ISSUES IN THE STUDY OF RESIDENTIAL ENERGY USE: ETHNOGRAPHIC METHODS AND MODELS OF BEHAVIOR

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ABSTRACT

As residential energy research has matured, researchers have become increasingly interested in gaining a better understanding of actual energy-use behavior. However, when ethnographic methods are used to secure a more detailed picture of ordinary behavioral routines than is afforded by either instrumented monitoring or survey approaches, the research is forced into direct contact with situated energy-use. Energy use is found to be part of ongoing activity in everyday cultural contexts and is rarely thought of by persons as "energy use". We argue that an intentional model of behavior is not the best fit for these data, suggesting a cultural model as an improvement which can better account for the institutionalization of technologies, habitual action and variations in interpretation.

We draw upon our research at two apartment complexes in Davis California to illustrate problems in application of the "intentional" model and discuss several experiments with ethnographic methods in terms of their bearing on behavioral theory and their usefulness in doing residential energy research. These approaches include: participant observation - with its problems of access, role limitations, the discovery of the "incidental" character of energy use and the context of energy-related standards of conduct; group interviews -as comparative opportunities, the collaborative research attitude and persons' "discoveries" of their own behavior patterns; photo interpretation and diaries -as devices for interview focusing which allow the objectification of past behavior and the exploration of the moral and status implications of certain technologies; and adaptations made to the standard social survey - suggesting that many rigid formalities of the survey research tradition may inhibit this method's effectiveness, and may productively be loosened.

The study of energy-use behavior (a more complex phenomenon than has been commonly imagined by energy researchers) is seen as profiting from increased use of ethnographic methods, although progress in building up a detailed picture of this sort of conduct is not likely to be rapid and offers its own theoretical and methodological challenges.

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When Art Rosenfeld was recently awarded the Leo Szilard Award for Physics in the Public Interest by the American Physical Society, appropriate note was taken of the enormous contribution to resource conservation that has been and may for some time continue to be made by an eager and informed pursuit of energy efficiency: the investment in this work, Rosenfeld noted, has been returned about 1000 to 1. Of course one might argue that for a time, at least, there's profit to be made in undoing what profit-seeking once produced, or simply that the technological state of the art was such that real efficiencies were ready when they were needed; but the award, at least, presumes that something more is involved, that there's a "Rosenfeld Effect" at work here. This isn't something that can be understood using a genetic theory, and if we try to attribute it to personality or attitude, as a psychologist might, we simply elaborate a tautology: we separate Rosenfeld's attitudes and his behavior so that one can explain the other, but really they're the same thing. A more accurate approach, in our sociological view, would be to understand the Effect as characteristic of a certain institutional and social setting --even, in fact, to see it as something of a "social movement," a movement that features, of course, the wit and wisdom of Arthur Rosenfeld.

These observations parallel an evolution in the thinking of, at least some, residential energy researchers. An engineering and physical science approach has transformed the hardware on behalf of efficiency, and it has produced the most sophisticated scientific models of energy consumption. But after structural variations are controlled in these models, a great deal of variation in real-world consumption patterns remains for which we need an explanation. The explanation has been slow in coming, and having effectively exhausted the "attitudinal" approach, the persistent unexplained variation has pushed research in the direction of a taking a progressively "closer look" at the actual behaviors which might account for it. Methodologically this has meant increasing use of instrumented end-use monitoring and an interest in

ethnographic research, so that we might better understand the social and institutional settings in which this behavior occurs. The movement toward a more anthropological research style --best exemplified, in our view, in Willett Kempton's work-- has been made without a break of any apparent significance with the engineering approach: a desire is maintained to realize descriptive precision, to decrease the size of the N and, in exchange, to increase control over variations in the dependent variable. But ethnographers bring both detail and paradox to the energy research community --a community which is often tempted by an image of energy-use behavior as purposive, rational, causally-regular and matter-of-factly describable.

I

The purpose of this paper is to discuss some of the data, problems, paradoxes and theories that ethnographic research methods contribute to energy research. It is far from the definitive discussion, but by drawing on our own research experience for examples, we hope to present some observations on theory and method which may be of use to those whose work is somehow concerned with these sorts of questions.

