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Evaluation of nuclear power and renewable alternatives as portrayed in UK local press coverage[†]

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Abstract. A content analysis was conducted of all UK local daily newspaper articles appearing in the first half of 1981, concerned with nuclear power or renewable alternatives. Evaluative coverage of these technologies was compared on dimensions found to characterise energy issues (economic, environmental, technological, future/political, physical and psychological risks). In addition, comparisons were drawn between coverage in areas 'threatened' with the potential siting of a new nuclear power station and that in 'unaffected' areas. The development stage of the two technologies and the degree of 'factual' as opposed to 'polemical' coverage they attracted were also recorded. In evaluative terms, nuclear power was evaluated overwhelmingly negatively, and alternatives positively. Moreover, this pattern showed a degree of consistency irrespective of the dimension of evaluation. The 'threatened' subsample was most negatively disposed towards nuclear power. Polemical coverage was greater for nuclear power than for alternatives and greatest in the 'threatened' sample. This category also contained articles more likely to attract attention because of their greater headline size and length. Whereas most coverage of nuclear power concentrates on preoperational or operational stages, coverage of alternatives is more concerned with its formative and planning stages. These findings were related to people's attitudes concerning nuclear power, and the growth in antinuclear feeling in particular.

Introduction

The nuclear energy supply industry continues under a programme of expansion in the United Kingdom at a time when public opinion has become increasingly opposed to this technology and the search for viable alternatives all the more exigent. Against this background we conducted a content analysis exploring how nuclear power, and the building of further nuclear power stations, is presented and evaluated in local daily newspapers.

In the late 1960s and early 1970s, the impending long-term depletion of fossil fuels, highlighted by the 1973 Organization of Petroleum Exporting Countries oil crisis, enhanced the attractiveness of nuclear power as a source of energy; its role in the future seemed assured. However, over the last ten years, the prospects of this technology have been seriously questioned. Public disagreements among experts about the viability of nuclear technology inevitably catalysed public opposition, and incidents like Three Mile Island (1979) have done nothing to reduce public anxieties. Organised opposition, especially in the form of environmental movements, ensured that nuclear power would not remain an issue for technical or economic experts alone, but would have to win public acceptance unvicariously. The percentage of the public with neutral attitudes to nuclear power, especially on the question of waste disposal, has steadily decreased while the proportion of opponents has increased (compare Kasperson et al, 1980; Thomas and Baillie, 1982; van der Pligt, 1982;

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Nealy et al, 1983). Moreover, obvious links between nuclear power and nuclear weapons, coupled with the growth of the peace movement and Campaign for Nuclear Disarmament in recent years, has contributed to the tarnished image of the nuclear option.

Clearly this general climate of opinion and activity is bound to have a great bearing on any government's decisions to build more nuclear power stations. Attempts to site and build nuclear power stations in new locations also run up against the general opposition towards any new large-scale developments, encountered for bypass and airport projects, for example. Set within this context, the prospect of siting a new nuclear power station is bound to be a highly prominent and contentious issue for the local inhabitants concerned, not to mention the public at large.

Reviewing the literature, Thomas and Baillie (1982) have indicated that support for a new nuclear reactor in one's locality is indeed usually lower than support for the expansion of nuclear power in general. Our own research in southwest England confirms this (van der Pligt et al, 1984); and at Sizewell in Suffolk, where there is already a nuclear reactor, public opinion is opposed to the building of another, albeit a pressurised water reactor (PWR) (Warren, 1981).

Thus, apart from providing insights into the image of nuclear power generally, content analysis of *local* newspapers affords comparison between coverage in areas which are threatened with a new nuclear power station and that in areas which are not. This study is intended to be comparative in another important respect. Nuclear power cannot be evaluated in vacuo, since evaluation is meaningful only relative to some plausible alternative. For this reason, coverage of nonnuclear nonfossil fuel sources of energy was included in the analysis, to serve both as a relative benchmark and as a genuine alternative of interest in its own right.

