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The Role of Paradigm Analysis in the Development of Policies for a Resource Efficient Economy

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Abstract: Policy makers are often called upon to navigate between scientists' urgent calls for long-term concerted action to reduce the environmental impacts due to resource use, and the public's concerns over policies that threaten lifestyles or jobs. Against these political challenges, resource efficiency policy making is often a changeable and even chaotic process, which has fallen short of the political ambitions set by democratically elected governments. This article examines the importance of paradigms in understanding how the public collectively responds to new policy proposals, such as those developed within the project DYNAmic policy MiXes for absolute decoupling of environmental impact of EU resource use from economic growth (DYNAMIX). The resulting proposed approach provides a framework to understand how different concerns and worldviews converge within public discourse, potentially resulting in paradigm change. Thus an alternative perspective on how resource efficiency policy can be development is proposed, which envisages early policies to lay the ground for future far-reaching policies, by altering the underlying paradigm context in which the public receive and respond to policy. The article concludes by arguing that paradigm change is more likely if the policy is conceived, framed, designed, analyzed, presented, and evaluated from the worldview or paradigm pathway that it seeks to create (i.e., the destination paradigm).

Keywords: paradigm; worldview; discourse; DYNAMIX; policy; sequencing; practice; attitudes; behaviour; sustainability

1. Background

Despite numerous policy initiatives and ambitions at an EU level (see [1–5]), Europe is still a long way from decoupling the consumption of resources (measured as total material requirement (TMR)) from economic growth, despite examples of success in improving the material efficiency of production. According to the Ecological Footprint indicator, Europe uses 20% of the world's resources, while it hosts only 7% of the world's population. This makes nearly all EU countries ecological debtors, using more natural resources than they provide [6]. The level of resource use within the EU (and other industrialised and emerging economies) cannot be maintained without seriously threatening the functioning of various ecosystems with crucial provisioning and supporting services for human society and endangering climate stability [7].

The apparent gap between political ambition and policy success is in part explained by the EU public's resistance to resource efficiency policy, as demonstrated by results presented in another article published in this special issue on public acceptability [1], which found that, of the 14 policies considered by those proposing them to be within the existing political paradigm, nine were considered likely to generate either contentious or highly contentious levels of concerns, particularly around the policy's cost, effectiveness and fairness. Underlying this result is the public's limited prioritization of environmental issues, and therefore the potential for conflict and rejection in the event that more prioritized factors are threatened. The Standard Eurobarometer 82 survey [8] reported that climate

change was identified as the most important issue by only 7% of respondents, followed by energy supply (6%) and the environment (also 6%), which therefore places these issues as the ninth, tenth and twelfth most important concerns respectively. In contrast, the issues associated with the economic crises of 2008 (i.e., the economic situation and employment) were identified by the European population as a priority by 33% and 29% of respondents respectively.

A further reason for the gap between political ambition and policy success in this area is the long-term nature of the challenges faced by policy makers, and the need for policy commitment, which spans political appointments. As seen with the withdrawal of the previous Circular Economy Package in December 2014 as part of Juncker's new agenda for Jobs, Growth, Fairness and Democratic Change when appointed as president of the European Commission, policy packages proposed by one administration will not always be retained by the next, and where it is re-introduced, as it was in this case, its ambition will not necessarily be as great. The new Circular Economy Package presented a year later [1] was reported to be "not Better Regulation but short-termist Bad Regulation" [9].

2. An Introduction to Paradigms

Vanner and Bicket [10] found that paradigm is a term that has come to be applied loosely with a range of different meanings; it is synonymous and used interchangeably with belief, concept, theory, and even tradition, practice, or attitude. In broad terms, an individual or group of people's paradigm is the worldview—the set of sometimes-unconscious values, beliefs and ideologies—in which they are immersed and which they use to navigate any new evidence, challenges or choices with which they find themselves confronted. Paradigms manifest themselves externally via discourses and are reinforced within society via the creation of social technical systems. Paradigms exist across society in different shapes and forms. Typically, paradigms are viewed within two contexts:

(1) Scientific paradigms encapsulate those paradigms held by scientists and professionals in both the natural and social sciences. Thomas Kuhn popularised the concept of paradigm in his book "*The Structure of Scientific Revolutions*" [11]. Kuhn postulated that science goes through alternating periods of stability and changeability—in which a combination of factors, such as the emergence of new contradictory evidence and the availability of alternative plausible hypotheses, may coincide to provide more favourable conditions for the shift to a new paradigm. Social science paradigms represent a subset of scientific paradigms but with a greater tendency toward numerous competing paradigms, reflecting different worldviews and models of how society will respond to a given intervention. They in many respects reflect the complexity and diversity in human behaviour, with different models being relevant depending on the context.