In sociology and anthropology, ethnographic work has long standing as the primary approach to the study of culture, everday life and social interaction. These studies are also often called upon to provide the tangible theoretical and descriptive "foundations" for macroscopic studies of social history, demography, organizations, societies and economies. The social sciences have, through their ethnographic inquiries, cultivated an appreciation for the complexities of human action and the difficulties encountered in attempts to get at the meanings which orient behavior. They have also evolved vocabularies whose sometimes literary and anecdotal qualities may be more than a little vexing to persons trained to speak in the measured and certain tones of the natural sciences. But the important contribution that detailed study of end-use can make is well worth any annoyance that it may cause; and its primary contribution may the development of a new model of energy-use --a theme which we will return to periodically.

Ethnographic methods place energy consumption "in context," so that the use of the stove, for example, is seen in context of "cooking" (in which case, it might be added, we are made to notice the fact that the stove is sometimes used "out of context" to heat the dwelling), and the use of gas can come to be

seen to be indirect or incidental to this form of activity. Gas use, is then (to pursue the example) set in a social and technical "milieu" that begins in the kitchen but also expands outward, making the kitchen a dependent node in a much larger cultural grid. There is a temptation in analyses of this sort to argue that gas use is explained by the use of stoves, and stoves by the requirements of cooking. Such a simple, rational account consigns to gas the status of a mere tool or instrument, whereas the use of gas in fact modifies, qualifies and re-defines the activity that it is otherwise said to serve. "Cooking with gas" is not simply a matter of cooking with the aid of gas; it is a type of cooking --just as cooking itself, if we approach it rigorously, is a type and not a tool of food-preparation --and meals, in turn, are certainly one approach to nutrition but in no sense a requirement of it.

The implications of this conceptualization are not trivial. By freeing "resources" and "tools" from the linguistic confinement of the "mere", we are able to examine the ways in which particular technical arrangements define everyday activities. Another and perhaps more important implication of this view is that "resources," if they enter into the re-definition of the "ends" that they serve, may also be the source of new ideals. We have an example of this paradox in the DeCicco and Kempton paper on this panel, in which they report that selected New Jersey apartment tenants are found to regulate the heat in their routinely-overheated apartments by opening the windows, and that the use of the window in this way seems to have given substance to the ideal of apartment air that is both warm and "fresh."

When energy-using activities are examined in their social contexts we also find that a considerable part of routine behavior cannot be described as either conscious or intentional. Instead, these activities are better said to be competently habitual, unconsciously performed and ordinarily are candidates for "explanation" only if unsuccessful or questioned after-the-fact. This is not to say that such activity --meaningful, contextual, socially-defining, habitual-- is neither regular nor predictable. Certainly the world of energy-users is a largely orderly place, but it is a world whose organizing principles are not captured by the "intentional", "rational" model of "means-ends" energy-use behavior.

The movement of research toward more detailed end-use description warrents a good deal of healthy self-consciousness about methods of inquiry, since variations in method produce variations in theory. The theoretical variation that seems to us intrinsic to the ethnographic approach is one that

does not force the separation of means and ends; it allows "resources" to fashion the uses to which they are put and makes it possible to treat ends as the emergent "endings" or outcomes or consequences of those activities --activities that are, usually in retrospect, classified as the tools or means of their realization. This is, we might also note, a precise parallel to the notion that "method" produces "theory." Consumers work out their notions of what gas is "for," not prior to its use but in the context of using it --although they do not arrive at these notions in isolation of the social context in which they are located. Similarly, researchers work out their notions about what "the behaviors are", in the context of performing those activities which are said to constitute their methodologies.

The effort to "stand close" to the actual contexts of energy use produces a, sometimes unwelcome, "explosion" in the varieties of actual conduct that constitute the "dependent variable" (Hackett,1985; Hackett and Lutzenhiser, 1985). No doubt much of the principle at work here is simply the product of magnification, allowing appreciation of details. But inspection of the details can also reveal altogether different and deviant forms --as, for example, in the case of the use of air conditioners to muffle or "dampen" noises penetrating a dwelling from the outside. Furthermore, one is likely to arrive at an appreciation of the extent and importance of these deviations (a subject to which we will return) only if one abandons conventional social surveys or questionnaires as their primary source of information on energy consumption. We provide this caution because the frequently vast differences between "what we say" and "what we do" (Deutscher,1973) places sharp limits on the accuracy of survey methods which rely on the use of persons as "informants" with regard to the description of their <u>own</u> behavior, these accounts almost without exception describing the respondent as socially "normal."

