Downloaded from orbit.dtu.dk on: Nov 07, 2026

DTU Library

From theory to practice: Understanding transformational change in NAMAs

Mersmann, Florian ; Olsen, Karen Holm; Wehnert, Timon ; Boodoo, Zyaad ; Fenhann, Jørgen Villy

Publication date:
2014

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Mersmann, F., Olsen, K. H., Wehnert, T., Boodoo, Z., & Fenhann, J. V. (Ed.) (2014). *From theory to practice: Understanding transformational change in NAMAs*. UNEP DTU Partnership.

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Wuppertal Institute
for Climate, Environment
and Energy

UNEP DTU
PARTNERSHIP

FROM THEORY TO PRACTICE:

UNDERSTANDING TRANSFORMATIONAL CHANGE IN NAMAs

International Partnership
on Mitigation and MRV

NAMA PARTNERSHIP

United Nations
Framework Convention on
Climate Change

FIRM Facilitating Implementation and Readiness for Mitigation

FROM THEORY TO PRACTICE:
UNDERSTANDING TRANSFORMATIONAL CHANGE IN NAMAs

Authors: Florian Mersmann, Karen Holm Olsen, Timon Wehnert and Zyaad Boodoo

Reviewers: Sebastian Wienges, Claudio Forner, Karoline Augenstein, Jørgen Fenhann

Acknowledgements: The publication is the first output of Phase 1 of a research project titled 'Indicators of transformational change for MRV of NAMAs' jointly undertaken by the NAMA Partnership Working Group on Sustainable Development (WG-SD) and the International Partnership on Mitigation and MRV. The financial contributions from the UNFCCC, FIRM project and UNEP DTU Partnership to this publication are acknowledged.

For more information on the research project see here: www.namapartnership.org

November 2014

ISBN: 978-87-93130-23-4

Disclaimer: The concepts and ideas presented in this publication do not necessarily represent the views of the institutions involved in the research project or the endorsement of any approach described in the publication.

Table of Contents:

1. Background 2

1.1. Objectives of the research project 2

1.2. Why Transformational Change? 2

1.3. What is meant with Transformational Change? 3

1.4. What is the link between Transformational Change and Sustainable Development? 4

1.5. NAMAs and Transformational Change 6

2. Theoretical Approaches to Transformational Change: What is in them for NAMAs? 8

2.1. Multilevel Perspective (MLP) 9

2.2. Phase Model of Transformation Processes 12

2.3. Theories covering management of transitions 16

2.3.1. Strategic Niche Management (SNM) 16

2.3.2. Transition Management (TM) 17

2.4. Hypothesis to inform further studies 20

3. References 23

1 Background

1.1 OBJECTIVES OF THE RESEARCH PROJECT

The NAMA Partnership Working Group on Sustainable Development (WG-SD) & International Partnership on Mitigation and MRV is conducting a research project on indicators of transformational change for monitoring, reporting and verification (MRV) of Nationally Appropriate Mitigation Actions (NAMAs). The project aims to improve the understanding of transformational change (TC) and how to MRV such that NAMAs facilitate a transformation for low emission and sustainable development to achieve the 2°C target. These indicators shall help policy-makers, investors and implementers to *identify and decide* which NAMA proposals should be prioritized to promote transformational change, which factors must be observed and worked on to foster transformational change through targeted interventions, and to *track* progress of transformational changes through MRV.

Important points for research to respond to these interests are the following:

1. Goal dimension: low carbon development and sustainable development impacts, taking into consideration the debate on SDGs.
2. Process dimension: Identification of success factors and indicators increasing the probability of transformational change.
3. Link between success factors/indicators of change and depth of transformational, paradigm change

The UNEP DTU Partnership (formerly the UNEP Risoe Centre) in collaboration with Wuppertal Institute (WI) is implementing the project, supported by the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

The objective of the concept paper is to propose an operational definition for what transformational change means in the context of NAMAs, taking into consideration ongoing discussions among NAMA experts, and to give an overview of theoretical approaches to sustainability transitions and transformational change, exploring their possible applicability to NAMAs. The theoretical approaches are the basis to propose hypotheses for the dynamics, indicators and success factors that foster transformational change, which is necessary to assess whether a NAMA intervention has been or can be transformational to achieve low carbon and sustainable development goals. This paper will serve as the basis for further exploration of a framework to assess the potential for transformational impacts of NAMAs.

1.2 WHY TRANSFORMATIONAL CHANGE?

Transformational change and paradigm shifts are becoming important terms within the vocabulary of the climate change and development community. They reflect a shared belief that a fundamental change is needed to prevent dangerous levels of climate change and to ensure a globally sustainable development. Such a change cannot simply arise from changing technologies or simple structures. It must entail a systemic change involving changes in “worldviews, institutions and technologies together, as an integrated system” (Beddoe et al. 2009).

Selecting concrete actions that have the highest potential to bring about this type of change is not trivial: a simple comparison of numbers (e.g. involved costs vs. expected reduction of emissions) will not suffice. Instead, the design of strategies and interventions needs to incorporate and reflect institutional and cultural surroundings in order to have the greatest potential for a transformational effect. Thus, gaining a deeper understanding of what "transformational change" entails forms an important part for decisions on the design of interventions, and also financing decisions of financial agencies that fund these activities.

1.3 WHAT IS MEANT WITH TRANSFORMATIONAL CHANGE?

Despite the increasing use of the term in the climate context, there is no single, generally acknowledged definition of Transformational Change or Paradigm Shift. Two of the most prominent proponents of the concept, the British-German NAMA Facility and the UNFCCC's Green Climate Fund, omit an explicit definition. Instead, the concept is circumscribed through factors that potentially increase the transformational impact of an intervention.

Such factors include contributions to broader programmes or policy frameworks, change of prevailing structures of a sector contributing to high emissions, impact beyond the project scope, institutional capacity building, private sector engagement, innovation, replicability, scaleability, and learning processes.

These can all be considered important aspects of potentially transformational processes. However, their individual importance varies strongly with the individual intervention context.

The recent guidebook "Shifting Paradigms" (Mersmann et al. 2014) included a strongly theory-driven definition of transformational change, defining it as

> *"a structural change that alters the interplay of institutional, cultural, technological, economic and ecological dimensions of a given system. It will unlock new development paths, including social practices and worldviews."*

Due to its high level of generalization, it may serve as the starting point for further research and refinement. The case studies and analyses carried out within this project have a high potential to adapt this definition to "real-world" applications such as NAMAs in national development contexts.

In order to be able to delineate Transformational Change from other – quantitatively extensive – changes and thus identify NAMAs which foster the institutional, cultural, technological, economic and ecological transformation of systems, we start our research with a working definition:

"Transformational Change through NAMAs is a change:

(1) *that disrupts established high-carbon pathways, contributes to sustainable development and sustains the impacts of the change (goal dimension),*
(2) *that is triggered by interventions of actors who innovate low carbon development models and actions, connect the innovation to day-to-day practice of economies and societies, and convince other actors to apply the innovation to actively influence the multi-level system to adopt the innovation process, (process dimension)*
(3) *that overcomes persistent barriers toward the innovated low carbon development model and/or create new barriers which hinder the transformed system to relapse into the former state (sustains 'low-carbon lock-in')."*

The research shall describe phases of such transformational changes and analyse which are the success factors, how they act together in order to mutually positively influence one another and achieve a new innovative low carbon development model in a scrutinized system. At the end of the case study analysis, this working definition shall be modified according to the findings of the case studies. Such a definition serves us for the research and is expected to help implementers design and implement their NAMAs for transformational change impacts.