(2) Socio-cultural paradigms, which represent the remaining non-technical ideologies, beliefs, and values of society. The concept of socio-cultural paradigms as defined here represents a particular philosophy of life or a framework of ideas, beliefs and values through which a community or an individual interprets the world and interacts with it. The term is often reflected in (and reflects) religion and political ideology. It is quite common for there to be a number of socio-cultural paradigms within society, apparently competing and contradicting one another. Socio-cultural paradigms have the capacity to create their own stability when collectively held; with observable behaviour reinforcing the prevailing worldview. Culture and cultural differences are essential in permitting the co-existence of greatly different worldviews. The important difference between socio-cultural paradigms and social science paradigms is that the judgments and models used by social scientists are subject to review and challenge about the degree to which they reflect how the world works, unlike the beliefs underlying socio-cultural paradigms, which need not be.

2.1. Paradigms, Sustainability and Discourse

Investigation in this area, as reported in [10] suggests that, while it is possible to define socio-cultural paradigm, scientific paradigm and discourse as separate concepts, many of the resource

efficiency terms and paradigms can be placed in any of these three categories depending on the context in which the paradigm is used and to whom it relates (policy makers, individuals, institutions, etc.), and of course, from whose perspective the term or paradigm is reported. In doing so, the meaning or focus of the term slightly shifts. Thus, for example, the concept of sustainability might be observed and theorised by both natural and social scientists, but seen to be a socio-cultural paradigm within a social justice discourse. The new constraints required by sustainability have also led to scientific paradigm shifts within established fields such as economics. A further example includes the circular economy, which can be perceived intuitively and quite strictly from a socio-cultural perspective to mean products in never-ending use, but can be used more precisely and potentially quite loosely by some within policy and industry to refer to actions that contribute towards a circular vision.

Alongside the limits to growth discourse [12], the desire for resource efficiency and decoupling has increasingly become a social concept co-constructed with scientists, governments and citizens. Therefore, the definition of paradigm used within the FP7 funded DYNAMIX project (DYNAmic policy MIXes for absolute decoupling of environmental impact EU resource use from economic growth) requires an understanding of how socio-cultural and scientific paradigms interrelate and how they become tangible via the notion of discourses. According to Dryzek [13], discourses establish meanings, identify agents, confirm relations between actors and other entities, set the boundaries for what is legitimate knowledge, and generate what is accepted as common sense. Vanner and Bicket [10] explored the relationship between discourses and paradigm and found that, in essence, an individual's discourse is the interface between his or her (inner) paradigm and the outside world; that discourses represent the main interface between scientific paradigms and socio-cultural paradigms, and therefore often highlight areas of significantly different perspectives and worldviews. Vanner and Bicket propose that the most readily available point that paradigms can be observed is through mass media reports.

2.2. Understanding the Process of Paradigm Change

The dominant paradigm in society sets a strong context for the public acceptability of introduced policies, and will often set the starting parameters of public discourse of what might be deemed acceptable by the public when considering proposed policies. However, Vanner and Bicket [10] find that while they may be deeply embedded and difficult to change, there is evidence to suggest that paradigms are not immovable, and are influenced and reshaped over time through reactions to both new evidence and experience. Sometimes, compelling new evidence of environmental harm can lead to a collective acceptance for the need for policy intervention. Other times, resistance to change will mean that policy and practice may need to move ahead of consensus and therefore the investment of political capital. Either way, positive change in practices may well, over time, help to bring about a positive shift in the dominant paradigm, leading to a redefining of the limits of public acceptability and of the policies at the disposal of policy makers in the future.

The literature on paradigm change reveals that they can be viewed from a number of different perspectives [10], all of which need to be considered when contemplating the kind of whole-system paradigm change envisaged within DYNAMIX. As the starting point in the development of a more integrated perspective on paradigm change, this section of the article considers paradigm change from several perspectives in turn. To consider paradigm change from only one perspective would fail to understand the interrelatedness of the system.

