

Midstream and Sideways: Considering A Middle-Out Approach to Changing Energy Demand

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Abstract:

The paper suggests the 'middle out' as an additional, and sometimes alternative approach to 'bottom-up' and 'top-down' efforts to drive low carbon innovations and practices in society. Individuals are often seen by policy makers as the target agents for changing their own behaviour. To induce bottom-up change in energy demand patterns, governmental and non-governmental organizations have produced information tools such as carbon calculators, real-time feedback, and media based campaigns encourage individuals to reduce their carbon emissions voluntarily. At the same time, government employs top-down regulatory approaches to reduce emissions. These are being demonstrated in the introduction of market mechanisms (e.g. emissions trading schemes), and in the regulation of energy suppliers (e.g. renewable obligation), products (e.g. minimum efficiency standards) and infrastructures (e.g. building regulation). Much less attention has been given to presence, absence, or role of middle agents such as formal and informal community-based and practice-based organizations (e.g. schools, faith organizations, unions, professional associations). CBOs and PBOs are particularly important as change agents in that on the one hand they have been found to be more familiar with the contextual factors that shape individuals' behaviours than higher order agencies and organisations, and on the other they often have more structure and power than most individuals to communicate local needs to, and negotiate with, decision makers. Hence these 'middle' agents are in a good position to have an impact 'out' and influence the behaviour of individuals (downward), on other CBOs and PBOs (sideways), and on decision makers (upward). This paper (1) discusses where and what is the 'middle', (2) conceptualises the 'middle-out' approach in reference to energy policy, and (3) draws some lessons from other disciplines about the role middle agents could play in changing energy demand.

1. Top-Down, Bottom-Up: Missing Middle?

The social science literature that discusses societal change and the spread of innovation is dominated by a dichotomist approach: change and innovation are introduced and promoted either from the bottom up by, for example, individuals and grassroots organizing, or from the top down by, for example, government regulations and procedures. Individuals are often seen by policy makers as the target agents for changing their own behaviour. In the effort to reduce emissions information tools such as carbon calculators (e.g. Defra's 'ActonCO2'), feedback, and media based campaigns aim to encourage individuals to reduce their carbon emissions voluntarily and to create a bottom-up change in energy demand patterns. At the same time, government employs top-down regulatory approaches to reduce emissions. These are demonstrated in the introduction of market mechanisms (e.g. emissions trading schemes), and in the regulation of energy suppliers (e.g. renewable obligation), products (e.g. minimum efficiency standards) and infrastructures (e.g. building regulation).

The general characteristics of bottom-up and the top-down approaches will be familiar to most readers (see table 1), as is the assumed dichotomy between them. The middle, however, is relatively unfamiliar territory. Compared to the top and bottom, the middle is often overlooked. A Google scholar search for "top-down" "bottom-up" and "middle-out" shows that "top-down" is the most frequently used term, and that "bottom-up" is on the same order of magnitude. Each of these terms, however, are used about 200 times more frequently than "middle-out".¹ Scopus, a more selective search engine, gives similar results.² What is it about the middle that leads it to be overlooked, and are we missing something important by concentrating the lion's share of effort at the smaller and larger ends of the spectrum?

In a time when urgent and large scale social change is called for to stabilize the climate, we should take advantage of all the ways in which new ideas and behaviours might be introduced. If new ideas and new behaviours could be induced from the bottom-up or from the top-down, why couldn't they be introduced from the middle-out? And actually, what is the 'middle' and where is it located? And what is 'out' referring to?

This paper addresses these questions in a conceptual way. It begins with examples of "the middle" from a number of different disciplines. Next, it addresses the question of what "middle-out" change management might mean, particularly with respect to energy systems. We conclude with a reflection on further research on defining and making use of "middle-out" innovations.

¹ A Google Scholar search for "top-down" yields 889,000 hits. A search for bottom-up yields 706,000 hits. A search for "middle-out" yields 3320.

² A Scopus search gives 16,686 hits for "top-down", 13,383 for "bottom-up", and 61 for "middle-out."