In summary, in the present study we examine the content and structure of evaluation concerning nuclear power and renewable alternatives, as portrayed in the local press. Clearly these technologies can be evaluated according to a number of different criteria. For example, Thomas et al (1980) performed a factor analysis of belief items concerned with energy technology, and found five underlying dimensions: economic, environmental, technological, future/political (indirect risk), and physical/psychological (direct life-risk). These dimensions will be used to structure the present content analysis.

Overall, this approach offers a convenient and nonintrusive method for exploring the evaluative content and structure of a critical energy issue.

Design: method and procedure

Sampling frame

The sampling frame was made up of all the local daily newspapers in the United Kingdom ($n = 103$). Any article referring to nuclear power or alternatives appearing in the first half of 1981, of more than one inch column space, was selected for coding.

Coding frame

Apart from recording the date and source of articles, the coding frame is mainly concerned with their form and content.

Content of articles

Headlines The evaluative tone of headlines (positive or negative) was recorded according to the basic nuclear/alternative classification. Neutral headlines were not scored. Specifically, the procedure was to scan the headline for any evaluative content and to determine the subject of this evaluation (that is, pro/anti; nuclear/alternative). However, if it was unclear from the headline whether the evaluation

applied to nuclear or alternatives the main body of the article was referred to and a judgment of its reference was made. (An additional measure of the explicitness of headline evaluations was incorporated, but this distinction adds little and is not reported here.) Evaluations referring to neither technology were defined as neutral. Headlines which were evaluative of both technologies were scored in favour of the dominant evaluation or, if this was balanced, defined as neutral (although no instance of this type was recorded).

Emphasis This section of the coding frame corresponds to the substantive content of the articles. The emphasis of the article concerns how positively or negatively either or both of the technologies are evaluated along certain relevant dimensions. As indicated earlier, these dimensions were taken from a previous study (Thomas et al, 1980) in which five such dimensions were elicited: economic benefits, environmental risk, indirect risk (future/political), technological development, and factors concerned with direct life-risk (psychological/physical).

To this scheme, two additional categories were added which, however, did not change the dimensional structure. The economic dimension was divided into short-term and long-term costs/benefits, since a single dimension may have a tendency to undervalue costs incurred for long-term gain (for example, investment) or overvalue 'false economies'. An unqualified category, accounting for evaluation which did not fall into any of the other categories, was also included.

The unit of analysis was the sentence; each sentence of the article was coded for positive or negative evaluations regarding the two technologies. Neutral, indeterminate, and merely descriptive statements were ignored. Thus, each article could potentially be coded for the number of positive/negative statements concerning nuclear/alternatives on each of the seven dimensions (twenty-eight cells in all).

The following more specific coding rules were followed as closely as possible.

(1) If separate points (as defined by the coding categories) were being made within a sentence, each was coded according to the appropriate category. If an unqualified point was linked to a specific one within the sentence, only the specific category was coded.

(2) Where one lobby might cite an argument of the other in order to repudiate it within the same sentence, this was coded as positive of the former, or negative of the latter, accordingly. (However, citing the argument of an opposed position and criticising this in a new sentence was evaluated separately for each sentence.)

(3) A short-term cost/benefit was defined as a resource (financial, material, convertible) associated with a specified price or time (if the 'short' or 'long term' was not specifically mentioned within the sentence). Any unspecified economic cost/benefit and any cumulative or operating cost/benefit was defined as long term. Building and construction costs were defined as short term, running costs and the provision of jobs were coded as long term. Where the term 'investment' was used evaluatively, this was coded both as a short-term cost and as a long-term benefit.

Conservation, reduction of wastage, recycling, etc were coded as long-term economic benefits where appropriate.

(4) Unspecified risks, hazards, and safety issues generally were coded both on 'environmental' and on 'physical/psychological risk' dimensions.

(5) The 'technology' dimension was interpreted as technological changes; research and development; introduction of new options or known options on a new scale, in a new format or in new places.

For some concrete examples of the application of the coding scheme, see the appendix.