2.2.1. Changes within Scientific Paradigms

Scientific paradigms typically heavily influence the development of policy via the professional background of those who develop and inform its design. Within natural sciences, Kuhn [11] posits that paradigm shifts are the culmination of several contingent factors, beginning with the emergence of new evidence that does not appear to fit within the current dominant paradigm. Should enough significant anomalies appear, science—still guided by the existing dominant paradigm—enters a state of crisis with greater potential for a paradigm change. Anomalies are either: *Reconciled* and the existing

paradigm survives; *set aside* for the existing paradigm to explain once the tools perceived to be lacking are improved or developed; or they *become considered as counter-examples* to the existing theory or model, at which point both new and old alternative theories and models are considered for their suitability as replacements [11]. Factions of scientists form, arguing for and against both the existing and alternative theories and models. Kuhn proposes that a paradigm shift is said to have occurred when "an older paradigm is replaced in whole or in part by an incompatible new one" [11].

It is less clear whether such decisive paradigm shifts occur so frequently within the social sciences. Theories, models and therefore paradigms in the social sciences are more malleable, often less explicitly incompatible, and anomalies may be more easily explained away. However, analysis of previous changes in trends in the social sciences (and in societal beliefs and values that social scientists claim to report) suggests that paradigm shifts have indeed occurred in these arenas too. An example of competing paradigms and processes of crises within social science is reflected within the discourse initiated by Shove [14], when she challenged whether more collective based models of pro-environmental social change, such as those explained by practice theory, would be more relevant to policy making than the existing individualistic or so called 'ABC' models then favoured by the UK's Environment Department (DEFRA), which Shove argued merely saw human behaviour as a barrier to policy implementation. Shove challenged policy makers to see behaviour as both complex and socially constructed.

2.2.2. Changes within Social-Cultural Paradigms

Socio-cultural paradigm changes were reflected in discourses on issues such as maternity and paternity leave, women's rights, the slave trade, drunk-driving, and smoking. However, it would be difficult if not impossible to separate such process of socio-cultural paradigm changes from the social science focus on such issues and their influence on public campaigns and policy. Hence, the direction in the causal chain can remain uncertain. Thus, for example, the 2007 smoking ban in the UK resulted in a socio-cultural paradigm shift but it is difficult to exclude the possibility that a paradigm shift was already underway in significantly influential sections of society, which led to the government to impose a ban.

It has been shown that different groups and individuals are adaptable to different perspectives and values, depending on how things are presented [15]. Thus, both practice-led (i.e., collective and automated) and conscious individual-based routes of behaviour change are potentially relevant, depending on the context and population segment. There is also the potential for people's socio-cultural paradigms (and therefore behaviour) to be constrained by the worldview messages communicated within the way that policies are constructed and are communicated. This makes paradigm changes and shifts complex to implement but paradigm change is more likely if the policy is conceived, framed, designed, analyzed, presented, and evaluated from the worldview or paradigm pathway that it seeks to create (i.e., the destination paradigm). It is therefore important for those formulating policy to be aware of the paradigm that their thinking is based on and the pathway of change they envisage when they design policy.

2.2.3. Changes within Policy Paradigms

The literature on policy paradigms often focuses on agricultural reform and frequently references Hall's 1993 paper [16]. Hall identifies policy paradigm as *frameworks of ideas which influences the way in which policy is formulated in a given policy area*. Such frameworks of ideas are said to colour not only how a policy problem is understood, but also policy choices and institutional structures, and importantly in this context, the processes of institutional change during periods of crisis. Hall reports the process of policy paradigm change to be akin to scientific paradigm changes, whereby a policy paradigm can be threatened by the appearance of anomalies. Where such anomalies accumulate, ad hoc attempts are generally made to stretch the terms of the paradigm to cover them, but this gradually undermines the intellectual coherence and precision of the original paradigm, and ultimately result in policy failures

that gradually undermine the authority of the existing paradigm and its advocates even further. This eventually triggers a broader, societal, political partisan contestation over policy goals, problems, and solutions until a new policy paradigm emerges.

Coleman et al. (2008) [17] builds upon this understanding and describes a further alternative route to paradigm shift to that of Hall's in which change is negotiated between state actors and group representatives. Within this description, discussions of change are largely confined to sectoral policy networks and the result is a more managed series of policy changes that culminate in a paradigm shift. This paradigm change is reported to be more gradual and results from negotiations conducted over a number of years within the relatively depoliticized confines of an existing policy network. Comparing the two trajectories to paradigm change, Coleman et al. 2008 demonstrated that corporatist policy networks lend themselves to the cumulative, negotiated, problem-solving trajectory to paradigm change; whereas state-directed or pressure pluralist networks are more likely to be associated with crisis-driven change.