Table 1: General characteristics of bottom-up and top-down approaches to change and innovation

Change and innovation	Bottom-up	Top-down
Initiation	Grassroots, individuals	Established organization / institution
Organization of change	Spontaneous, organic	Well managed and coordinated
Evolution of innovation	Unpredicted	Planned
Coordination	Decentralized/ Diffused / Non-existent	Centralized
Motivation	Self interest (opportunistic)	Group interest (political)
Resources	Limited and recruited while in progress	Allocated in advance
Termination	Unexpected	Planned

2. Finding Middle Ground

Although the middle-out is not a common phrase like top-down and bottom-up, various disciplines have been recognizing that a 'middle' exists somewhere between the 'top' and the 'bottom'. What's more, this 'middle' is not simply 'filler' between the top and the bottom, but rather has distinct characteristics, follows its own logic, and has various kinds of influence. In this section, we briefly demonstrate what the middle is and does in the areas of sociology, sociotechnical studies, public policy and administration studies, management studies, public health, processes of production, and energy studies.

2.1. Sociology

One of the most famous middles is the "middle class." The middle class in Weberian socio-economic terms is composed of the rather wide group of people who fall socioeconomically between the working class and the upper class. The middle class has a long history in sociology. The middle class was seen as the intermediate social class between the nobility and the peasantry of Europe. The nobility owned the countryside and the peasantry worked the countryside. The new bourgeoisie (literally "town-dwellers") arose around mercantile functions in the city. The functionality of the bourgeoisies and the middle class has changed with the processes of industrialization and urbanisation and the increase in the importance of cities in national and international economy, culture and social structure. Famously, the bourgeoisie helped drive the French Revolution this creating a new social order.

In common use today, the term refers to status rather than to class and is loosely defined. People are considered to be middle class or otherwise by their level of education, their profession and their consumption habits rather than by their relationship to the means of production. The middle classes include professionals, managers, and senior civil servants. A defining characteristic of membership in the middle class is possession of significant human capital (Cashell 2007). Worldwide, the middle class is growing, and it has a significant role in moving the economy forward (Banerjee & Duflo 2007, p. 50).

Another area in which sociology helps us to understand the middle is through understanding the role of professional work, which lies in between traditional ideas about production on the one hand and consumption on the other. The study of professions (Tripiet & Dubar 2005) and the system of work that professions create and perpetuate (Abbott 1988) is not about either labour or the means of production. Instead, this approach is concerned with the ways in which different professional or occupational groups define their work and compete for authority, which is linked to their use and appropriation of knowledge. From a system of professions perspective, each work group is linked (neither permanently nor absolutely) to a set of socially-accepted tasks considered to be its jurisdiction. Professional groups compete and develop interdependently, based in part upon their ability to perform (and defend) the tasks within their jurisdiction. Jurisdictions and professions change over time and are shaped by a number of social, economic, historical, and institutional factors (Abbott 1988; Bureau & Suquet 2009; Evetts 2006).

2.2. Socio-Technical Studies and Transitions

Socio-technical studies is another field where the top-down and bottom-up have dominated the discourse, although the “top” and the “bottom” are defined in this field with respect to both people and technology. There are two extreme views regarding the importance of people and machines in causing change: technological determinism and social constructivism (Thomas 1994; Misa 1988). Technological determinism views machines as causal agents and assumes their adoption depends on rational choices based on extraneously defined costs and capabilities. Determinism has been associated with macro-level analysis, and it appears in its purest form in the works of philosophers of technology (Misa 1988). Social construction theory emphasizes the development process in which technology is shaped and the meanings assigned by its users. This approach generally proceeds at the micro-level, treats people as causal agents, and is used in its most extreme form by labour historians (Misa 1988). Between the two extremes, there are several approaches that combine elements of the first two, suggesting that technological change is shaped both by technical limitations and social forces (Thomas 1994). Other proposals along this middle path include a coevolutionary model describing the relationship between variation and selection (Schot 1992), and a focus on the importance of

interinstitutional arrangements (Sørensen and Levold 1992). Sørensen and Levold (1992) call attention to the fact that macro studies of government technology policies and micro analysis of individual scientists and technologists miss the “meso” level of analysis. They argue for more attention to be paid to “intermediate” institutions and institutional arrangements, particularly networks.

More recently, transitions theory has introduced another form of middle ground that incorporates several levels of analysis into a shared framework. Geels (2004) suggests a multi-level perspective for understanding system changes on three levels: niche innovations, socio-technical regimes and the macro-level landscape. Transitions from an incumbent energy regime to new regime are therefore dependent on the interactions between these three levels.

2.3. Public Policy and Administration Studies

Policy scientists have recognized that a top-down approach to policy analysis and policy implementation is too narrow and sometimes misleading. Until the 1970s scholars emphasised policy formulation and policy decision making, assuming that once a policy decision was made it would be implemented, as written, by the governmental arms or by the regulated actor (Hargrove 1975). However, studies about policy failure demonstrated that policy success is very much determined by the actors who implement it and mediate between the regulator and the regulated actors.