II

We propose to illustrate these points, and to share some useful methodological innovations, in a series of brief discussions of our energy research in Davis and of the efforts we have made to confront the problem of obtaining good end-use data. The first papers from these inquiries are now available (Hackett and Lutzenhiser,1985;1986), so we won't describe the findings of the research in detail here. Our most recent study of energy use in apartments focused on the two "student family" housing complexes on the Davis campus of

the University of California. Because this is student housing the populations are in that respect especially homogeneous, and the research may have limited generalizability; but the site offered an opportunity to study the consequences of a change from master to unit metering of gas and electricity, and to do so under very special circumstances: the apartments were individually metered but not individually billed since their construction early in the 1960's, and we were able to read these meters for a little over two years prior to the start of individual billing in August of 1985. The population here is also very diverse ethnically, including students from a large number of countries, and the two complexes are significantly different in this regard: two-thirds of the families in one of them come from countries other than the U.S., and this complex is furnished, including air conditioners; in the other complex the U.S./non-U.S. ratio is reversed and the apartments are unfurnished.

Participant Observation

We began our field work at these sites when one of the authors and his family moved into one of the apartments in 1983. About six months later, his spouse, a collaborator on this research, took a part-time job with the campus Housing Office as a "resident assistant" --a position which has since brought her into contact with nearly every household in the complex. Her official responsibilities included making sure that both the apartment hardware and the tenants were performing adequately and appropriately in the setting. This was, in many respects, an ideal arrangement for making observations both of residents' and Housing Office activities --including, of course, observation of one's own experience.

In the initial phases of this sort of field work the observer is not only allowed to experience a new setting, but is in a sense encouraged to safeguard a rather inchoate perspective, to observe but to have the fortitude not to prematurely "make sense" of the setting. The theory behind this method is thoroughly positivistic: one sees, in this fashion, the real thing. One is trying to be "in" but not "of" the setting, this effort at "distancing" being, one supposes, the condition of objectivity. There are, of course, tensions inherent in this situation. One rather quickly settles into household routines and habitual ways of acting and interpreting familiar events which make observation increasingly difficult. Furthermore, the requirements of "participant" come to conflict with those of "observer". The participant-observer is trying to "pass" as a participant while remaining

reasonably incognito as an observer. This stance is taken in order to manage the tension, without attempting to "resolve" it in such a way as to either distort the data by intrusion or, in the effort to secure objectivity by withdrawing from the site and substituting an anonymous and confidential survey, risking only "normal accounts" of activity and sentiment. The compound paradox here is this: that the more "scientific" and objectively detached one becomes, the more one produces data that is superficial and context-free; at the same time, however, gathering information as a "neighbor" places severe limits on one's ability to gain access to material that might be considered "personal" precisely because neighbors are not supposed to be "detached."

In spite of these dilemmas of participant observation, we find the method indispensable. For example, after a very short time in the field it becomes immediately obvious that much energy consumption is institutionalized --by this we mean that the presence of energy-using technologies in apartments (air conditioners, garbage disposals, exhaust fans, washing machine hook-ups) convey a powerful presumptions as to their appropriateness in that setting. This insight suggests considerably more than the obvious conclusion that "devices which aren't present can't be used." But by taking the perspective of the user, we conclude that household technologies are, in fact, rarely evaluated at all by tenants --the question is not whether an air conditioner is desirable but whether it is a good air conditioner, and whether one is capable (or can appear to be capable) of managing it.