Daugbjerg (2003) [18] considers the feedback effects of incremental policy adjustments over time and whether the impact on the policy paradigm changes over time. Focusing on EU agricultural policy, Daugbjerg (2003) explored the MacSharry reform negotiation's unsuccessful proposal to agree bond payments to farmers (i.e., future payments de-linked from production AND sellable on capital markets). In the event, the MacSharry reform created sufficient incremental de-linking of payments from production to move the CAP reform process closer to the bond scheme over time, thus resulting in a paradigm shift whereby bond payments would be significantly less contentious if now proposed.

3. Our Approach to Paradigm Analysis

These concepts of paradigm and paradigm change were applied within the DYNAMIX project to develop a package of steps and approaches in the development of resource-efficient policy. These steps included:

(1)　An awareness within the policy development community of its own paradigm context and an appreciating that the policy it develops will need to be tailored to the paradigm context that it seeks to act upon.

(2)　An assessment of previous relevant discourses to understand how resistance might emerge due to differing worldviews. The approach to this analysis has been outlined here, with the full methodology and results of the analysis being the subject of another article in this special issue [19].

(3)　A review and potential revision of the policy proposals based on an understanding of the paradigm level concerns and the paradigm change envisaged. The resulting revisions might include re-packaging, or sequencing of the policies into policy pathways, which seek to change the underlying basis under which future policy will be received and understood.

3.1. Awareness of the Paradigm Context within Which Policy Is Being Developed

Where policy seeks to influence paradigms, an appreciation that all analysis is rooted in a paradigm is required. The analysis that informs the policy's development will very likely have been framed within a certain professional paradigm or worldview. Furthermore, those undertaking the analysis will be likely to hold their own more personal worldviews of how society works and responds to challenges, which will likely be heavily but not exclusively influenced by their professional experiences. In addition, scientists working for policy makers (either employed or contracted as consultants) are often required to offer the design of their analyses for comment and peer-review, thereby needing to remain within an existing paradigm. Finally, the outcome of the analysis will need to be understandable, acceptable and of relevance to the policy makers who commissioned and funded the analysis, with the prospect of future work at stake. This makes policy

that seeks to influence at the paradigm level both challenging and problematic, even in terms of knowing the extent that the analysis has managed to look beyond its own paradigm.

The DYNAMIX project team engaged with policy makers and expert stakeholders on resource efficiency on a regular basis through Policy Platform events held in Brussels. During the 2nd DYNAMIX Policy Platform, which took place on 24 and 25 October 2013, the DYNAMIX team explored the feasibility and potential impact of alternative paradigms, as viewed through concepts (such as "green growth") which are often not the dominant paradigm but reflect and reveal large parts of a paradigm system by offering a conceptual view of an alternative paradigm. This was done as a way to gauge participants' worldview and paradigm perspectives, and heighten awareness within this group of their own worldviews. This was done within an interactive working group session of 58 participants from 16 European countries attending the Policy Platform of intended users of the DYNAMIX results. Participants included policy makers, researchers (including the DYNAMIX researchers), and representatives from civil society organizations, business, environmental protection agencies, and international organizations. The workshop participants were asked to form small groups of 4–6, ensuring where possible that each group had representatives from policymaking, research and civil society. Participants discussed a sub-section of three of the following paradigm concepts: *green growth*, *circular economy*, *biomimicry*, *green economy*, *transition towns*, *reliance on markets*, and *beyond GDP* in a focus group structure. Participants assessed the concepts' potential to realise absolute decoupling (i.e., its effectiveness), and the feasibility for widespread adoption; drawing on their personal experience and perspectives. They were also asked at the end of the exercise to choose their own favoured concept to "champion". The results of the group discussions were recorded on a ranking and assessment sheet for each group.

A summary of the results of the exercise is presented in Table 1 below, with concepts ranked in decreasing order based on the average of the combined effectiveness and feasibility scores. In all three columns, the results show the average score out of 5 for all groups who provided a score. The champion score is calculated to be the number of individual champions divided by the total number of groups allocated the concept to discuss.

Table 1. Results of survey of DYNAMIX' policy stakeholders.