Most notably, Lipsky (1980) argued that street level bureaucrats (i.e. front line policy implementers like policemen, social workers and judges) make policy decisions in their interpretation of policy and daily practices. Following Lipsky, more attention was paid to the meso and intermediating levels of policy implementation (Fineman 1998; Ellis, Davis, & Rummery 1999; Hill 2003).

Sabatier (1986) argues that each of the top-down and bottom-up approaches to implementation research has its own weaknesses. Top-down approaches focus on legal and political variables that impact implementation, and often neglect variables such as actors' interests and power positions. Bottom-up approaches focus on actors' networks, self interests and actor's actions, thus underestimating the importance and power of institutions and tending to neglect factors which indirectly impact implementation. Sabatier suggests the advocacy coalitions approach as a meso level synthesis between the top and bottom. Advocacy coalitions combine the bottom-uppers' unit of analysis—state and non-state actors involved in a policy issue—with top-downers' concerns with the manner in which socio-economic conditions and legal instruments constrain behaviour. Shared values and beliefs are the glue that keeps the different coalitions together while seeking to realize their common goals over time.

A networks approach to the analysis of policy making (Borzel 1998) and organizational behaviour (Thorelli 1986) is yet another attempt to suggest an alternative to top-down and bottom-up approaches to governance and order. While hierarchies create order by command-and-control top-down mechanisms, and markets generate order by supply and demand rules and the involvement of many downstream actors that allow the creation of an 'invisible hand', networks are somewhere in between. They have some structure and low level of hierarchy and coordination but they are also big and plural enough to encourage new solutions from less powerful actors.

2.4. Management Studies

Similar to the public policy and administration studies, in the past many management researchers considered middle management's primary role in the firm strategy as the implementers of top management intentions (see for review Dopson & Stewart 1990). In addition it was argued that middle managers themselves share this perception (e.g. Reid 1989). Interest in the 'middle', however, has been growing over the last two decades. For example, management and administration literature increased the attention dedicated to the agency roles of middle management in organizations. Since then the recognition of the different roles that middle managers play in firm strategy has been increasing (e.g. Currie 1999; Floyd & Wooldridge 1992, 1994).

2.5. Public Health

In the fields of public health practice and research the focus has shifted too from top-down approaches to networks of collaboration (Roussos & Fawcett 2000). Health experts have recognized the importance of middle agents such as community centers after failing to bring about behavioral change on topics such as safe sex and child vaccination via other methods. Collaborative partnerships between people and organizations from multiple sectors (e.g. schools and businesses) working together to improve the conditions, health and well being of entire communities, were found to be effective. Such partnerships could have both top-down (i.e. social planning led by experts) and bottom-up (i.e. grassroots community organizing) features (Fawcett et al. 1993; Kreuter 1992).

The health literature recognizes the strengths of local communities in being agents of change (Green & Kreuter 1999; Minkler & Wallerstein 1997). Authors in this tradition assert that:

- local communities often have better knowledge and understanding of individuals motivations and needs and therefore can provide better tailored solutions and alternatives;

- they establish two way communication, and therefore learn and adjust to needs coming from individuals;
- they are in a better position than individuals to communicate needs or demands to policy makers and therefore can provide useful policy feedback and evaluation which are necessary for policy correction;
- they are often perceived by their members as more trustworthy and with a greater moral authority than government and therefore could serve as social enforcers and have greater influence on behaviour.

Consequently, many of the health policies today are mediated through communities, which are recognized as an important agent to facilitate sustainable behaviour and societal change.

2.6. Processes of production

Another commonly used 'middle' is midstream vis-à-vis upstream and downstream. Midstream usually refers to the position of specific stages in the processes of production or to the location of a place or substance in the flow of material. In oil production, for example, these terms are rather technical and define different activities and institutions in the different stages along the process of oil production: upstream refers to the searching, recovery and production of crude oil; midstream refers to processing, storing, marketing and transporting oil; downstream refers to selling and distribution of oil.

In the lifecycle of products, upstream refers to the production, downstream to the consumption and midstream to the different activities which bring – physically and mentally —the products to consumers e.g. distribution, retail and marketing (e.g. Fuller & Ottman 2004).