The main purpose of this coding scheme was to provide a richer account of the evaluation of the technologies than is afforded by examining headlines alone and to explore the descriptive dimensions along which these evaluations are operating. An important merit is that this scheme allows for a distinction between articles which are 'neutral' in the sense that they do not contain 'evaluative' or controversial coverage and those that are 'neutral' but evaluatively polarised in their presentation of pro and con arguments. The following measure was also designed to address this question.

Material type A distinction was made between the reporting of brute fact and polemic, controversy, or debate over the merits or demerits of a technology.

Development stage The development stage of the nuclear and/or alternative technology was coded. Because of the different nature of the two technologies some diversification in the coding scheme was required [stages (c) to (e) below]. The stages are as follows:

- (a) speculation/drawing board phase;
- (b) active piloting, testing, or research and development; untried on a production scale; technology not used to generate general purpose electricity;
- (c) *nuclear*: advent of an operating policy decision (national or local, strategic or specific) prior to a Public Local Inquiry (PLI);
alternatives: promotions or exhibitions of working technology, but as yet not tried or applied in its intended setting; intentions to use a functional technology, to implement a wider programme of use, etc;
- (d) *nuclear* (only): advent of an operating policy decision after PLI;
- (e) *nuclear*: technology being implemented on a production scale;
alternatives: individual use in situ, private enterprise, etc;
- (f) completed but dormant (before use);
- (g) fully operational, putting into the national grid;
- (h) shut down, closing down, closed down, after use.

Form of articles

Three attention variables were measured: headline size (number of columns), space (column length), and the number of pictures.

Reliability of categories

All the coding categories achieved an acceptable level of intercoder reliability on appropriate indices. Thus, for the emphasis categories, all but two of the dimensions, for nuclear (sample size, $n = 58$) and alternatives ($n = 60$), yielded very significant Spearman's r values for intercoder agreement ($p < 0.001$; for the negative, nuclear, indirect risk dimension, $p < 0.01$). For the other two (positive and negative indirect risk for alternatives) a correlation coefficient could not be computed because of insufficient entries.

Intercoder agreement on the other *nominal* categories of the coding frame—headline evaluation, material type, and development stage—resulted in Cohen's k values of 0.75, 0.95, and 0.72 respectively, which were also highly significant ($n = 90$, $p < 0.001$).

Results

Description of the sample

Of the 103 local daily newspapers in the United Kingdom, eighty-nine were represented in the content analysis. For the six-month monitoring period, 939 articles were detected which contained evaluative information about nuclear and/or alternative technology. 488 (52%) of these articles contained evaluations concerning

nuclear power, 352 (37.5%) contained evaluations concerning alternatives, and 99 (10.5%) contained evaluations concerning both.

The distribution of output on this issue is an interesting dependent measure in itself, irrespective of content. Table 1 lists the most prolific papers. It can be seen that a single newspaper, the *East Anglian Daily Times*, accounts for 14% of all the articles on this energy issue, more than double the output of the next most prolific source. None of the newspapers outside the top seven most prolific contributed more than 3.0% to the total output.

Table 1. The most prolific sources of articles concerning nuclear power and/or alternatives.

	Number of articles	%
1 <i>East Anglian Daily Times</i>	131	14.0
2 <i>Western Morning News</i> (Plymouth)	65	6.9
3 <i>Evening Star</i> (Ipswich)	62	6.6
4 <i>North Western Evening Mail</i>	33	3.5
5 <i>Dorset Evening Echo</i>	31	3.3
<i>Morning Telegraph</i> (Sheffield)	31	3.3
7 <i>Lancashire Evening Post</i>	29	3.1

Definition of subsamples

Newspapers were categorised according to whether they were in an area 'threatened' with the prospect of a new nuclear development or not, hereafter referred to as the affected and unaffected samples respectively. The affected sample was made up of the following four newspapers: *East Anglian Daily Times*, *Western Morning News*, *Evening Star* (Ipswich), and *Dorset Evening Echo*. The two East Anglian papers qualify for this sample because of the proposal by the Central Electricity Generating Board (CEGB) to build the United Kingdom's first PWR at Sizewell in Suffolk. The two papers in the South West qualify because of the CEGB's plans announced in 1980 to build a new nuclear power station somewhere in the South West, for which two sites in Dorset and three in Cornwall were put forward. Since they are all in the top five of the most prolific newspapers on this issue (table 1), together they comprise a reasonable sample ($n = 289$) to compare with elsewhere (the unaffected sample).