1.4 WHAT IS THE LINK BETWEEN TRANSFORMATIONAL CHANGE AND SUSTAINABLE DEVELOPMENT?

Two distinct concepts

In public discourse the concept of transformational change is generally used in (implicit) connotation with the goal of sustainable development (Homer-Dixon 2009; WBGU 2011; UN 2012), sharing a common conviction that switching to genuine sustainable development pathways will only be possible through transformational (i.e. massive and structural) change – not only on a technological level, but also on political, social and cognitive levels.

We believe that it is important to clearly distinguish between the two concepts (see figure below):

- Sustainable development is a normative concept defining the direction and the goal of development.
- Transformational Change is a descriptive concept defining the process and depth of change.

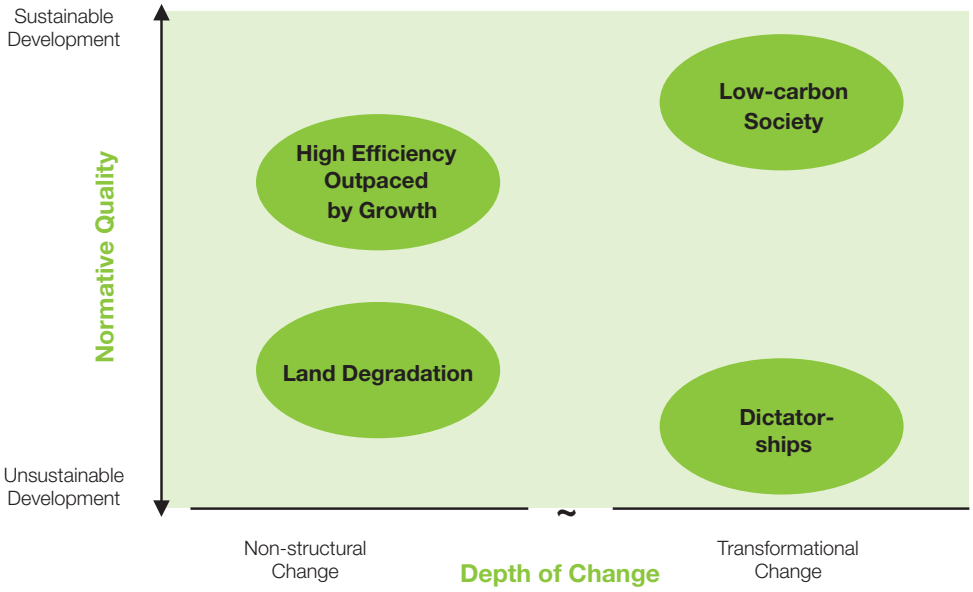
In this sense, Transformational Change has no normative connotation on its own. A crucial difference to non-structural ("normal") change is a shift of predominant paradigms (i.e. established "ways of doing things").

Directions of change

Normatively, change can lead to a "better" as well as a "worse" development, and may also lead to an outcome in stark contrast to sustainability. This also holds true for deeper and more fundamental paradigm shifts. The figure above may serve to illustrate our reasoning. Change may be gradual (land degradation), or balanced by other changes (high efficiency outpaced by growth), or it may fundamentally alter and transform societies (low-carbon society, dictatorships). Thus, we can make statements about the depth of a change process without referring to its normative quality.On the other hand, we may look at the normative aspect of a change process. In terms of sustainable development, we perceive production methods that lead to land degradation as non-sustainable. Highly (energy-)efficient means of production we perceive as a crucial component of sustainable development, though rebound effects through economic growth may lessen their sustainable development impact. Our most desired goal is that of a low-carbon society, including wholly sustainable production methods, while we would shun dictatorial systems as wholly unsustainable[1].

1 Note that this can by no means be a direct comparison, as the examples given pertain to very different aspects of sustainable development.

Fig. 1: Relation of sustainable development and transformational change (adapted from Mersmann et al., 2014)



Of course, the figure crudely simplifies the multi-dimensional nature of a change process: the direction of change is given in only one dimension – while factually sustainability has many dimensions: social gains may come with ecological losses; changes contributing to climate change mitigation may increase local pollution. In practice this makes it difficult to make an overall assessment of what sustainable development is. In this respect, also our examples refer to different dimensions of sustainable development: land degradation is an ecological issue, possibly with social impacts (rural poverty), while dictatorships impact most strongly in the social sphere and may (or may not) have negative impacts with respect to ecological aspects of sustainability.

Changing pathways

When we discuss "change", we need to be aware that our world and all of its subsystems encounter constant change – we are on a continuous development pathway. But as much as the state of the system changes, fundamental pathways often stay the same (on the left side the figure). However, transformational change is not only about changing the given status (which is, in any case, subject to constant change) but is about fundamentally changing the pathway.

Land degradation is a typical example of constant overuse of resources depleting arable soils over time, due to a prevailing use paradigm that cannot be sustained by the available land. Land degradation can be classified as a constant process of change towards non-sustainability that results from upholding an unsustainable status quo. Technological fixes such as soil fertilisation may be able to slow down the process for a period, but without a shift towards sustainable use patterns, lands continue to be degraded over time.

Transformational Change towards Sustainable Development

In order to address climate change adequately, the dimensions of sustainable development and transformational change are inextricably linked. Therefore we adopt the shared normative notion that this direction should be geared towards low carbon, climate-resilient, resource efficient, socially just and other types of sustainable societies.

However, in order to navigate the path towards genuine sustainable development, we find it very helpful to distinguish between the direction and the depth of the change process ahead of us.

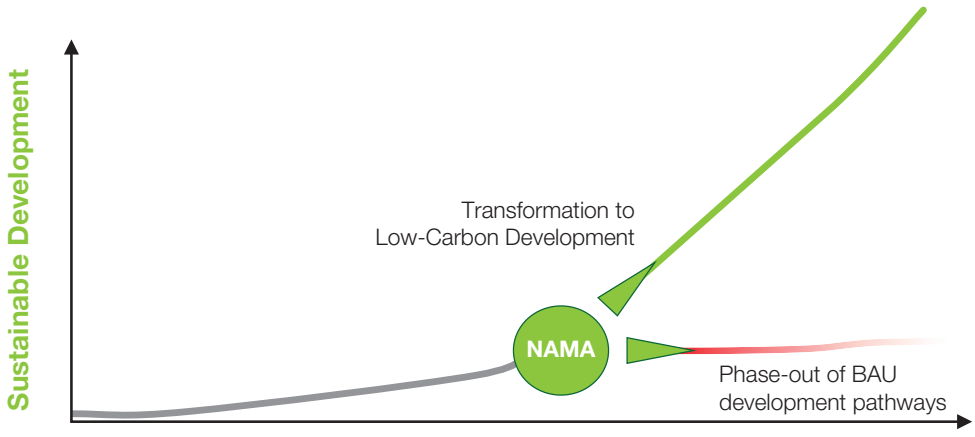
In other words: Sustainable Development is the goal we want to achieve – Transformational Change is the process that can bring us there.