2.7. Energy Studies

The middle in energy studies might be conceptualized in several different ways. Physically, it could be the interface of supply and demand, which could include the transmission and distribution systems. Other "middles" in the energy demand field include the role of supply chains (Guy & Shove 2000), property agents (Schiellerup & Gwilliam 2009), builders (Killip 2008), and architects and engineers (Janda 1999, 1998a). From a social perspective in the residential sector, Parag and Darby (2009) argue that in the area of energy demand there are three main groups of actors that play essential roles: central government, energy suppliers, and energy users. They introduce a "demand reduction triangle" to help discuss the relationships between these groups, arguing that a careful analysis of the interrelationships of the dyads shows a number of missing linkages. In this framework, energy suppliers are *both* in between government and energy users, but interestingly, they are also to one side. Parag and Darby

argue that although government tries to place energy suppliers in the middle, suppliers fail to connect successfully with consumers on issues of carbon reduction. In effect, suppliers are essentially a kind of “failed” middle, suffering from principal-agent problems, and their interests towards emissions reduction do not align with consumers’ interests.

2.8. Synopsis

The previous sections described a number of different disciplines and how they see “the middle.” Table 2 provides a synopsis of some of the major points.

Table 2: what/where is the middle?

	Top	Middle	Bottom
Level of analysis	Macro Structure	Meso Socio technical systems	Micro Technology
The set of order	Hierarchies	Networks	Markets (invisible hand)
Agents of change	Government	Communities / Organizations	Grassroots/Individuals
Management	Executives	Middle management	Employees
Policy	Regulations and bureaucracy	Coalitions / networks / street level bureaucracy	Actors / street
Processes of production	Up stream	Mid stream	Down stream
Energy management	Regulator	Supplier	Consumer

3. Why (or Why Not) Middle-out for Energy Systems?

Energy systems present particular challenges for policy and governance as they tend to reflect long-term historical forces and crisis events, and tend to lead to lock-in rather than change (Unruh 2000). Transforming energy systems to incorporate a high renewable energy content requires co-ordinated effort and changes amongst numerous actors and institutions (Smith 2007). Coordinated effort is also needed to transform energy consumption sectors to lower energy demand. As such, the significant changes expected in the UK energy system require an analysis of the networks and the relative bargaining power of the actors within them that determine policy outcomes. However, the scaling up of activities to a systemic change requires

broader (and deeper) social transformation processes. We suggest that a middle-out approach could assist in this process.

But what exactly is a middle-out approach? In the previous section, we reviewed how different disciplines view “the middle” and the purpose that it serves, beyond separating the top from the bottom. This section moves into a closer consideration how the concept of “middle-out” could be used to help manage societal change. It starts with a brief description of the history of the term. Next it considers some strengths and weaknesses of trying to use a “middle-out” approach. Finally, it considers how this concept might apply particularly to energy systems.

3.1. Background

Different disciplines use the term middle-out. The term ‘middle-out’ was first mentioned in Kinchla & Wolfe (1979) to describe a visual processing sequence humans use to make sense of shapes. About 85% of its academic use over the past 30 years has been in the natural sciences, largely in computing and engineering, but also in biochemistry and the biological sciences. Its use in a social science context has been relatively infrequent and shorter lived, occurring only over the last decade. Its social science use has been in highly diverse fields, including conflict resolution (Hancock 2008), nuclear non-proliferation (Dhanapala 2001), neighbourhood reform (Deschenes 2003), and change management in higher education (Cummings et al. 2005; Hodgson, May, & Marks-Maran 2008).

For purposes of this paper, the use of middle-out to manage change is particularly relevant. Cummings et al’s (2005) paper discusses the responses of Australian universities to constraints and changes such as cuts in budgets, changes in student demographics and increase in the number of students who study off-campus and part time. Cummings et al argue that most universities responded to the new circumstances by either formal strategic plans developed top-down by executives or through organic developments arising from staff in the bottom-up. One university response however was led by a small group of staff who had middle management responsibilities and had managed to champion successfully the reform of key university functions. They called it ‘middle-out’. Cummings et al summarise that middle-out approaches to innovation in teaching and learning are more problem solving oriented, collaborative by nature and better fit to the organization than top-down or bottom-up approaches.

Middle-out is not necessarily an alternative to the top or bottom but rather an additional, supportive, and maybe more effective way of delivering change. The middle-out could be used as a strategy to initiate change, propose ideas, and innovate. Ideas coming from the middle could be better tailored to downstream needs, better communicated upstream, more acceptable by both up and down stream, and with a potential to have an impact on sideways

too. As an agent, the middle might be more trusted, have established and accepted information channels, serving to mediate between the top and the bottom. Hence the middle can be harnessed to increase public support for changes. The middle also might have greater agency than the top and bottom to actually implement changes. In this section, we discuss some potential strengths and weaknesses of the middle-out concept.

