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Quarrying theory for practice: the case of energy efficiency

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In his inaugural editorial in *Environment and Planning B* (EPB) March (1974) reflected on the relationship between theory, which was to be the focus of the new journal and, as he saw it, of the academic enterprise generally, and the practical use that might be made of that theory by practitioners. He suggested that practitioners, particularly in the building industry, tended to dismiss the 'useless knowledge' produced by researchers. This he argued was to the great detriment of the industry. "Knowledge like material must undergo transformation to be of value", he argued (page 2). The task of transformation must lie with all involved; researchers and practitioners. However, it is the job of the researcher "to lay down the strata of theory, it is for others to quarry them for practical ends. ... the quarries of theory are the learned journals" (page 2).

This view rather obscures the relative roles of researchers and practitioners in bringing ideas into the practical realm, suggesting both that the enterprise should be a joint one and that the task should rest primarily with the practitioner. However, rereading this view prompts two questions on the theory – practice issue. The first general question is what overall role has the journal played in March's transformation process? The second is whether EPB has been a useful quarry in any specific field?

On the first question, an instinctive response following a browse through 25 years worth of volumes is that much of the work remains as useless knowledge—despite an attempt to promote practical work in the journal (Breheny, 1989). Many strata have been laid down but few of them quarried. The suspicion is that many were never intended to be quarried—the authors having little real concern with potential practical applications. The only expected users were other researchers. This does not detract from the quality of the work, which is of a gratifyingly high standard, but March might reasonably have expected more of it to have made a practical impact. Whether the fault lies with introspective producers of theory or with practitioners lacking the 'social imagination to extract it' that March said would be required is difficult to determine. One final thought on this first question is that perhaps EPB has been particularly impenetrable.

The second question asks whether there have been exceptions to this general lack of transformation? Have some theoretical strata been quarried to practical effect? There are contenders. For example, the journal has carried numerous papers on planning methodologies—on how to produce planning policy more effectively. At certain times over 25 years these theory papers will have had a marginal impact on practice. However, the degree of impact will have depended more on the changing receptiveness of practitioners to theory than on the quality or practical value of the theory. The rationality of planning practice, and hence the interest of practitioners in adopting theoretical ideas, has waxed and waned over the years. This kind of changing receptiveness will have a major effect on whether anyone is interested in transforming theory into practice.

This can be demonstrated by a second example of EPB having produced ideas that could be readily transformed for practitioners. The work in question concerns efforts to maximise energy efficiency in buildings and towns. This has been a modest but consistent theme in the journal from the outset. It is particularly interesting to view the contribution of the journal to this field in retrospect because energy efficiency is now such a major policy issue, as planners and architects struggle to make their contribution to sustainable development.

This theme got off to a very good start. The first paper in the first issue of EPB was Steadman's (1974) "Energy conservation measures in buildings: a survey". This reviewed energy use in space heating and cooling, water heating, lighting, and domestic and other appliances. Using evidence from the United States, Steadman considered what he called 'belt tightening' and 'leak plugging' approaches to energy conservation. The former concerns changed behaviour of households, whereas the latter refers to measures to achieve efficiency gains from given behaviour. The building scale focus of the paper was entirely consistent with the aim of the journal to 'cover architectural and building research'.

Although issues of energy conservation in buildings have been addressed periodically over 25 years, it has featured as a very small proportion of the coverage given to the building scale. Perhaps more impressive is the coverage given to these issues at the urban or settlement scale. Although the journal has gradually supplemented March's original architectural and building focus with an urban and even regional perspective, the former view has dominated. But within the modest urban and regional coverage, energy-efficiency issues have been prominent.

A continuing theme at the settlement scale has been the development of models to assess the energy characteristics of different urban forms. Papers on the use of models to address energy issues began to feature in the journal in the early 1980s at a time when such models and energy issues were unfashionable. Yet a group of people persisted in developing land-use–transportation models, at a time when even the current editor of the journal had moved on to different things. The group pursuing these issues through EPB can be traced back loosely to the Centre for Land Use and Built Form Studies, and later the Martin Centre, at Cambridge, and specifically to various collaborations with Echenique. Hunt and Simmonds (1993) provide an interesting genealogy of modelling work that can be linked back to these origins. The rich seam of work has continued beyond their cut-off date of 1990. The special issue of EPB on the work of the Martin Centre (Owers and Echenique, 1994) provides a further detailed reflection. A subset of this modelling work had the specific intent of calculating the energy-consumption characteristics of the urban patterns being modelled. Interestingly, the special issue does not feature this energy-efficiency theme. A second group of researchers—related to those in Cambridge—who have been responsible for this energy focus in the United Kingdom originated in the Centre for Configurational Studies at the Open University in the 1970s. This group, although now somewhat scattered geographically, still work together (for example, on the Swindon study referred to below).