1.5 NAMAS AND TRANSFORMATIONAL CHANGE

The concept of Nationally Appropriate Mitigation Actions (NAMAs) was established in 2007 at the Bali climate conference. One of the key elements of the Bali Action Plan, the roadmap for the development of a new comprehensive climate agreement that was to be concluded at the Copenhagen conference in 2009, was the provision that non-Annex I countries should undertake "nationally appropriate mitigation actions (…) in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner" (UNFCCC 2008).

The aim is that developing countries will leapfrog stages of development which deplete natural resources and global common goods and immediately build sustainable development models. The scope of NAMAs is to support large-scale mitigation actions, and to broaden the scope of interventions for low-carbon development in developing countries. An assessment of early NAMA proposals showed that these NAMAs in the long run may yield GHG emission reductions on a much larger scale than the current market-based mechanisms (cf. Wang-Helmreich et al. 2011). Current and potential funding options explicitly state the objective to "catalyse transformational change towards low-carbon development" (BMU and DECC 2013) or to promote "the paradigm shift towards low-emission and climate

Fig. 2: NAMAs provide an opportunity to change development pathways



resilient development pathways" (UNFCCC 2011). Thus, fostering transformational change has become an explicit ambition of NAMA financing. If this ambition is taken up widely by developing countries, NAMAs can become important agents to set countries on a pathway to low-carbon societies.

This paper is intended as a starting point to develop an assessment framework for the transformational impact potential of NAMAs. Assessing transformational impact potentials will be indispensable in order to find the best solutions to low-carbon challenges, aid decision-makers in choosing the right NAMA for their specific circumstance, and guide financing institutions in their NAMA financing decisions.

2 Theoretical Approaches to Transformational Change: What is in them for NAMAs?

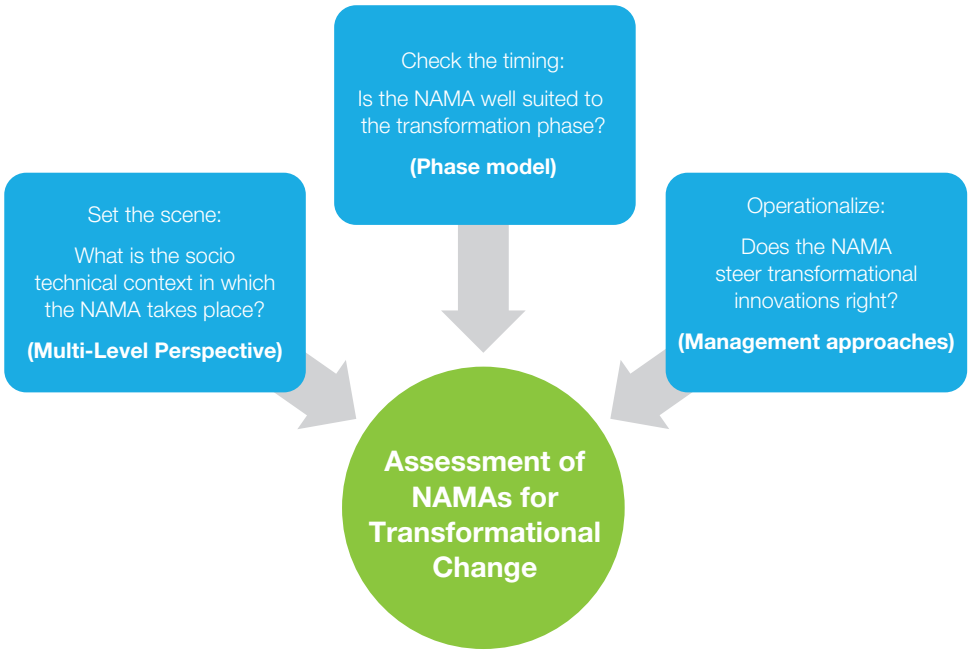
In the following, we explore a number of approaches from theories of sustainability transitions that can be helpful to analyze change processes in general, and specifically NAMA-type policies and projects, in terms of their transformational impact potential. Depending on their focus, each approach has different strengths, and provides another "piece of the puzzle" for the analysis of transformational change processes.

The Multilevel Perspective (section 2.1) provides analysts and decision makers with a heuristic for analysis of change processes, as well as a starting point for considering NAMA designs.

The Phase Model (section 2.2) adds to this by providing a temporal dimension, and a further means to design NAMAs tailor-made to their specific context.

Finally, two management theories for sustainability transitions (section 2.3) add possibilities for managing and steering innovations as a crucial point for transformational change to the overall picture.

Fig. 3: Each theory adds important aspects to NAMA assessment



For each approach, we provide a short overview. We then sketch out their possible relevance for transformational NAMA development and assessment, or any activities that can be classified as such. We have attempted to break down the theories into easily approachable recommendations for practical application.[2]

In lieu of a conclusion, we provide the reader with a set of possible hypotheses that can be derived from the theoretical approaches as a basis for further analysis.

2.1 MULTILEVEL PERSPECTIVE (MLP)

At their core, transition studies seek to answer the question: How do innovations lead to a change in the established way of doing things? To this aim, transition research analyses dynamic processes of structural change in so-called socio-technical systems, defined as "a configuration of elements that include technology, policy, markets, consumer practices, infrastructure, cultural meaning and scientific knowledge" (Geels and Kemp 2012, 49). In most transition studies, change processes are captured in terms of a multi-level perspective (MLP). The MLP distinguishes three basic levels within over-all systems that interact and reinforce each other:

Socio-technical landscape:

This can be anything that is outside the sphere of direct influence for the actors within the system, but can influence the change process.

As an example: Domestic electricity generation choices will not be able to directly influence the outcomes of the multilateral negotiations under the UNFCCC, whereas decisions taken there can certainly shape domestic activities in that field.[3]

Socio-technical regime:

This is the system's established way of doing things, including not only technological choices, but also any type of established political, social, economic or cultural practice. A socio-technical regime is essentially stable, and will not change fundamentally by itself.
To stay with the example, generating electricity from coal is an established practice within most countries, with proven technologies and established policies and business models. It is unlikely that a change of energy generation models will occur if it is not subject to pressure from outside (i.e. the landscape, e.g. UNFCCC agreements or the oil price – see above), or inside (i.e. niche innovations like new technologies or business models – see below).

Niches, or niche innovations:

This is where new things are tried out that deviate from established practice within the dominant regime. Successful niche innovations will start to compete with established practices, i.e. seek to enter the regime level. If they do, the regime is transformed, and a new dominant way of doing things develops.