One also comes to appreciate the variety of senses in which energy use is incidental to ongoing activity and the ways, as we have said, in which it is "embedded" in that activity. Persons organize their lives and routines in terms of nearly everything but the energy that is consumed through their action. The relevant cultural categories being: finishing the laundry, having guests over, celebrating the holidays (whatever they may be), babysitting, letting the children have a bath and keeping the baby (or plants or fish or parrot) warm. Obviously, our conclusion is not that daily life is incoherent, disorderly or inaccessible to disciplined inquiry. Rather, it suggests that, among other factors, modern engineering has succeeded so well in making the functioning of critical systems "invisible" to the daily activities which they support. We have been fortunate that the cultural diversity of our study population provides a rare comparative opportunity to describe and examine the ways in which social activities with energy implications (cooking, bathing, entertaining, appliance accumulation, etc.) compose varying ways of life which are ordered by fairly

precise, most often unstated, standards of conduct appropriate to men, women and children of particular ages and statuses in each culture.

It follows, then, that the specification of "community" and "cultural" contexts for energy use is another important contribution of this method. Our observations of social differences between the two complexes led to estimation of a regression model in which, controlling for all obvious structural and demographic differences, residence in one or the other of the two complexes per se accounts for a not-insignificant amount of energy consumed. We are now conducting further field work which may help us to specify the community ecology of cooling behaviors which might account for this difference.

Through observation we have also been able to make sense of the some of the absurdities of energy use --for example, the finding that the apartments are constructed in such a way that each air conditioner faces a neighboring apartment's air conditioner less than 10 feet way, so that many tenants feel the need to run their air conditioner to neutralize the noise and balance the exhaust heat coming from their neighbor's. Finally, participant observation in the Housing Office has allowed us to examine the ways in which organizational rules are constructed without regard for energy itself, but which often have substantial energy-use implications. Here we refer to rules governing washer hookups, laundry price policy, door and window security, curtains, appliance replacement, clothesline location, patio landscaping, etc.

Group Interviews

Several of the methodological experiments that we have pursued in this study grew out of the realization that one way to circumvent the limitations of the "neighbor" role (while making use of its advantages) is to enlist neighbors as collaborators in the research. This may seem to be an obvious step, but in fact most social science research conceives of persons as "subjects", "respondents", or at best, as "informants" --as sources of data-- and rarely as persons who might be able to make a theoretical contribution to the research topic. When we speak of enlisting "collaborators" we are not suggesting that it is good to "get close to your subjects" in the way that a therapist might. Rather, we have found that, while most routine action escapes notice, persons can be stimulated to make acute observations and can supply sophisticated interpretations of events --when given the incentive and opportunity to do so. The group interview provides such an opportunity.

We were working to develop questions for a social survey which was designed to gauge responses to the metering and billing change, provide us with an appliance "inventory," and explore the correlates of energy consumption in general. Based on our previous experience, we were fearful that the survey would challange respondents only to provide an account of their conduct as socially "normal," sharply distorting the end use picture. So we conducted an open-ended group interview as a kind of "collective pre-test" of our evolving survey form, but soon came to appreciate it as a distinctive data-gathering method in its own right.

The group interview (or "focus group", in marketing research) has its own special dynamics. Discussion of conventionalized routines such as laundering or bathing reveal the fact that seemingly conventionalized people make "accommodations" to the particular circumstances of their setting that might make the person seem "strange" but can "go unnoticed" so long as they remain unspoken and unremarked. (As in, for example, the woman who "discovers" in the course of the interview that she washes just a few items in her washing machine nearly every day in order to have something to take to the community dryers where, most likely, she will find several friends.) Presumably the group situation could fall apart at such a point, but this was not our experience. The group interview creates a reciprocal and comparative framework in which one story is offered in exchange for another, and potentially sensitive information is brought forth so long as these revelations are in fact shared. In fact, a conversation begun around a particular topic, and allowed to "run" wherever it might lead, may run a considerable distance, with participants finding it not only permissable but desirable to be somewhat "exotic," and searching their experience for distinctive behaviors. However this method seems to be particularly fruitful in identifying a range of both "normal" and "deviant" behaviors and it has the advantage of encouraging participants to "self-generate" questions and data --a quality often lacking in the individual guided interview.