3.2. Strengths

We argue that the middle is well situated to make change, particularly in terms of agency and capacity. The term 'agency' in sociology refers to individuals' capabilities to act independently and to make their own free choices. The term 'structure' on the other hand, refers to factors that shape or limits individuals opportunities, and include for example social class, religion, gender and ethnicity (Barker 2005). For many years 'agency' and 'structure' were seen as alternative explanations to behavior. The 'structuralists' explained agency of individuals mostly by the operation of the structure (e.g. Marxism); while the opponent stressed the capacity of individual "agents" to construct and reconstruct their worlds. An alternative integrative option was adopted by modern social theorists (Berger & Luckmann 1966; Bourdieu 1977, 1990). They have pointed at the balance between the two previous positions: structure and agency are complementary forces. Structure influences human behavior, and humans are capable of changing the social structures they inhabit.

Most individuals have some level of agency over their behavior but this agency is influenced and shaped by social norms, social order and established practices, i.e. structure. An effective behavioral change would happen when individuals have the capacity to change their behavior and when the 'structural' elements support this change. In some aspect of life, the social norms, order and practices are delivered to individual via different communities, organizations and networks the individual is attached to, affiliated with or embedded in.

These mediating entities often can harness greater resources and capacities to make changes, compared to individuals. Figure 1 shows a graphical representation of this idea.

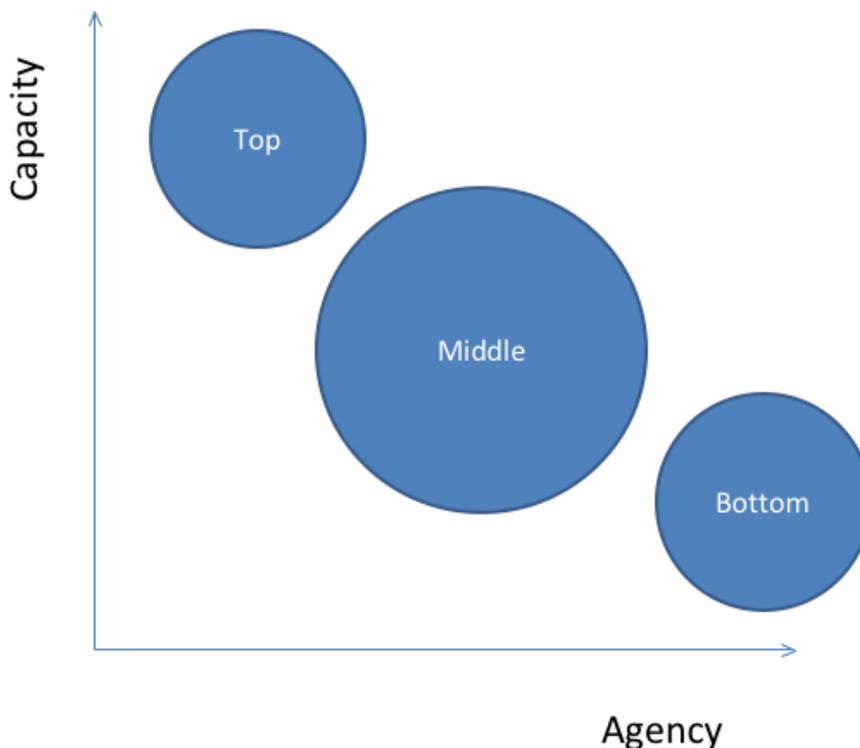


Figure 1. Agency, Capacity, and Level of Analysis

3.3. Weaknesses of the middle-out

In many cases, what constitutes the middle is relative, subjective, and not easily defined (Cashell 2007). Methodologically speaking, it is easier to conceptualise the ends of the spectrum rather than what lies between. In a policy context focused on evidence-based research, it is simpler to treat people as discrete, rational units than try to understand the overlapping webs and networks that they build.

Another potential weakness of a middle-out strategy is that often the middle actor has its own agenda and vested interests, which may not be in line with the nature of the change it is supposed to drive. For example, Parag and Darby (2009) discuss and demonstrate the conflict of interests that energy suppliers (the middle agents in their case) face when needed to bring about emissions reduction from the UK domestic sector. In addition, middle actors may be powerful enough to manipulate the top and / or the bottom and to shift the societal goal toward their own needs.