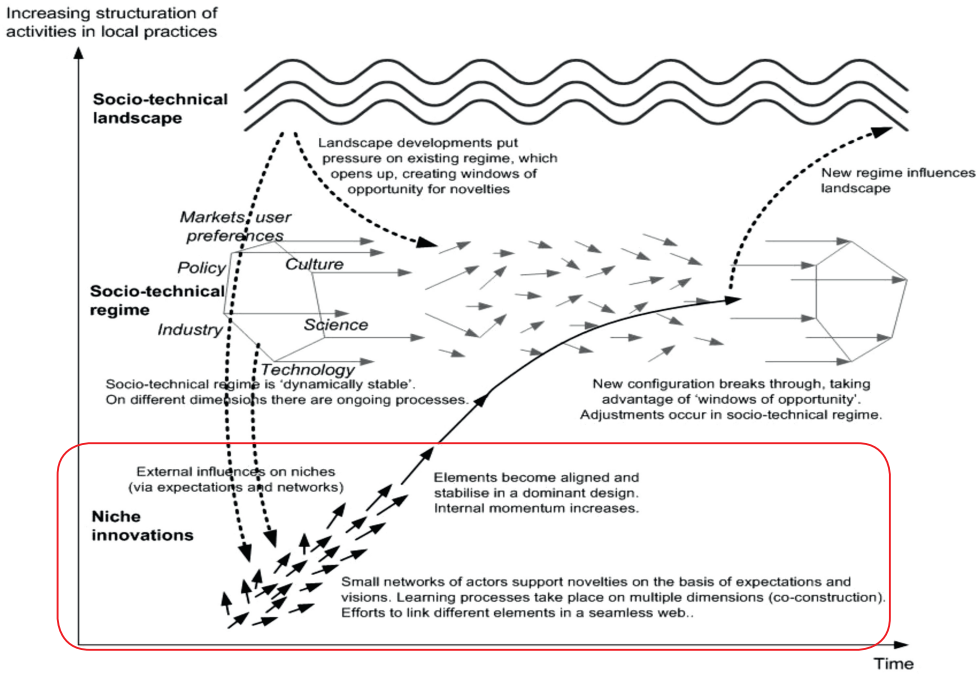
2 We are aware that there is a great number of theoretical as well as practical approaches to transformational processes, such as Arenas of Develop-ment, Technological Innovation Systems, Theory of Change and many others. The three approaches presented here were chosen not least for rea-sons of consistency, as they represent different aspects of the same school of thought.

3 Note that these exogenous factors not only include international politics, but also natural or man-made occurrences outside the direct sphere of influence, e.g. extreme weather events or the global oil price

Coming back to the example, despite a dominant model for generating electricity, renewable energy technologies may be tried by some individuals, and new business models developed in conjunction. These new electricity generation models will start to compete with the established electricity sector in a country. If they are successful, they can replace coal-generated electricity with renewable energy as the main source of electricity. However, this also brings forth changes in business models, policies and social practice – the structure of the system is changed.

The basic logic of the MLP model is captured in the graphic below:

Fig. 4: Multi-Level Perspective (cf. Geels and Schot, 2010))



Transformational change consists of change in the socio-technical regime. A niche innovation can trigger such changes in the socio-technical regime while exogenous factors from the socio-technical landscape can foster or stall changes in the socio-technical regime. Hence, the Multi-Level Perspective mainly scrutinizes the context of transformational change.

Relevance for transformational NAMAs

The MLP in itself does not give any prescriptions on how to design or implement potentially transformational actions. It does, however, provide analysts and policy makers with a highly useful heuristic framework that can shape the way possible actions are considered and consequently designed.[4]

4 In section 2.3 below, we also sketch out the basics of two more prescriptive management theories that strongly draw from transition theory and MLP.

Three questions

As sketched out in the short examples above, first of all the MLP viewpoint structures systems in an easily graspable fashion. On the most general level, practitioners designing NAMAs may consider:

1. What is the NAMA supposed to change?

Answers to this question will first of all delineate the socio-technical regime. For a complete picture, it will be important that answers cover as good as possible the institutional, cultural, technological, economic and ecological aspects of the established 'way of doing things'. This will help to gain insights on where an intervention will likely have an effect, and where barriers or strong resistance to change may be encountered.

Thus, practitioners can gain insights from the MLP on what to change. But, at least equally importantly, how can a NAMA best induce change? MLP posits that every change process starts in niches. So, practitioners may consider:

2. Which niches exist? How could they be enhanced through a NAMA?

Answering this question can define the focus of the NAMA. If there is only a little activity, or no niche at all in the envisioned field, a NAMA may be designed in such a way that it creates such a niche. For instance, coming back to our electricity example, a NAMA could be to jumpstart renewable energy deployment in a country or region by creating pilot projects as showcases.

Anyhow, if there is already a niche, a NAMA may more strongly focus on political and/or economic support in order to heighten the likelihood for success of the innovations developed in that niche. So, if there already is a niche for renewable energy, a NAMA may support its success by creating incentives for a stronger uptake, e.g. through the establishment of a feed-in tariff system.

Finally, while outside of the sphere of influence of NAMAs themselves, they may profit from making positive use of exogenous factors (the "landscape") in order to heighten the likelihood of a NAMA to change the mainstream regime. NAMA developers should ask:

3. Are there exogenous factors that support the change that the NAMA is designed for?

There are many exogenous factors that influence a change process. E.g., outcomes of international negotiations can open up political windows of opportunity to act on the domestic level, or can lead to new financing opportunities such as through the Green Climate Fund.

Tailor-made NAMAs, patterns of development

Thus, the MLP heuristic in our view provides a highly useful structure for the NAMA design process. Thinking about and answering the three questions posed above will not automatically lead to transformational change, but it will help to design tailor-made NAMAs that can jumpstart new and target ongoing change processes within a country.

Tailor-made solutions will be absolutely crucial for the potential for success of a transformational process. Because all countries are host to different circumstances, there is no silver bullet solution to transformational mitigation actions. Anyhow, thinking of NAMAs

as creators or means to support niches also provides researchers with a pattern after which NAMAs can be assessed, and similarities in their development be traced. Doing so may allow drawing lessons learned for further progress within a country, and possible replication elsewhere.

2.2 PHASE MODEL OF TRANSFORMATION PROCESSES

The depiction of transformational processes as a stylized S-curve is a common theme within theories of transition (e.g. Rotmans et al. 2001), but also within behavioral psychology. The phase model of transitions has been used to analyze and structure historic innovation and transition processes. For example, Laes, Gorissen, and Nevens (2014) use it to compare energy transition governance in Germany, The Netherlands and the United Kingdom.