Concept	(a) Mean Effectiveness	(b) Mean Feasibility	Mean Effectiveness & Feasibility (a + b)/2	Champions	# of Groups that Considered Concept	Champions per # of Groups Considered
Circular Economy	3.8	4.1	4.0	8	5	1.6
Reliance on Markets	3.3	4.0	3.6	2	4	0.5
Green Growth	2.5	4.2	3.3	9	5	1.8
Beyond GDP	4.5	2.0	3.3	2	3	0.7
Green Economy	3.3	3.0	3.1	4	2	2.0
Transition Towns	3.5	2.3	2.9	1	2	0.5
Biomimicry	1.6	4.0	2.8	0	4	0.0

The results suggest that there is considerable verity in the level of acceptance and perceived feasibility of adopting the paradigm concepts. Interestingly, the one considered to be the most effective and feasible, the circular economy, would arguably entail a greater level of paradigm change than some of the other paradigm concepts, such as "Green Growth" and "Reliance on Markets", which might be argued to be more of an adaption of the dominant paradigm to environmental pressures than a genuine paradigm change. This reflects the present environmental policy discourse at an EU level being heavily attracted to the Circular Economy. It is part of the future vision of resource efficiency within the EU, which envisages an economy with significant "win-win" benefits [1]. Closely behind the Circular Economy are "Green Growth" and "Reliance on Markets", which reflect established professional paradigms within environmental policy professionals, as represented by this group. There is therefore real experience among our stakeholders of implementing policy based on these paradigm concepts

over a number of years now, with the experience of the detailed resistance from business, which this naturally entails.

The two concepts perceived to be least feasible for widespread adoption were "Beyond GDP" and "Transition Towns". Particularly in the case of "Transition Towns", widespread adoption was perceived to be hard to imagine within our present paradigm. Many of the stakeholders identified particular methodological challenges of implementing a Beyond GDP approach into the existing system.

This exercise was undertaken in a workshop context and had more than one intended function. The outcome of the exercise was intended to both provide the DYNAMIX researchers with an idea of the worldviews held by our stakeholders, and raise awareness among the stakeholders of paradigms and how they impact on their work more generally. There are therefore several limitations. The groups were not systematically assigned with only guidance given on their makeup. Furthermore, the discussions within the groups were not facilitated and therefore the views of some participants risk being given greater credence than others. The individual championing of particular concepts was intended to mitigate for these limitations, but will not have overcome them altogether.

3.2. The Importance of the Paradigm Context within Which the Policy Is Being Implemented

The DYNAMIX project developed cornerstone scenarios, which explored different societal scenarios in which the proposed policies might feasibly be implemented [20]. These scenarios have a significant paradigm element and were therefore additionally used to explore how policy for sustainable resource use differs depending on the paradigm context that might be proposed and implemented. The two variables chosen to be the most important in supporting or hindering the achievements of the DYNAMIX objectives variables were: Materialism *versus* environmentalism; and the level of innovation (both social and technical). These two variables were mapped on axes to create four cornerstone scenarios around a central reference scenario as shown in Figure 1 and discribed below.

- The *Economic bonanza* scenario includes technological breakthroughs and a focus on increased production and consumption. The economic efficiency and growth are high but global competition over some scarce resources becomes fierce.
- The *Safe globe* scenario is characterized by a high rate of technological and social innovation with a focus on the safety and well-being of all humanity, future generations, and nature. Most individuals strive for close social bonds and cultural achievements, rather than economic wealth and social norms are strong, making it difficult for companies and politicians to take actions that risk significantly harming the environment.
- The *Divided we trudge* scenario is characterized by a lack of cooperation, increased nationalism in Europe, diminished knowledge transfer between stakeholders and countries, a low rate of innovation. Economic growth is sluggish despite a materialistic focus on production and consumption.
- The *Back to nature* scenario focuses on societal values and well-being of all humanity, future generations, and nature and less so in on technological innovation. Characterized by distrust in experts and advanced technology, small-scale solutions and more local decision making.

These four paradigm scenarios offer alternative views of how policies might be perceived under different paradigm contexts, and how the political imperatives, such as for economic growth, are not fixed across all of these cornerstone scenarios. Therefore:

(1) Under a *safe globe* scenario, policy can work within more favourable combinations of paradigms and assume high innovation and a collaborative paradigm context.

(2) In a *back-to-nature* type context, policy makers need not necessarily require policy packages that seek more economic growth. This is because under this scenario the population would have come to focus on well-being over GDP, and therefore could accept policy outcomes that do

not necessarily deliver positive growth in GDP, and would reject policies that seek economic growth and the cost of social or environmental capital. Within this scenario, policy may need to promote 'green-innovation' to ensure that resources are used efficiently enough to maintain sustainability thresholds.