3.4. Targeting the middle-out for energy and climate change policies

Although a middle-out strategy is not without its challenges, we argue that this level of analysis is useful for energy and climate change policies. The recent £10M DECC “Low Carbon Communities” and the current £7.5M RCUK call for research on “Energy and Communities” suggest that government agencies recognize the potential of communities to contribute to, and maybe drive a change in, the way we consume and produce energy. Communities are often thought of in geographical terms. We suggest that it worth expanding our thinking of ‘communities’ beyond the spatial terms, as other type of practice –based organizations (PBOs) and community-based organizations (CBOs) might have unique and valuable capacities and agencies too. Communities could be, for example, profession-, ideology-, practice- or faith-based. Each type of community has its own strengths and weaknesses in relation to the desired change. But, at the same time each community has its own agenda and vested interests. These need to be considered too when evaluating communities’ appropriateness and suitability to bring about emission reduction and societal change.

We argue that professionals and practitioners are in particular important middle agents for initiating, delivering and promoting infrastructural changes. Transforming the entire stock of existing homes in the UK to be more energy efficient by 2050, for example, is a challenge that requires 500,000 refurbishments of older, inefficient properties every year (Killip 2008). The sheer scale of these transformations requires radical changes in both technology and work practices. Although optimising the suite of available technical and social strategies for each existing dwelling will yield the best results in reducing carbon emissions, it is a tremendous challenge to assign this task to a fragmented construction industry. In the UK and elsewhere, housing refurbishment is the preserve of small and medium-sized enterprises which include general builders, specialist builders (eg roofing contractors), plumbers, heating engineers, electricians, architects, design engineers, project managers, and building control inspectors. These groups are often considered to be “intermediaries” in the technology adoption process, and as such are expected to provide low carbon refurbishment if their clients demand it. However, intermediary groups have been shown to have their own habits, practices, ways of thinking about problems, and ways of working that affect their ability to provide (and interest in promoting) low carbon refurbishment (Janda 1998b, 1999). How might the need for low carbon refurbishment change the roles of professions, and their interactions? How are existing professions developing to meet the challenge? Which professions will gain control over the new activities involved in low carbon refurbishment?

The challenge remains to recognize CBOs and PBOs, study their strength and weaknesses, agencies and capacities in reference to the aim, and think of ways to harness them in a way that will bring about the change in a win-win path.

Table 4 summarises some of the differences between a middle-out approach and the more traditional top-down and bottom-up approaches to carbon reductions.

Table 4: Approaches to energy and climate change policies

Carbon reductions via	Top-down	Middle-out	Bottom-up
Low carbon society	Supply of low carbon facilities and low carbon alternatives	Introduction of Norms; tailored supply of needs	Introduction of norms and behavior
Low carbon homes	Regulations	Professionals and practices	Demand from individuals
Low carbon energy sources	Utilities	Community ownership	Individual ownership
Agent and agency	Government	Communities	Individuals, grassroots

While research on these topic areas is underway, we turn to some additional questions that explore the connection between community-based research and the middle-out approach further.

4. Conclusions About (and Beyond) the Middle

This paper draws from a variety of disciplines to suggest that more attention be paid to “the middle” relative to the top and the bottom. We have showed that the middle is more than a filler between the two levels, but also pointed at the vagueness of the term and its lack of definition. Further thought should be dedicated to finer definitions of the middle(s) in reference to energy and climate change. Definitions that enable the operationalisation of the middle(s) for the purposes of research, policy design, and evaluation of change would be particularly important. To illustrate, in order to evaluate the potential of middle agents to create a momentum of change, it would be useful if we could quantify the number of middle agents vis-à-vis the top and the bottom ones. To evaluate the actual impact of a training scheme for PBOs, it would be helpful if we know the spread of the PBO members in a region. These last two examples also demonstrate the need to further investigate the ‘out’ part of the middle-out concept. Who and which are the actors / organizations / individuals the middle can impact? What are the relations between the ‘middle’ and the ‘out’ when it comes to energy and climate change, and in what ways could the ‘middle’ impact the ‘out’ with its own agenda and capacity?