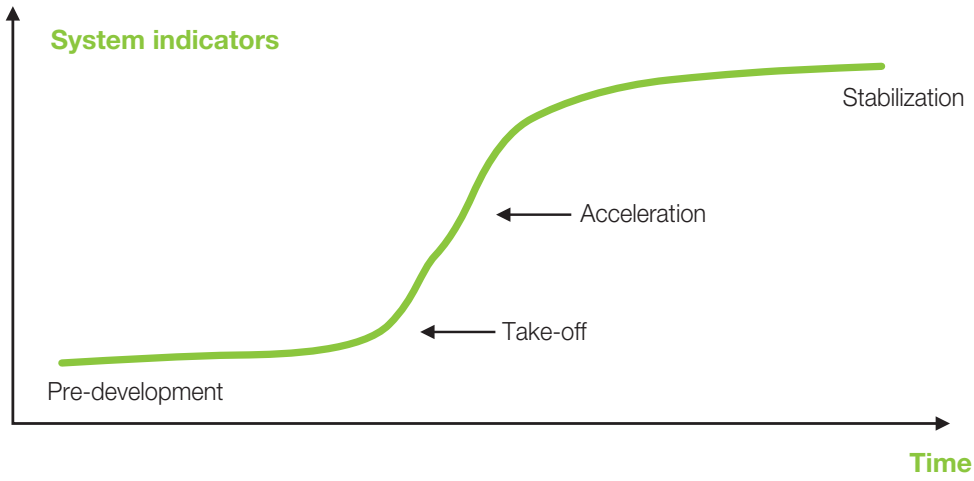
As implied by the name, the phase model is therefore not a theory in itself, but the application of a certain way of structuring transformational processes within the field of transition theory. Referring back to the MLP outlined in section 2.1, the phase model describes the process of how the "way of doing things" in the mainstream regime is broken up and transformed.

Phases of transformation

Typically, every transformation a system undergoes can be depicted as a (stylized) S-curve. In practice, transformational processes will most likely not be as smooth, because they incorporate many smaller factors (e.g. individual proponents and opponents of change, institutional and political processes), which may propel or delay the process as a whole. While transformations are processes, not discrete steps, transition theory describes four typical phases.

1. **Pre-Development**
   Within this phase, development occurs along established pathways. Paradigms are (almost) unquestioned and institutions are stable. Some irritations exist, e.g. caused by external pressure or by symptoms of unsustainable development, which become more and more visible. However, major stakeholders and key players are either not aware of existing alternative solutions, or perceive them as being too complicated/too costly/ otherwise unfeasible.

Fig. 5: Transition s-curve (Timmermans 2006), after Rotmans et al. 2000)



Note that in countries undergoing major transformation processes of fundamental paradigms (*e.g. political and societal shifts through military coups*) other paradigms may continue virtually unchanged (*e.g. electrification through grid extension and fossil power plants*).

2. **Take-off**
   In this phase, the system starts to absorb new ideas and concepts. Irritation and problem awareness have increased and a number of different solutions to the problem at hand exist. In this phase, there is no common agreement on which (set of) solutions is the best: technologies are not yet competitive; business models are not yet firmly established.

   However, experiments become larger and larger. Alternatives spread more widely, become more visible and become accepted as potentially realistic. On the other hand, proponents of the old system may switch from ignorance and mockery (*e.g. statements like "more than 3% of PV is technically impossible"*) to concerted opposition as a possible paradigm shift becomes visible (*lobbying against new solutions*).

3. **Acceleration**
   Within this phase, new solutions challenge the existing mainstream. They become acknowledged and widespread. The speed of change increases and incidents in this phase may be broadly perceived as "tipping points". The consequences for the larger system become apparent. The interconnections between different problem fields and sectors become more and more apparent (*e.g. electro mobility is not only a transport issue, but heavily influences challenges and potentials in the power sector*). International cooperation may become more important (*e.g. international power grids to balance intermittent renewable electricity*).

   If the transformation runs successfully, technological, institutional, social and economic innovations mutually reinforce each other (*e.g. the more people buy eco products, the cheaper they become, being sold in more and more shops – which make more people buy eco products. The more people are interested in car sharing models, the more it becomes a business model, the more companies will enter and the more cars will be available, making it more attractive for new customers.*).

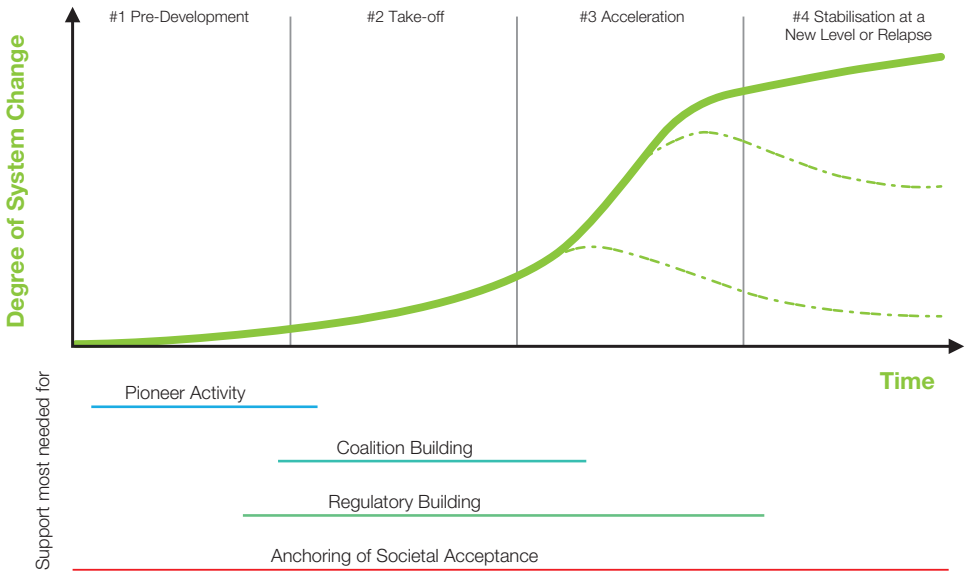
   However, opposition to the transformation may continue or even increase radically by the former 'winners' of the previous development pathway, who may now face severe losses in political or economic terms.

4. **Stabilisation or relapse**
   Ideally, the new pathway is now anchored. The magnitude of change decreases and the system stabilises. However, stabilisation may occur at any level from a total relapse to the system's original state if structures and proponents of the "old" system have proved more persistent, to a fully transformed system if the process has proven fully successful. The change will be transformational if barriers have been overcome and new barriers hinder the transformed system to relapse.

Relevance for transformational NAMAs

Mersmann et al. (2014) have adapted the phase model to a tool to select transformational interventions in a development cooperation context. The phase model can help to identify appropriate actions which correspond to the specific aspects of the different phases of transition processes.

Fig. 6: Phase model (Mersmann et al. 2014, adapted from Rotmans et al. 2000)



A general assumption is that the current, established and commonly accepted pathway is a less sustainable, higher carbon and less resilient to development than the one envisaged. Any intervention should, therefore, be geared towards transforming development approaches into sustainable, specifically low carbon and resilient, pathways.

The Phase Model ("S-curve") can be used as a visualisation tool in the NAMA selection process. Depending on the transformation phase, different interventions will likely have most effect in a particular setting. It can be used on various levels: for a whole country, for a sector, or for individual areas of intervention. In different phases different actors are pivotal and need to be targeted by NAMAs.

How do I use it?

The Phase Model is intended as an anchor for discussions. As such, it sketches the "degree of transformation" on the y-axis versus time on the x-axis in a stylised fashion.