The breakdown of the affected sample into articles on nuclear/alternative/both technologies provides a sharp contrast to the unaffected sample and the sample as a whole (see above). In the affected sample, 66.4% of articles are concerned with nuclear power, compared with 17.3% and 16.3% for alternatives and both, respectively. The analogous figures for the unaffected sample are 45.5%, 46.5%, and 8.0% respectively (that is, here articles concerned solely with alternatives are actually in the majority). Comparing these two sets of percentages between the two subsamples (affected, unaffected) results in a very significant difference: χ^2 [two degrees of freedom (df)] = 75.15, $p < 0.001$.

Evaluations of nuclear and alternative technology

In this section we examine the structure of evaluations of nuclear power and alternatives derived largely from the emphasis categories. Throughout, comparisons are also drawn between affected and unaffected samples.

Headline evaluations Perhaps the most basic and salient evaluations are contained in headlines. Figure 1 presents the percentage distribution of positive and negative headlines for nuclear power and alternatives (neutral/nonevaluative headlines are not presented here although the percentages in figure 1 are uncorrected for their absence). The continuous profile represents the affected subsample and the broken

line profile corresponds to the unaffected subsample. For both samples it is clear that negative evaluations of nuclear power considerably exceed positive evaluations, whereas the reverse is true of alternatives. Comparing headline evaluation (positive, negative) across technology (nuclear only, alternative only) *for the sample as a whole*, resulted in a very significant association: χ^2 (df = 1) = 262.59, $p < 0.001$ ($n = 625$). If we turn to the subsamples, it is noticeable from figure 1 that for nuclear power the 'evaluative gap' between the percentage of positive headlines and that of negative headlines is greater in the affected sample than in the unaffected sample (8.0% positive, 46.0% negative compared with 9.8% positive and 29.4% negative, respectively). On the other hand, for alternatives the evaluative gap is greater in the unaffected sample than in the affected sample (33.7% positive, 4.3% negative compared with 14.2% positive, 1.4% negative, respectively).

There were significantly more negative headlines per se in the affected sample than in the unaffected sample: χ^2 (df = 1) = 33.59, $p < 0.001$ ($n = 703$). For articles concerned with nuclear power alone, there were more negative headlines in the affected sample than in the unaffected sample (86.5% and 75.1% respectively) χ^2 (df = 1) = 5.83, $p < 0.02$ ($n = 350$). For articles concerned with alternatives alone there was no significant difference in the percentage of positive and negative headlines between subsamples ($\chi^2 < 1$, although the affected sample/negative headline cell had less than five cases).

Figure 1. Percentage of articles with positive (pos.) and negative (neg.) headlines about nuclear (nuc.) and alternative (alt.) technology.

Evaluations within articles Investigation of the overall evaluative content contained in the newspaper articles (that is, from the emphasis section) reveals a similar though less accentuated pattern to that obtained for headlines. In figure 2 the bar chart corresponding to the continuous profile depicts the percentage of articles in the *affected* sample containing *any* positive or negative evaluations of nuclear or alternative technology. The broken line profile represents the analogous bar chart for the *unaffected* sample. Consistent with the headline measure, the percentage of articles containing negative evaluations of nuclear power exceeds its positive equivalent, whereas the percentage of articles containing positive evaluations of alternatives considerably exceeds its negative equivalent. *This holds for both subsamples,*

although there are comparatively more antinuclear articles in the affected sample, and comparatively more pro-alternatives in the unaffected sample.