(3) Under the *economic bonanza* scenario, high levels of innovation offer the technological and social means for green growth but high levels of materialism-driven consumption means that it is less likely that sustainable levels of resource use are achieved. The policy choices under this scenario context are to either implement far-reaching price-based policy measures intended to cap consumption (but risk social-regressivity), or social engagement leading to paradigm change.

(4) Under the *divided we trudge* scenario, intervention would need to involve attempts at paradigm change. Under this paradigm context, the desire for consumption would be too great and the levels of innovation and cooperation too low to be at all likely to be environmentally sustainable.
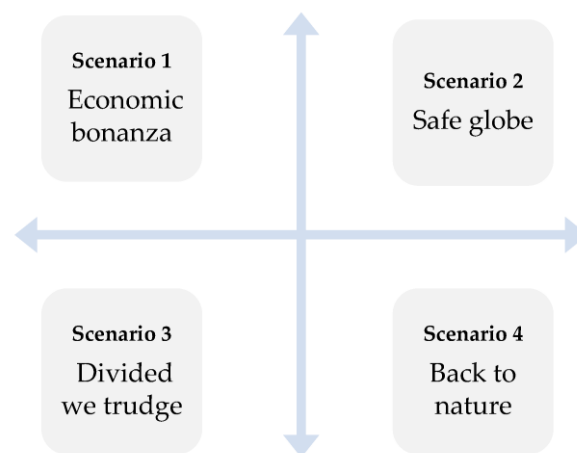

Figure 1. The cornerstone scenarios. Source: Gustavsson et al. [20].

3.3. Understanding the Existing Paradigm System and How Resistance Can Emerge from This

As a way of understanding public acceptability, we mapped how scientific, socio-cultural paradigms, and institutions such as governments interact via discourses, forming a wider paradigm system form, as shown in Figure 2.

This paradigm system presents the means that paradigms can be observed, co-created and re-validated; thereby maintain a certain level of paradigm stability and resistance to change. So, social science paradigms can become self-reinforcing when interacting with socio-cultural paradigms via policies. The reasons are that the systems and worldviews, both within the population and the structures and institutions, which are being asked to change, are not set up to support the change. It is useful to look at this from the perspective of health policy in the USA, which offers a very different context to considering these issues. The *Patient Protection and Affordable Care Act* (PPACA), or so called "Obamacare", gave more Americans access to affordable, quality health insurance and aimed to reduce the growth in U.S. health care spending. President Obama was by no means the first President to attempt such a reform, and faced very significant challenges and political cost to achieve this. The reason being that the worldview within the US is that medical cover is a private matter between citizens, their employers and private insurance firms who assess individual level potential costs. The proposed changes only propose to partially reform this situation, thereby highlighting losers who are paying for the reform, not least the better off who will need to pay more through taxes, on top of their existing cover. The reforms also challenge the inefficiencies within the existing system but does not replace the system; thereby coming up against some powerful institutions within the system it seeks to reform. The more fundamental reform, to move towards a more national health

system which guarantees long-term care and decouples payments from the care given, remains beyond the existing paradigm within the US. If this could be accommodated in some way, an alternative view of how medical care could be delivered could be promoted by policy, rather than the Obamacare process which highlighted and re-enforce existing worldviews, contrary to what is sought. The political infeasibility of such a move in the US highlights the kind of challenge faced by DYNAMIX.
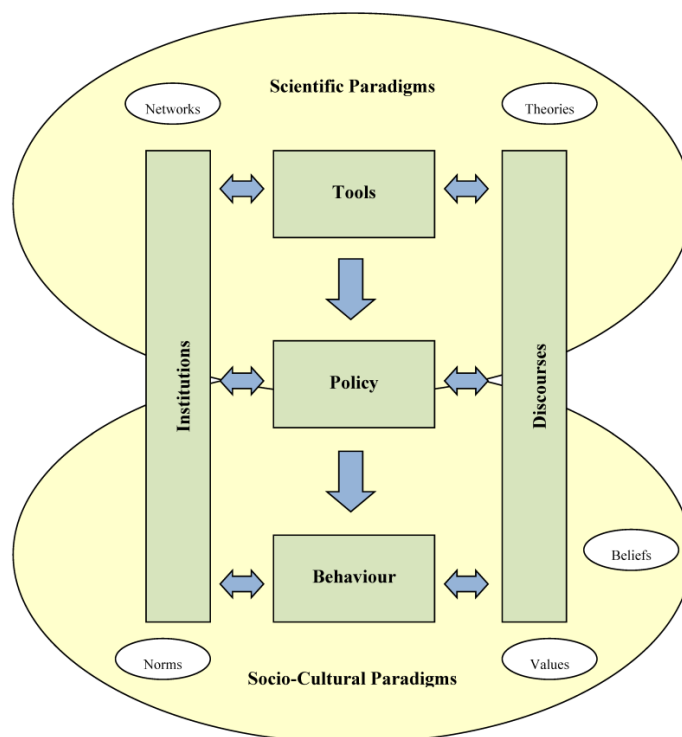

Figure 2. Mapping of the paradigm system.