We found the tool very helpful for structuring and facilitating group discussions and for helping a group of experts to develop a common view with respect to the questions: where are we today and where are we heading? Letting every member of the group pinpoint their understanding of this question on the curve quickly draws a picture that helps to find a common understanding, and consequently possibilities for suited approaches. The graph may provide some rough guidance on types of support NAMAs may provide within the different transformational phases.

Which interventions are suited?

Depending on the current phase of the system, you can discuss and identify interventions that are especially useful to "move you along the curve". The following can only provide rough guidance about the types of interventions that will be suitable, as this will depend mainly on the particular country and system you are targeting.

1. **Pre-development:**
   - Foster alternative thinking
     Alternatives need to be made "thinkable". Fundamental questions need to be raised (e.g. *is there enough solar radiation to provide enough energy for our country? Could flood prevention protect important supply chains?*) As part of NAMA readiness programmes, research studies can help to provide a new basis for an informed dialogue.
   - Demonstrate new possibilities and create niches for experimentation
     Pilot projects help to make alternatives tangible (*This is what an eco-house looks like – it can actually be built*). Small-scale NAMAs can provide technology and capacity support to innovators in pilot projects.
   - Create new fora for discussion
     The new thinking is an outsider to the strong mainstream. The exploration of new ideas requires protected spaces. Capacity development can search for open minds and bring them together.

2. **Take-off:**
   - Scale-up Niches
     In this phase, alternatives need protected spaces to grow and mature. This is way beyond individual pilot projects – experiments need to be scaled up and replicated. These niches can be at sub-national level (e.g. eco-towns, low carbon settlements) or supported by national regulations (feed-in tariffs for renewables).
   - Build coalitions
     Innovators and niche actors need to connect and exchange ideas, to define common ground and lobby for the alternatives they wish to explore. NAMAs may include support for the advocates of a paradigm shift with capacity support and establish a forum for stakeholder dialogue and exchange.

3. **Acceleration:**
   - Policy NAMAs:
     governmental actors may develop legal and institutional frameworks as NAMAs. This includes legal advice, capacity building and institution building, including the support of cross-departmental and cross-sectoral cooperation.
   - Help to establish new actors
     NAMAs may also support new players who need to build up lobbying power in favour of the new system. In order to gain societal acceptance for the transformational process, it is crucial to integrate civil society actors and to give them sufficient voice, to enable them to convince the mainstream of the low-carbon innovation.
   - Assure continuous implementation
     Another focus should be on assuring the continued implementation of actions defined in the political realm. A common barrier is a lack of capacity at lower political levels. NAMAs at this stage should therefore incorporate multiple political levels in an integrated manner.

4. **Stabilisation or relapse:**
   During this stage it is too late to intervene strongly; instead, long-term processes from earlier phases pay off. It is, therefore, crucial that throughout the whole transformation process, acceptance of climate-friendly, resilient solutions is anchored within society. Good communication plays an important role, but information and marketing alone will not suffice. It is essential that large and influential sectors of society see the benefit of the new system. Questions of cost/benefit distribution and "fairness" of the new system need to be addressed at early stages of the transformation (e.g. when designing law, business

models, mitigation technologies and adaptation strategies). An anchoring within society should therefore be part of every NAMA development.

2.3 THEORIES COVERING MANAGEMENT OF TRANSITIONS

Strategic Niche Management (SNM) and Transitions Management (TM) are two branches within transitions research that are based on a Multilevel Perspective approach. SNM and TM do not provide universal blueprints that will guide sustainable transitions. Instead, they provide attempts at unpacking elements that could constitute an enabling environment, including targeted interventions, social networks and enabling conditions, which fosters transformational innovations and their market introduction and dissemination.

2.3.1 Strategic Niche Management

Strategic Niche Management (SNM) is a concept that has both been used as a research and policy tool. Initially envisaged as a perspective to bridge the missing links between research, development and market introduction, SNM is an approach that proposes to address the issue by isolating and controlling the selection pressures (e.g. climate concerns, market interests, regulatory norms) that innovations are exposed to through experimentation. SNM posits against the use of a mere technological fix to sustainability concerns by incorporating its evolution with user practices and regulatory structures through the creation of protected spaces.

In short, SNM seeks to support the smooth introduction of sustainable innovations into society by investigating the process involved in the successful creation and development of niches established through real-life socio-technical experiments. Examples of such experiments are demonstration and pilot projects, community initiatives, sustainability experiments and low carbon technologies.

SNM (Schot & Geels, 2008 and Raven *et al*., 2010) specifically targets how those experiments have been designed with an aim to:

a) Create and further new social networks:
   New networks are expected to emerge from regular interactions within a constellation of actors from originally unconnected fields and disciplines. In other words, the wider the network, the better.
b) Encourage actors to discuss and frame shared expectations:
   The assumption is that stakeholders such as policy makers, industry representatives and users participate in transition experiments on the basis of different expectations. SNM recommends the explicit articulation of expectations as a means to provide mutual understanding and more informed choices in the design process of the transition experiment. The intent is to nurture a convergence of expectations from more and more stakeholders towards a shared vision based on results obtained from experimentation.
c) Stimulate broad and interactive learning processes:
   Broad and reflexive learning processes are expected to increase the chances of successful diffusion beyond the experiment.

SNM assumes that successful niches will emerge through an evolutionary process of searching, selection and retention. The process is influenced by social interaction and the construction of shared meanings through sense making, learning and debates (Geels & Schot, 2007). The aim is to align technical and social preferences to enhance the possibility of emergence of new sustainable patterns.

Relevance for transformational NAMAs

To identify transformational properties of NAMAs within the analytical frame of SNM, practitioners can consider whether their NAMA intervention can be designed as a niche, a protected space for a socio-technical experiment to develop and break through the established way of doing things. A positive answer will lead to a series of follow-up questions:

1. *Framing the NAMA as a niche* – What are the mechanisms, factors and sequence of events that can lead to the creation of a NAMA intervention as a niche?

   For example, if the NAMA is about energy efficiency in buildings, the intervention can be designed by identifying parameters, pressure points, political drive, support and other requirements that will enable niche characteristics to be appropriated into the mainstream regime of building codes and practices. The importance of timing interventions in NAMA implementation can also be gauged. For example, barriers towards implementing a niche intervention can be made explicit, targeted and timely action prioritized.

2. *Internal NAMA/niche processes* – How can social networks be created around the NAMA to frame stakeholder expectations, while allowing those expectations to evolve towards a shared vision through a learning process?

   The question can help practitioners to identify and map the stakeholders to be mobilised as well as the expectations to be clarified during the course of implementation. Platforms that allow knowledge development and diffusion over time can be created and conditions that allow emergence of specialised actors. For example, NAMA interventions such as grants and subsidies that favour green business models can support the development of innovation champions and active entrepreneurs. Stakeholders are given a protected space to facilitate a change of perceptions and a questioning of initial assumptions for how to address the regime problems of high energy use and carbon lock-in. The importance of 'thinking out of the box', based on new information gathered during implementation, can also be stressed.

2.3.2 Transition Management

Transition Management (TM) is a hybrid approach that is interdisciplinary in nature, practice-oriented in the hands of policy-makers and a useful analytical tool for case study authors. TM views transitions as multilevel, multiphase processes of structural change in societal systems. It offers a management approach that recommends that innovation processes can be shaped through a step-wise differentiation of transition activities within governance processes (Figure 7) while taking sustainable development as a long-term goal.