Further research on this topic might consider different ways in which the middle separates the extremes. For instance, does the middle not just mediate between the top and the bottom, but

actually serve a role that enables the levels above and below it? And in what way is the middle actually middle? For reference here, the idea of trophic levels in ecological systems is a highly developed concept that functionally links levels of production and consumption with the expenditure of energy between the levels. There is a top and a bottom to the trophic levels (predators on the top, primary producers on the bottom), but the “middle” is shared by two different ecological functions (primary consumers and secondary consumers), each of which supports the system as a whole. These levels are not just analytically useful, but functionally interdependent. Alternatively, there is a concentric ring model used to map health behaviour from a socio-ecological perspective. Armel (2008) has adapted this model to propose multiple levels of intervention to create “energy positive” behaviours. In Armel’s model, individual behaviour is in the center of a series of four rings which represent interactions at the interpersonal, sociocultural, physical environment, and policy level. Although this is another multilevel concept, it differs in that there is an assumed core to the model. To further develop a middle-out approach to changing energy demand, it would be important to discuss the role that the middle(s) play, both functionally and logically, within the broader sociotechnical system.

5. References

- Abbott, A. 1988. *The System of Professions*. Chicago: University of Chicago Press.
- Armel, K. C. 2008. "Behavior, Energy and Climate Change: A Solutions-Oriented Approach." In proceedings of *Stanford University's Energy Forum*. Palo Alto, CA. February 27.
- Banerjee, A. V., & E. Duflo. 2007. What is middle class about the middle classes around the world? Massachusetts Institute of Technology, Department of Economics: Boston, MA. <http://econ-www.mit.edu/files/3107>
- Barker, C. 2005. *Cultural Studies: Theory and Practice*. London: Sage.
- Berger, P. L., & T. Luckmann. 1966. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*. Garden City, NY: Anchor Books.
- Borzel, T. A. 1998. "Organizing Babylon -- on the different conceptions of policy networks." *Public Administration* 76 (2):252-273.
- Bourdieu, P. 1977. *Outline of a Theory of Practice*. London: Cambridge University Press.
- Bourdieu, P. 1990. *The Logic of Practice*. Cambridge: Polity Press.
- Bureau, S., & J.-B. Suquet. 2009. "A professionalization framework to understand the structuring of work." *European Management Journal* 27 (6):467-475.
- Cashell, B. W. 2007. Who Are the "Middle Class"? (RS22627). Report for Congress Congressional Research Service: Washington DC. http://digitalcommons.ilr.cornell.edu/key_workplace/554/
- Cummings, R., R. Phillips, R. Tilbrook, et al. 2005. "Middle-out approaches to reform of university teaching and learning: Champions striding between the top-down and bottom-up approaches." *International Review of Research in Open and Distance Learning* 6 (1).

- Currie, G. 1999. "The Influence of Middle Managers in the Business Planning Process: A Case Study in the UK NHS." *British Journal of Management* 10 (2):141-155.
- Deschenes, S. N. 2003. "Lessons from the Middle: Neighborhood Reform for Youth in San Francisco." *Dissertation Abstracts International, A: The Humanities and Social Sciences* 64 (3).
- Dhanapala, J. 2001. "Multilateralism and the Future of the Global Nuclear Nonproliferation Regime." *Nonproliferation Review* 8 (3):99-106.
- Dopson, S., & R. Stewart. 1990. "What is happening to middle management?" *British Journal of Management* 1:3-16.
- Ellis, K., A. Davis, & K. Rummery. 1999. "Needs Assessment, Street-level Bureaucracy and the New Community Care." *Social Policy & Administration* 33 (3):262-280.
- Evetts, J. 2006. "Short Note: The Sociology of Professional Groups: New Directions." *Current Sociology* 54 (1):133-143.
- Fawcett, S., A. Paine-Andrews, V. Francisco, et al. 1993. Promoting health through community development. In *Promoting Health and Mental Health in Children, Youth and Families*, edited by D. Glenwick and L. Jason. New York: Springer-Verlag.
- Fineman, S. 1998. "Street-level Bureaucrats and the Social Construction of Environmental Control." *Organization Studies* 19 (6):953-974.
- Floyd, S. W., & B. Wooldridge. 1992. "Middle Management Involvement in Strategy and Its Association with Strategic Type: A Research Note." *Strategic Management Journal* 13:153-167.
- Floyd, S. W., & B. Wooldridge. 1994. "Dinosaurs or Dynamos? Recognizing middle management's strategic role." *Academy of Management Executive* 8 (4):47-57.
- Fuller, D. A., & J. A. Ottman. 2004. "Moderating unintended pollution: The role of sustainable product design." *Journal of Business Research* 57 (11):1231-1238.
- Geels, F. W. 2004. "From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory." *Research Policy* 33 (6-7):897-920.
- Green, L. W., & M. W. Kreuter. 1999. *Health Promotion Planning: An Ecological and Environmental Approach*. 3rd ed. Mountainview, CA: Mayfield Publishing Co.
- Guy, S., & E. Shove. 2000. *A Sociology of Energy, Buildings, and the Environment*. London: Routledge.
- Hancock, L. E. 2008. "The Northern Irish peace process: From top to bottom." *International Studies Review* 10 (2):203-238.
- Hargrove, E. 1975. *The missing link: The study of the implementation of social policy*. Washington, DC: The Urban Institute.
- Hill, H. C. 2003. "Understanding Implementation: Street-Level Bureaucrats' Resources for Reform." *Journal of Public Administration Research and Theory* 13:265-282.
- Hodgson, D., S. May, & D. Marks-Maran. 2008. "Promoting the development of a supportive learning environment through action research from the 'middle out'." *Educational Action Research* 16 (4):531-544.
- Janda, K. B. 1998a. Building Change: Effects of Professional Culture and Organizational Context on Energy Efficiency Adoption in Buildings. Dissertation, Energy and Resources Group, University of California at Berkeley, Berkeley.