Energy-Use Diaries

We were encouraged enough by this experience that we recruited twenty residents to keep diaries recording their energy-related conduct for a week. The social definition of this activity is ambiguous; we classified it as a form of work and paid people a modest sum to do it; but this may have been unnecessary. The diaries were revealing, but at the same time rather

disappointing in themselves --perhaps because of the very informal and open-ended format that we established for them. However, when we interviewed diary-keepers, to clarify ambiguities in their diaries and to ask about the diary-keeping experience, we found in many cases that their experience had provided the foundation for a revealing, reflective and even "detached" discussion about the household's energy-relevant routines, strategies and problems. The materials from these discussions had a significant impact on the way in which we formulated our subsequent survey.

The most promising feature of this method is the ability of the diary to "objectivize" ordinary conduct so that it can be examined and interpreted by the researcher and the diarist. Considerable improvement in diary format, taking advantage of the experience of other disciplines which routinely use diary methods (e.g. nutrition), is certainly possible and would undoubtedly increase the value of energy-use data obtained in this fashion.

Photo Interpretation

One feature of the diaries led us to explore another collaborative method in a related project. Almost all of our diary-keepers experienced surprise at the large number of times they or other members of the household were in and out of the refrigerator during the diary-keeping period. (We had asked them to mark a "refrigerator log" taped to the door, every time they opened the refrigerator.) This surprise implied a disjunction between what people actually do and what they would be likely to say they do if filling out a questionnaire or responding to an interview. More than that: it implies that a conventional and rational account of refrigerator-use may miss a good deal of it. We resolved to explore refrigerators and their owners as a "side issue."

We began by asking people if we could use a polaroid camera to photograph their refrigerator so that we could discuss it without holding open the door. We found a lot of seemingly "deviant" material in these refrigerators (and their freezer sections): old and sometimes unidentifiable food itsems, of course, but also money, important documents, baby shoes, "controlled substances," in one instance a pair of credit cards frozen in a block of ice so that they could be used but not used impulsively, panty hose, paint brushes frozen so that they need not be cleaned, frozen birds that had died in collisions with windows, hibernating snakes, daffodil bulbs and peach tree scions. Using the photo as an objectivized version of the object of behavior (as in the case of the diary) data emerged which also confirmed that refrigerators are typically subjected to a

good deal of "foraging" and "just looking" behavior (thought to be "a special problem with children") and that the "mood" of the forager can be the product and not just the source of this activity: one informant has a small sign near her refrigerator that cautions "Do not open the refrigerator to see how hungry you are." The data became even more interesting when we showed people pictures of other persons' open refrigerators. In these cases the clear tendency was to treat the pictured shelves as evidence of a kind of person or especially of a kind of family. We were not surprised, then, when one woman told us that when she took up with a new man one of the first things she would do was to inspect his refrigerator "to see what kind of a man he is." Our interviews in student households were also especially revealing because refrigerators in that setting are typically the site of conflict, or of uneasy truce at best, and this seems to mean that the presence of a refrigerator presumes the existence of a family --that it is a specifically familial appliance.

This study partiularly produced evidence challenging the simple "rational" models of appliance use --again, the sorts of models that are taken for granted in most energy research. The assumption that refrigerators (e.g.) are tools for the accomplishment of purposes that are devised a priori by their users, was clearly contradicted by our finding that many of the "ends" to which the tool is addressed in fact emerged in the course of its use. The refrigerator is also an "institution," not simply an expendable tool, an element in a continuing round of meaningful but unthinking and "habitual" actions that, importantly, identify and define social actors.

While this study was indeed a side issue for us, it demonstrated the usefulness of photo interpretation in energy-use behavior interviews. In addition it allowed us to explore the moral, status and cultural implications of a particularly energy-consumptive household technology, in turn exposing the defects in a "rational" and "intentional" model of appliance use. It also demonstrates that studies of these sorts of technical artifacts as social facts are not only possible, but are intellectually productive and of possible practical value.