While SNM focusses on management of protected spaces, i.e. niches in interaction with socio-technical regimes, TM expands the scope of analysis to the management of societal systems such as energy systems, health care and mobility that span all levels of society; micro, meso and macro levels. The end point of transitions is not assumed to be known but will reveal itself through a participatory process of searching and learning, testing, exploring and adapting problems and solutions. TM recognises that side effects are not predictable but can be managed through flexible objectives at a system level to cater for the uncertainties inherent in innovation processes. TM also views that the creation of protected space is crucial to foster innovation (Loorbach, 2010). It rejects the possibility of accurately steering socio-technical systems towards pre-determined objectives and rather posits for a coordination of interaction, co-evolution and self-organization by networks of actors, who share a vision and expectations for a radical change of the established high-carbon regime.

Operationally TM is envisaged as a cyclic process as shown in Fig. 7 comprising of four governance activities:

- Strategic – the establishment of a transition arena through structuring of a problem enables to look beyond their own domains of expertise. For example setting up an institutional arrangement such as a cross-sectoral technical committee dealing with energy efficiency and comprising of open-minded visionaries. . This governance dimension represents a long-term (30 years) envisioning of cultural and societal change.
- Tactical – activities include development of transition agendas, a vision of sustainable development and its associated pathway. The tactical dimension deals with structures within institutions and regimes over a mid-term period (5-15 years). For example, the pathways needed to translate a long-term emission-reduction goal into practice are set up through development of coalitions, images of the desired transition, institutional changes needed, barriers to overcome, behavioural changes and trends to reverse.
- Operational – activities focus on the mobilisation of actors and execution of projects and experiments. The focus of the operational dimension is on actual practices occurring within the short term (0-5 years), e.g. the actual testing of a new biogas technology so as to learn from practice.
- Reflexive – evaluating, monitoring and learning from ongoing policies and societal changes. Based upon reflexive thinking and activities, the vision, agenda and coalitions are adjusted over time. An example is the establishment of MRV frameworks for NAMAs and how data on GHG reductions, sustainable development impacts and analysis of interventions can inform the transition management cycle of strategic, tactical and operational governance activities.

Fig. 7: The Transition Management Cycle (Loorbach 2010)

Relevance for transformational NAMAs

Applying the Transition Management approach to NAMAs can provide practitioners with a governance approach that fosters innovation by adopting reflexive reorientation as described above. Practitioners can use the Transitions Management approach to develop the NAMA as a transition experiment. If NAMA developers design an intervention as the creation of a protected space to build up alternative regimes, a number of useful questions can be posed. These include the following;

1. What mechanisms can be implemented so that content and process aspects of the NAMA are considered in parallel?
   Practitioners can consider how short term goals can be devised as milestones towards long-term, strategic goals for GHG reductions and sustainability. NAMA interventions can then be revised through the use of back- and forecasting techniques to reflect on NAMA development and implementation. Back-casting starts with the vision of a desirable future and then works backwards to identify policies and programs that will connect the future to the present. Forecasting is the process of predicting the future based on current trend analysis and scenario development.

2. Are options for strategic reorientation of NAMA objectives included in the design and are mechanisms in place to ensure timely intervention in crisis situations?
   For example, if conditions of the socio-technical landscape change other than expected such as falling global oil prices rather than increasing oil prices, there may be a need to modify the protected space, e.g. created by feed-in tariffs for renewable energy technologies such as solar, wind or biogas power or by removal/regulation of subsidies to fossil-fuel consumption. A reflexive governance approach to NAMA implementation can allow a timely response to unexpected changes and help NAMA managers to achieve or reorient strategic objectives.

3. Have both bottom-up and top-down approaches been considered to foster changes from both inside and outside the system?
   The question can help practitioners to focus on the different levels of organisations at play. For example, a NAMA intervention can facilitate stakeholder interactions across levels in a ministry, across different ministries and outside organisations to induce reframing of problems and solutions by developing new behaviours, values and attitudes. The need for broader stakeholder involvement can be gauged and action taken accordingly such as involving active entrepreneurs in government led NAMA design and planning. Mechanisms to reap inputs from multiple stakeholders and facilitate the co-evolution of a network of actors can be devised.

4. Will deepening, broadening and scaling up of NAMA interventions be considered with a view to actually transforming a sector?
   Deepening of a NAMA intervention is about learning processes, innovate practices and the regime changes required. Broadening of the intervention is about linking up with other initiatives in other domains, for example a bus-rapid-transit NAMA in one city linking up with other cities. Scaling up means to induce wider structural changes including culture and dominant practices. Practitioners can articulate their NAMA strategies in order to enhance mutual understanding and more informed choices in the design process of transformational NAMAs and, thereby, to ensure the widest possible impact of the intervention(s) for transitioning to more sustainable paths for the sector and beyond.

2.4 HYPOTHESES TO INFORM FURTHER STUDIES

The theoretical approaches sketched out in the previous sections each provide a different approach to analyzing and interpreting transformational change processes. Because of this variation, they add different viewpoints and starters for further analysis of change processes in general, as well as specific, NAMA-type policies and measures.

In the following, we have abstracted a set of hypotheses from the theories that can serve to drive further research into what constitutes a transformation, and to define success factors for fostering such processes in the context of international cooperation for sustainable development.

In addition, we have gathered a number of further theses from an internal brainstorming process on what entails transformational change in the NAMA context. We have endeavored to structure them along layers that embed them into each other. They are not fully based on theory, but represent what we believe are important aspects of transformational change in NAMAs. We encourage case study authors to analyze their cases if these apply to them.