Figure 3 was provided to the DYNAMIX policy development teams, along with a series of questions to support them to gain an initial understanding of what barriers to implementation might occur. The questions were:

(1) Why might the proposed policy fail if implemented at present?

    a. Is there a top-down barrier (within the existing relevant political authorities, business interests or institutions) to implementing this? If so, what form does these take (including any business lobbying interest)?

    b. Is there a corresponding bottom-up resistance (from within the public and civil society) to its successful implementation? What value or behaviour is being threatened?

    c. Is there an established channel of discourse between policy and society on this issue? If so, who initiated the discourse and what form did it take?

(2) Are there envisaged "natural" (or counter-factual) processes of change, which would significantly change this situation? That is, are any of the contextual issues from question 1 likely to change within the foreseeable future (i.e., change of government) or are there long-term processes of social change, which would change these circumstances, notably occurring in the absence of political intervention?

(3) Using the responses to the questions above, what contextual changes would need to occur over time to make the policy implementable?

The responses to these questions were used to support policy author teams to develop "smarter" and more ambitious policies and *inform how they might be mitigated or sequenced to make them more*

effective policy packages. These resulting *policy packages were* then *assessed using the mapped paradigm system as shown in* Figure 3, *to understand the concern issues around public acceptability and the likelihood that the public would ultimately accept the policy* [18].
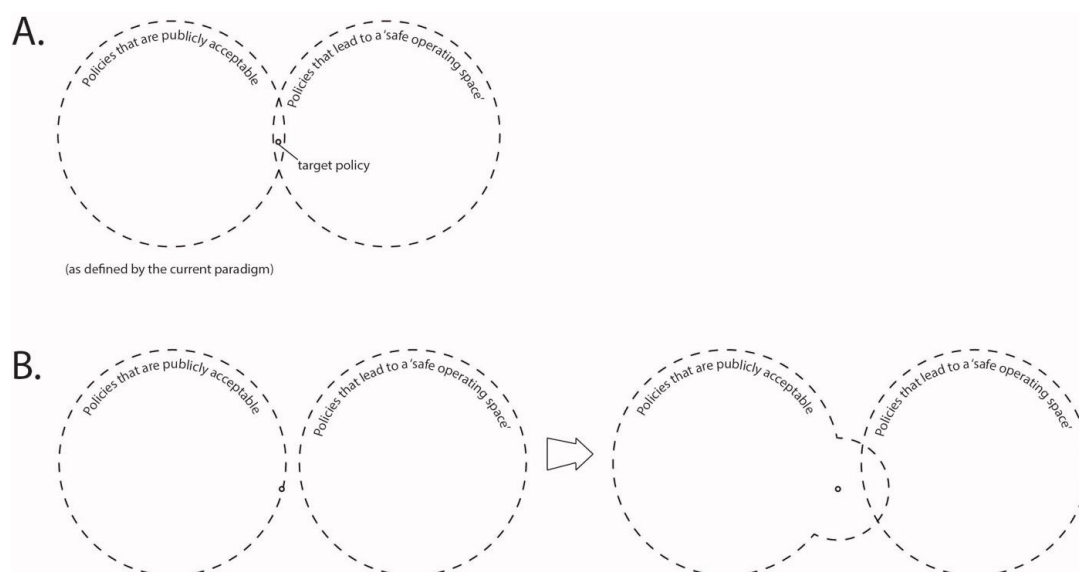

Figure 3. The two circle model for policy pathways towards a safe operating space.

3.4. Plotting out a Pathway for Paradigm Change and Policy Sequencing Strategy

Once public concern and paradigm issues have been assessed and understood, the policies can then be organized in a way that tackles some of the paradigm issues identified. Packages of policies can be sequenced to promote theoretical pathways of interactions and paradigm change over time in a way that does not breach acceptability thresholds of existing voters. Such theoretical pathways for paradigm change can support policies presently outside the existing political paradigm to become acceptable and feasible to implement at a later date.