Papers by Rickaby (1981) and by Jack (1981) were the first of a series to appear in the journal which examined the energy-efficiency properties of hypothetical, and later actual, settlement patterns. Rickaby, in his paper, develops a configurational, rather than a behavioural, model and explores the possible energy-consumption levels, in transport and building services, associated with different geometric forms. An initial geometric form is developed that is a simplified and regularised version of actual land-use and transport patterns in eastern England. From this, five variants are developed, based on permutations of three policy approaches: reducing the amount of travel;

switching to more efficient modes; and energy conservation in buildings. Two of the variants take concentrated forms, and three dispersed forms. Jack, in his paper, adopts a similar approach to that of Rickaby, but with a heavier focus on density levels at the neighbourhood scale rather than on geometric form at a settlement scale.

The six hypothetical settlement patterns generated by Rickaby in his 1981 paper reappear in de la Barra and Rickaby (1982) and Rickaby (1987). In the first of these two papers, the nature of the behavioural land-use transportation model, TRANUS, to be used to explore the energy characteristics of the alternatives, is explained. In the second, the merits of the six original settlement patterns are tested. Significant variations were found in energy efficiency between the alternatives. This finding contrasted with that in a further modelling exercise in Rickaby (1990). In this paper, an archetypal English town was characterised from data on twenty actual towns. The model was then calibrated for the archetypal town, and a range of 20-year land-use options assessed for their energy efficiency. This time the results showed little difference between the options.

Steadman et al (1991) provided a return to the building scale. This time the concern was to develop a theoretical morphology of built forms, in an attempt to link the form of buildings to performance. Interestingly, empirical work on Swindon, reported in the paper, has led to the later use of Swindon as a case study in an application of the TRANUS model to predict the energy-efficiency characteristics of urban form alternatives. This latter work, carried out for the UK Engineering and Physical Sciences Research Council and as yet unpublished, addresses many of the core issues in the current debate over sustainable urban forms. In particular it focuses on the merits of compact solutions to urban development, which is now the favoured UK Government answer to accommodating the national housing requirement.

The papers by Rickaby and colleagues from 1981 onwards, and the earlier work upon which they draw, such as March (1967) and Steadman (1977), now seem remarkable prescient. The debate that they raised about the merits of compact and dispersed urban forms in reducing energy consumption has been appreciated many years later by a wider group of researchers, by practitioners, and by politicians. Only since the early 1990s, and more intensively since the mid-1990s, has the possibility of manipulating urban form to deliver energy benefits been acknowledged. Now, it is all the rage. In many Western countries, urban compaction policies are now firmly adopted, as governments struggle to meet their agreed targets on CO_2 emission reductions. In the United Kingdom, for example, a comprehensive compaction agenda has been in place since 1994 (DoE, 1994) and the new Labour government has set high targets for the proportion of new housing to be built in urban areas (DoETR, 1998). 'Brown-field' development is the order of the day.

More recent contributions to the journal, such as Priemus's (1995) review of Dutch efforts to reduce car use and Banister et al's (1997) report on their case-study approach to testing links between urban form and transport energy consumption, fit into this contemporary debate. So does Banai's (1996) assessment of American 'neotraditional' settlement forms—which, incidentally, relates back neatly to Banai-Kashani's (1988) reflections on the characteristics of good settlement form.

The value of all of this work is best appreciated in retrospect. Through the 1970s and most of the 1980s there was no great political or popular interest in energy conservation. Short-lived bursts of interest did occur, as following the 1973 oil crisis, but there was little sustained concern. Now, as notions of sustainable development have been adopted worldwide, energy conservation and pollution control are major political goals. However, it is interesting to observe that the broad consideration of potential urban forms in the early EPB papers has been rather lost in the current debate. Whereas Rickaby and

March gave serious consideration to the merits of dispersed urban forms, and extolled the virtues of linear forms in reducing travel, the new debate has focused, perhaps too readily, on high-density compact forms. At present, any proposed alternative to urban compaction—such as Peter Hall's proposals for high-density new settlements along major transport routes—are given short shrift. The countryside protection lobby is too strong to allow serious considerations of such an option.

EPB has made a worthy, if modest, contribution, then, to the field of energy efficiency. A steady stream of papers has offered ideas that—certainly in retrospect—have great practical significance. If the papers concerned have not made the practical impact that they might, then it is due not to the lack of interest of the authors in practice, but because of the failure of practitioners to appreciate what was on offer. The work was eminently 'quarriable' if not actually quarried. But it is not too late. The 'strata of theory' are still there. The researchers are still around. If practitioners can conjure up enough 'social imagination', they may yet benefit.

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