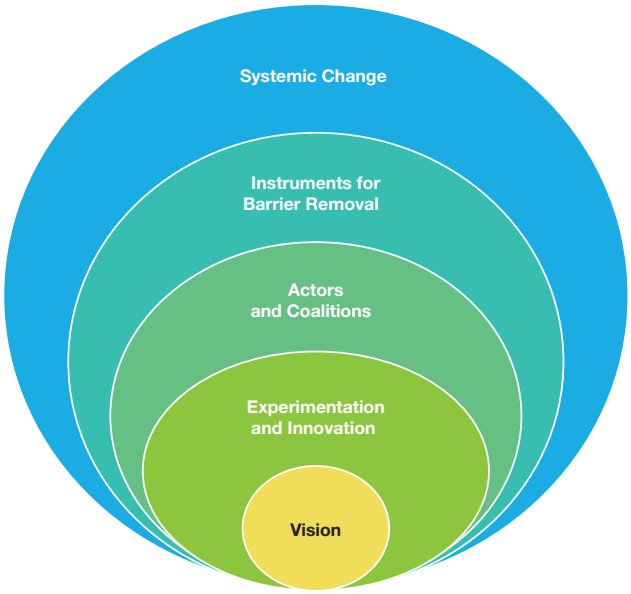
2.4.1 Theory-based hypotheses

Multi-Level Perspective	Changes in technologies as well as perceptions (worldviews) must go together to induce transformation.
	Transformational Change is more likely if there is protected space for innovations to develop.
	Outside pressure (e.g. through decisions on the international level) increases the chances for a transformational innovation to be taken up by the mainstream.
	A transformational change has occurred when there is a perceptable change in mainstream thinking and doing (the socio-technical regime) on a given issue.
Phase Model	Transformational processes follow typical phases that are not context-specific.
	Different phases of a transformational process require specific intervention types.
	NAMAs need to be tailored to the specific socio-technical context they target in order to have the highest transformational impact.
	Irrespective of the phase, NAMAs need to be anchored in, and supported by the society where the intervention takes place.
Strategic Niche Management	Transformations impacts are maximised when pressures at different levels link up and reinforce each other.
	Protected spaces for transformation evolve into a dominant design through the support of powerful actors.
	Broad interactive learning processes through social interaction enhances the possibility of emergence of new sustainable patterns.
	Niches stabilize within an environment conducive for performance improvement as well as strong expectations for further improvements.
Transition Management	Transformations require a long-term envisioning of change supported through mid-term articulation of transition agendas, sustainability visions and pathways.
	Transformations occur when innovative activities are envisaged as experiments with actors forming a specific arena.
	Transformation is fostered best through reflexive reorientation (of visions, agendas and coalitions) in strategic directions based on evaluation, monitoring and learning of progress towards change

2.4.2 Important further theses: Aspects of Transformational NAMAs

We expect that transformational NAMAs include a number of embedded layers for change. The following represents a number of theses that we have grouped according to their respective "embeddedness" from the inside out.

Fig. 8: Embedded layers of aspects for transformational NAMAs



Vision	Transformational change starts with an ambitious vision of change.
Experimentation and Innovation	Transformational change involves risky decisions and investments that are not guaranteed to pay off.
	Governments can create the protected niches needed for TC-NAMAs to experiment with new solutions.
Actors and Coalitions	Transformational change needs actors of change: innovators, disseminators, advocates, policy-makers.
Instruments for Barrier Removal	TC-NAMAs overcome persistent barriers.
	TC-NAMAs need policy instruments that are tailor-made to circumstance, in order to create a mix of push by markets and pull by policy.
Systemic Change	Transformational change needs to strike a balance between depth of change and connectivity to established practice (and habits) within society.
	For Transformational change, a portfolio of interventions is needed that together aim at change in all societal dimensions.

3 References

Beddoe, R. et al. 2009. Overcoming systemic roadblocks to sustainability: The evolutionary redesign of worldviews, institutions, and technologies. PNAS 106(8): 2483-2489.

BMU, and DECC. 2013. International NAMA Facility. General Information Document. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/199043/NAMA_Facility_-_Information_Document_14May2013_final.pdf.

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

Geels, F. W., Kemp.R. 2012. The Multi-Level Perspective as a New Perspective for Studying Socio-Technical Transitions. In *Automobility in Transition?* A Socio-Technical Analysis of Sustainable Transport, edited by Frank W. Geels, René Kemp, Geoff Dudley, and Glenn Lyons, 49–82. New York: Routledge.

Geels, F.W., Schot.J. 2010. The Dynamics of Transitions. A Socio-Technical Perspective. In Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change, edited by John Grin, Jan Rotmans, and Johan Schot, 9–102. New York: Routledge.

Homer-Dixon, T. 2009. The Great Transformation: Climate Change as Cultural Change. *http://www.homerdixon.com/2009/06/08/the-great-transformation-climate-change-as-cultural-change/.*

Laes, E., Gorissen,L., Nevens.F. 2014. A Comparison of Energy Transition Governance in Germany, The Netherlands and the United Kingdom. Sustainability 6 (3): 1129–52. *doi:10.3390/su6031129*.

Levin, K., Cashore,B., Bernstein,S., Auld,G. 2010. *Playing it Forward: Path Dependency, progressive Incrementalism, and the 'Super Wicked' Problem of Global Climate Change*. Paper presented to the Climate Change: Global Risks, Challenges and Decisions Congress, 10-12 March 2009, Copenhagen, Denmark.

Loorbach, D. 2010. Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. Governance, 23(1), 161–183. *doi:10.1111/j.1468-0491.2009.01471.x*

Mersmann, F, Wehnert, T., Göpel, M., Arens, S., Ujj, O. 2014. *Shifting Paradigms: Unpacking Transformation for Climate Action*. A Guidebook for Climate Finance & Development Practitioners. Berlin: Wuppertal Institute for Climate, Environment and Energy.

Raven et al. 2010. Transitions and strategic niche management: towards a competence kit for practitioners, Int. J. Technology Management, Vol. 51, No. 1, 2010

Rotmans, J., Kemp, R., Asselt, M., Geels,F.W., Verbong,G., Molendijk,K., Notten,P. 2001. Transitions & Transition Management: The Case for a Low Emission Energy Supply. ICIS Working Paper. Maastricht: International Centre for Integrative Studies (ICIS).

Schot, J., Geels, F. W. 2008. Strategic niche management and sustainable innovation journeys: theory, findings, research agenda, and policy. Technology Analysis & Strategic Management, 20(5), 537–554. *doi:10.1080/09537320802292651*

Timmermans, J. 2006. Complex Dynamics in a Transactional Model of Societal Transitions. *Interjournal* 1769: 1–18.

UN. 2012. Realizing the Future We Want for All. Report to the Secretary-General. New York: UN System Task Team on the Post-2015 Development Agenda. *http://www.un.org/en/development/desa/policy/untaskteam_undf/untt_report.pdf*.

UNFCCC. 2008. Report of the Conference of the Parties on Its Thirteenth Session, Held in Bali from 3 to 15 December 2007 - UNFCCC/CP/2007/6/Add1. UNFCCC/CP/2007/6/Add1. *http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf*.

———. 2011. Nationally Appropriate Mitigation Actions by Developing Country Parties - Summary by Co-Facilitators of Discussion on International Consultation and Analysis (ICA) Referred to in Decision 1/CP.16, Paragraphs 63 and 64. Bonn: United Nations Convention on Climate Change - AWG-LCA Contact Group. *http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/summary_on_ica_17_june_version_0900.pdf.*

Wang-Helmreich, H., Sterk, W., Wehnert,T., Arens,C., 2011. Current Developments in Pilot Nationally Appropriate Mitigation Actions of Developing Countries. JIKO Policy Paper. Wuppertal: Wuppertal Institute for Climate, Environment and Energy on behalf of: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). *http://www.jiko-bmu.de/960.*

WBGU. 2011. World in Transition. A Social Contract for Sustainability. Berlin: German Advisory Council on Global Change (WBGU). *http://www.wbgu.de/fileadmin/templates/dateien/veroeffentlichungen/hauptgutachten/jg2011/wbgu_jg2011_en.pdf*.

Wuppertal Institute
for Climate, Environment
and Energy

UNEP DTU
PARTNERSHIP

International Partnership
on Mitigation and MRV

NAMA PARTNERSHIP

United Nations
Framework Convention on
Climate Change

FIRM
Facilitating
Implementation and
Readiness for
Mitigation