. (2015). Elicitation of criteria importance weights through the Simos method: A robustness concern. *European Journal of Operational Research*, *246*(2), 543–553. https://doi.org/10.1016/j.ejor.2015.04.037

Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable sociotechnicaltransitions. *Research Policy*, *34*(10), 1491–1510. https://doi.org/10.1016/j.respol.2005.07.005

Smythe, K. R. (2014). An Historian's critique of sustainability. *Culture Unbound*, *6*, 913–929.

Sovacool, B. K. (2014). Energy studies need social science. *Nature*, *511*, 529–530.

Sundgren, D., Danielson, M., & Ekenberg, L. (2009). Warp effects on calculating interval probabilities. *International Journal of Approximate Reasoning*, *50*(9), 1360–1368. https://doi.org/10.1016/j.ijar.2009.04.008

Valkenburg, G., & Cotella, G. (2016). Governance of energy transitions: about inclusion and closure in complex sociotechnical problems. *Energy, Sustainability and Society*, *6*(1). https://doi.org/10.1186/s13705-016-0086-8

van der Horst, D. (2007). NIMBY or not? Exploring the relevance of location and the politics of voiced opinions in renewable energy siting controversies. *Energy Policy*, *35*(5), 2705–2714. https://doi.org/10.1016/j.enpol.2006.12.012

Vanclay, F., Esteves, A. M., Aucamp, I., & Franks, D. (2015). *Social Impact Assessment: Guidance for assessing and managing the social impacts of projects*. Fargo: International Association for Impact Assessment.

Voß, J.-P., Bauknecht, D., & Kemp, R. (Eds.). (2006). *Reflexive governance for sustainable development*. Cheltenham, Glos, UK ; Northampton, MA: Edward Elgar.

Voß, J.-P., & Bornemann, B. (2011). The politics of reflexive governance: Challenges for designing adaptive management and transition management. *Ecology and Society*, *16*(2), Art 9.

VROM, M. of H., Spatial Planning and the Environment. (2001). *Where there is a will there is a world: Working towards sustainability. Fourth national environmental policy plan*. The Hague: VROM.

Wang, J.-J., Jing, Y.-Y., Zhang, C.-F., & Zhao, J.-H. (2009). Review on multi-criteria decision analysis aid in sustainable energy decision-making. *Renewable and Sustainable Energy Reviews*, *13*(9), 2263–2278. https://doi.org/10.1016/j.rser.2009.06.021

Wittmayer, J. M., Avelino, F., van Steenbergen, F., & Loorbach, D. (2017). Actor roles in transition: Insights from sociological perspectives. *Environmental Innovation and Societal Transitions*, *24*, 45–56. https://doi.org/10.1016/j.eist.2016.10.003

Wüstenhagen, R., Wolsink, M., & Bürer, M. J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy Policy*, *35*(5), 2683–2691. https://doi.org/10.1016/j.enpol.2006.12.001

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