This last index of evaluation is rather conservative since it takes into account only whether articles contain any positive or negative evaluations; it does not give an indication of the *overall* evaluative tone of individual articles, nor the distribution of evaluation over the seven dimensions. To obtain a measure of this, we subtracted the number of negative evaluations from the number of positive evaluations, per dimension, per article, for both technologies and both subsamples. Thus, a positive score reflects an overall positive evaluation for that technology on that dimension in that article of that sample (and vice versa for a negative score). The magnitude of this score reflects the strength of the evaluation on that particular dimension.

Figure 3 to 16 display the relative evaluations of nuclear and alternative technology on the separate dimensions for the affected sample (continuous line) and the unaffected sample (broken line).

In these figures the ordinate axis represents the percentage of articles and the abscissa represents the net evaluation of articles, ranging from -12 to +12 (values outside this range were collapsed to contain the graph). Thus, as a graph extends upwards it reflects the frequency of that net evaluation, and as it extends outwards it reflects the overall net extremity of an evaluation. Each graph in the negative and positive sectors is accompanied by a percentage figure indicating the total percentage of articles in that sector for the respective samples. These figures will now be discussed in order.

Figure 2. Percentage of articles with positive (pos.) and negative (neg.) statements about nuclear (nuc.) and alternative (alt.) technology.

Short-term economic dimension From figure 3 it can be seen that for nuclear power the great majority of nonneutral evaluations tend to be negative on this dimension. This applies to both samples, although the trend is more marked in the affected sample; 20.4% of articles are net negative in evaluation in this sample, compared with 14.5% in the unaffected sample. A negligible percentage of articles are evaluated positively on this dimension for both samples. The plot for alternatives (figure 4) also depicts a trend towards negative evaluation, although this time a greater proportion of articles in the unaffected sample make net negative evaluations of alternatives compared with the affected sample (12.8% and 6.9% respectively).

Figure 3. Evaluation of nuclear power on short-term economic dimension.

Figure 4. Evaluation of alternatives on short-term economic dimension.

Long-term economic dimension On this dimension, evaluation of nuclear power (figure 5) is more evenly balanced than on the previous dimension. However, the affected sample again appears to be more negatively disposed to nuclear power than does the unaffected sample (9.7% net negative compared with 3.8%), although positively evaluative articles are no less frequent (10.4% compared with 8.0%) for the affected sample. For alternatives a very different picture is revealed (figure 6). A negligible percentage of negative evaluations is overshadowed by a relatively large percentage of positive evaluations for both samples. However, this percentage is twice as large in the unaffected sample as in the affected sample (34.6% compared with 17.0%).

Figure 5. Evaluation of nuclear power on long-term economic dimension.

Figure 6. Evaluation of alternatives on long-term economic dimension.

Environmental risk dimension For nuclear power on this dimension, there are approximately five times as many net negative evaluations as positive evaluations for both samples (figure 7). Evaluations tend to be more numerous both on the negative and on the positive side for the affected sample (31.1% compared with

18.6% for negative evaluations and 5.9% compared with 4.0% for positive evaluations). This dimension appears to be relatively irrelevant to alternative technology as indicated by the general paucity of evaluations (figure 8).

Figure 7. Evaluation of nuclear power on environmental dimension.

Figure 8. Evaluation of alternatives on environmental dimension.

Future/political risk dimension The general pattern for environmental risk is repeated here although less dramatically (figures 9 and 10). For nuclear power, evaluations are slightly more frequent for the affected sample. The dimension is again practically superfluous in terms of evaluating alternatives.

Figure 9. Evaluation of nuclear power on future/political risk dimension.

Figure 10. Evaluation of alternatives on future/political risk dimension.

Technological dimension Here, evaluations are more often negative than positive for nuclear power in both samples (figure 11). There are marginal differences between the two samples although the affected sample appears to be negative more often (10.4% compared with 7.8% for the unaffected sample). Evaluations are overwhelmingly positive for alternatives on this dimension (figure 12), although the percentage of positive evaluations in the affected sample (20.1%) is less than half the value for the unaffected sample (44.3%).

Figure 11. Evaluation of nuclear power on technology dimension.

Figure 12. Evaluation of alternatives on technology dimension.