This process makes reference to the "two circle" model of paradigm change [10] as presented in case B of Figure 3 below, where useful paradigm changing outcomes from early sequenced policies lay the foundations for previously "out-of-paradigm" policies to be implemented in subsequent steps. This is in contrast with the less problematic case, A, where there is already at least one publicly acceptable "target policy" which overlaps with a safe operating space (and the paradigm context provides the foundations for policy makers with the opportunity to create a sustainable path for resource use). This is not true for case B where the target policies as created by policy analysis do not overlap with a safe operating space. Here the key is to design a policy pathway which, whilst challenging, is publicly acceptable to present citizens but that moves the paradigm towards one compatible with a safe operating space in the longer-term, through a series of "stepping-stone" sequencing policies which might appear to not be achieving the policy goal in the most efficient way.

This model calls for policies to be designed in a way that not only changes behaviours (via a tax for example), but additionally considers how the policy might support a change in people's worldviews in a way that supports future policy measures that would otherwise be too contentious than is presently considered by the existing policy paradigm as publicly acceptable. The policy therefore needs prequel policies to lay the ground, and then the policy itself might need to be adjusted and extended in a way that creates a safe pathway for future policies.

4. Conclusions and Recommendations

This article has explored the case for paradigm change in policy intended to achieve sustainable levels of resource use. It proposes that, whilst paradigms may be deeply embedded and difficult to

change, they are not immovable, and can be influenced and reshaped over time. If policy makers are to direct this process successfully, an appreciation is required that they themselves will be rooted in a number of paradigms. Such an approach to resource efficient policy making does however offer the potential that citizens be more likely to find such policies acceptable, and the policy objectives can therefore be achieved with less invested political capital. The key is to design a policy pathway which, whilst challenging, is publicly acceptable to present citizens but that moves the paradigm towards one compatible with a safe operating space in the longer-term. This is best done through a series of "stepping-stone" sequencing policies, which might not necessarily appear to be achieving the policy goal in the most efficient way. An important element in achieving a successful policy pathway is to ensure that the proposed policies are conceived, framed, designed, analyzed, presented, and evaluated from the worldview or paradigm pathway that it seeks to create. In this light, the following recommendations are offered to those developing resource efficiency policy:

➢ *Become aware of the worldviews and paradigms of all those inputting into the policy formulation, including your own and those supporting you. Failure to do so risks disconnect and a reactionary discourse.* There is the potential for people's socio-cultural paradigms (and therefore behaviour) to be influenced by the worldview messages communicated within the way that policies are constructed and are communicated. Those developing policy also need to be aware that the scope for changes in socio-cultural paradigms perceived achievable can become limited by one's own worldview perspective. Policymakers therefore need to think and work within the paradigm that they wish to promote, ensuring that those who support them through research and consultancy contracts are aware of this.

➢ *Policies must be sensitive to the current paradigm;* policies which out-step the boundary of current thinking, behaviour, values and beliefs are more likely to be met with significant or prohibitive resistance from target groups, policy makers themselves and/or the wider public in general, making them politically unfeasible. Use the approach as outlined here and reported in Bicket and Vanner [19].

➢ *Choose words, concepts, discourses and rhetoric carefully.* The understanding of terms and concepts such as "green growth" or "sustainability" may differ subtly between different groups and stakeholders in society; they are riddled with preconceptions, various associations and incite biases for or against.

➢ *Frame the change in the context of a wider transition over the longer-term and highlight where equivalent paradigm shifts have occurred.* Highlight where possible how equivalent paradigm shifts have occurred in the past in particular sectors (e.g., in transport, telecommunications). Most change at the paradigm level can often have short-term and very visible costs (e.g., job losses, factory closures) and theoretical benefits more in the future.

➢ *Use policy sequencing of softer measures, such as voluntary schemes, to introduce the concept change required.* Sequencing of policies permits people to try and experience what a different system feels like and how it works in practice.

➢ *Beware the trade-off with effectiveness, avoid sidestepping difficult paradigms, and where necessary, be prepared to invest considerable political capital.* Often the most challenging and needed paradigm changes will provide a political return on the investment with 'interest' but it will not come without political risks.

Author Contributions: Robin Vanner conceived the concepts behind the paper in collaboration with the wider DYNAMIX team during the proposal writing. The authors then designed and executed all areas research reported in this paper in collaboration on an equal basis.

Conflicts of Interest: The authors declare no conflict of interest.

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