Social Surveying

Although our main concern here is ethnography, it is also appropriate to discuss uses to which the social survey may appropriately be put. Pursuit of our primary goal of trying to quantitatively disaggregate the pre- and post-conversion energy consumption in the two complexes, required us to

undertake a survey of all 476 apartments. Because questionnaire surveys operate at the greatest distance from actual energy use, and because we were studying student families, we wanted to avoid the obvious association that survey forms have with test forms, job application and tax returns --a resemblance that is neither superficial nor accidental. The traditional survey "instrument" is itself a particular sort of an "institution" --composed of a numbered list of questions with an official look, having a narrow range of pre-coded possible answers, with the implication that some answers are more appropriate than others and with the implicit invitation to the "respondent" to engage in a display of right-thinking and normal conduct.

Striving for clarity, while trying to avoid an "official tone", we found that we were able to experiment fairly broadly with the the survey form. We mixed a variety of styles, developing a stark but comprehensive appliance "inventory" which was lodged it in the midst of conversation-style questions that were unnumbered and had no key-punch codes. We also experimented with some "philosophical" questions that asked people, (e.g.) whether they were comfortable with machinery and whether they thought progress was possible --the overall response to these kinds of questions (which were designed to test rationality assumptions, rather than to entertain the respondents or researchers) was quite positive. With more than a little apprehension, we allowed the form to grow to 22 legal-size pages, implying that this was a measure of the importance of the study. Finally, we wrote a personally-addressed letter to each apartment and hand-delivered and retrieved each questionnaire. Perhaps the only lesson of importance to be concluded here is that reasonable care and individual attention to survey respondents will produce good results --a simple lesson which is, unfortunately, too-often overlooked in this sort of work.

The results of these efforts was a response rate of 84% (with a taxonomy of types of non-responsers) and a unique data set with a large number of measures of the energy-use behavior of these apartment dwellers. It is not imagined to be a "representative" sample, but an experimental study case in which questions about behavioral sources of variation can be addressed more unambiguously than in most research of this sort, since the apartments themselves are nearly identical, and are similarly-equipped with major appliances and HVAC systems. Most of the variability in these data (as much as 700%) is attributable to behavioral differences, then. This data base is helping us to profile the various patterns of activity which constitute the energy

demands so crudely measured by monthly meter readings. Without an ethnographic foundation, however, these data could not have been collected, nor are they interpretable in the absence of qualitative data. On the other hand, a "complete" picture of energy use in this setting should also include sub-meter data as well as comparisons with the consumption patterns of similar households living in other environments.

III

We argue on the basis of these studies that a new model of energy use emerges when ethnographic methods are used to study routine household behavior. Contradicting the implicit assumptions of instrumental rationality inherent in "intentional" models of action, we find support instead for a model of routine conduct as ongoing, practical and "cultural", stressing the emergent character of selves, social structures, values and especially technologies, as the latter are deployed in everyday life. Capturing and characterizing action of this sort is a far from an easy task, but the serious limitations in conventional "survey" approaches to the problem seem to indicate that few other choices are available.

We will not conclude with explicit comparisons of the approaches that we have experimented with, except to note that each has strengths and weakness (which are fairly obvious, if one thinks about it) that effect its performance in the practice of research. In every case, however, we urge attention to the "what we say vs what we do" dimension; the problem of the "normal account"; the intrusive effect of the researcher's own actions and expectations; the active and unreflected character of most ordinary conduct (paradoxically constrained by often strict, unarticulated standards); and to the institutional strengths of ordinary technologies which cause them to be taken-for-granted and their influences ignored.

Apart from interest, we can imagine several more negative reactions to our conclusions, including: denial and the assertion of modal rationality; continued reliance on "rigorous" and "orderly" methods in order to produce the finding of everyday orderliness (including the use of "multiple choice" surveys as primary data sources); or defining the detailed study of energy-use behavior as impossible, unimportant or both. We think it unlikely, however, that having taken an inevitable turn toward the study of behavior required by advances in load forecasting, end-use monitoring and conservation planning, any of these

alternatives will hold much serious appeal to residential energy researchers. What is called for is an increased use of ethnographic methods, including conscious efforts on the part of energy researchers to informally extend the range and variety of their own observations, refinement of these methods and the accumulation of an interpretive and analytic literature on the subject of everyday, routine and meaningful energy-use "behaviors" which can be put to use in the service of demand forecasting, conservation marketing and energy policy-making.

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