- Janda, K. B. 1998b. "What People Won't Do: Impacts of the Human Dimension on Achievable Potential for Energy Efficiency in Buildings." *Technology Studies* forthcoming.
- Janda, K. B. 1999. "Re-Inscribing Design Work: Architects, Engineers, and Efficiency Advocates." In Proceedings of the ECEEE Summer Study, June 1-6, 2009 (Mandelieu, France). Vol. 2, pp. 3.11.1-10. European Council for an Energy-Efficient Economy.
- Killip, G. 2008. Building a Greener Britain: Transforming the UK's Existing Housing Stock. A Report for the Federation of Master Builders. Environmental Change Institute: Oxford.
- Kinchla, R. A., & J. M. Wolfe. 1979. "The order of visual processing: 'Top-down', 'bottom-up' or 'middle-out'." *Perception and Psychophysics* 25 (3):225-231.
- Kreuter, M. W. 1992. "PATCH: its origin, basic concepts, and links to contemporary public health policy." *Journal of Health Education* 23:135-47.
- Lipski, M. 1980. *Street-level bureaucracy: Dilemmas of the individual in public services*: Russell Sage Foundation.
- Minkler, M., & N. Wallerstein. 1997. Improving Health through Community Organization and Community Building. In *Health Behavior and Health Education: Theory, Research and Practice*. San Francisco, CA: Jossey-Bass Publishers.
- Misa, T. J. 1988. "How Machines Make History, and How Historians (and Others) Help Them to Do So." *Science, Technology, and Human Values* 13 (3 & 4):308-331.
- Parag, Y., & S. Darby. 2009. "Consumer-supplier-government triangular relations: Rethinking the UK policy path for carbon emissions reduction from the UK residential sector." *Energy Policy* 37 (10):3984-3992.
- Reid, D. M. 1989. "Operationalizing Strategic Planning." *Strategic Management Journal* 10 (6):553-567.
- Roussos, S., & S. Fawcett. 2000. "A review of collaborative partnerships as a strategy for improving community health." *Annual Review of Public Health* 21 (369-402).
- Sabatier, P. 1986. "Top-Down and Bottom-Up Approaches to Implementation Research: a Critical Analysis and Suggested Synthesis." *Journal of Public Policy* 6:21-48.
- Schiellerup, P., & J. Gwilliam. 2009. "Social production of desirable space: an exploration of the practice and role of property agents in the UK commercial property market." *Environment and Planning C: Government and Policy* 27 (5):801-814.
- Schot, J. W. 1992. "Constructive Technology Assessment and Technology Dynamics: The Case of Clean Technologies." *Science, Technology, and Human Values* 17 (1):36-56.
- Smith, A. 2007. "Emerging in between: The multi-level governance of renewable energy in the English regions." *Energy Policy* 35 (12):6266-6280.
- Sorensen, K. H., & N. Levold. 1992. "Tacit Networks, Heterogeneous Engineers, and Embodied Technology." *Science, Technology, and Human Values* 17 (1):13-35.
- Thomas, R. J. 1994. *What Machines Can't Do*. Berkeley, CA: University of California Press.
- Thorelli, H. B. 1986. "Networks: between markets and hierarchies." *Strategic Management Journal* 7 (37-51).
- Tripier, P., & C. Dubar. 2005. *Sociologie des professions*. Second ed. Paris: Armand-Colin.
- Unruh, G. C. 2000. "Understanding carbon lock-in." *Energy Policy* 28 (12):817-830.