Direct life-risk dimension Figures 13 and 14 repeat in its clearest form the pattern of evaluation found for nuclear power and alternatives on the other 'risk' dimensions. For nuclear power, both samples reveal a surfeit of negative evaluations, although this is greater for the affected sample (28.4% compared with 20.9%). The affected sample also displays more positive evaluations (8.0% compared with 4.9%). Evaluations are negligible for alternatives on this dimension (figure 14).

Figure 13. Evaluation of nuclear power on direct life-risk dimension.

Figure 14. Evaluation of alternatives on direct life-risk dimension.

Unqualified dimension The pattern of evaluation for nuclear power on this dimension is similar to previous ones (see figure 15). Evaluations are very strongly skewed towards the negative side for the affected sample (52.6% negative compared with 16.3% positive) and rather less so for the unaffected sample (19.1% and 12.3% respectively). This pattern was reversed for alternatives (figure 16). The great weight of evaluations were positive, and this trend was more marked for the unaffected sample (19.7% positive compared with 16.6% for the affected sample).

Figure 15. Evaluation of nuclear power on unqualified dimension.

Figure 16. Evaluation of alternatives on unqualified dimension.

Overall evaluation This index was computed by subtracting all negative evaluations from all positive evaluations collapsed over the seven dimensions. Figure 17 presents this plot for nuclear power. It can be seen that there are almost three times as many negatively evaluative articles as positively evaluative ones for the unaffected sample (35.5% compared with 12.8%); this ratio is increased to a factor of four for the affected sample (65.1% positive evaluations compared with 15.6% negative). These trends are very dramatically reversed for alternatives (figure 18). A negligible percentage of negative articles in both samples compares with relatively large percentages of net positive articles both in affected and in unaffected samples, although this is considerably greater in the latter case (48.8% compared with 29.1% for the affected sample).

Although these trends are quite clear-cut and the numbers are sufficiently large to speak for themselves, it is useful also to supplement these data with some statistical analyses. To extend the comparison of evaluations for nuclear power and alternatives, we analysed those articles ($n = 99$) which covered both technologies,

Figure 17. Overall evaluation of nuclear power.

Figure 18. Overall evaluation of alternatives.

since it is here that the relative advantages and disadvantages of each are most explicitly pitted against each other. These data are presented in table 2. First, as might be expected from the preceding figures, six out of the seven dimensions result in a net negative evaluation of nuclear power for this subsample, whereas six out of seven of the dimensions are net positive for alternatives. If nuclear power is compared with alternatives on these dimensions, the latter are evaluated significantly more positively in five cases, and this difference is marginally significant for a sixth (environmental risk). An overall evaluative index computed by subtracting all negative evaluations from all positive evaluations, collapsed across categories, was also significantly more positive for alternatives [a mean of +3.323 compared with -3.000, $t(98) = 6.18$, $p < 0.001$].

Again, to supplement the figures, table 3 presents an explicit comparison between evaluative coverage in the two subsamples (affected, unaffected). It can be seen that overall the negative evaluation of nuclear power is greater in the affected sample [a mean of -3.218 compared with -1.488 in the unaffected sample, $F(1, 937) = 18.62$, $p < 0.01$] and the greatest contributors to this difference are the economic and unqualified dimensions. Similarly, the affected sample has a relatively less positive overall evaluation of alternatives compared with the unaffected sample [with means of 0.965 and 2.409 respectively, $F(1, 937) = 25.26$, $p < 0.01$]. This difference is accounted for most by the economic and technological dimensions. These data support and confirm the overall divergences between the two subsamples elicited on the figures, and indicate the critical dimensions of these differences.

Table 2. Evaluation of nuclear power and alternatives in articles about both technologies.

Dimension ^a	Nuclear power	Alternatives	$t(98)$
Short-term economic			
M	-0.647	-0.232	2.50**
SD	1.181	1.038	
Long-term economic			
M	-0.071	1.202	5.21***
SD	1.387	1.922	
Environmental risk			
M	-0.303	0.071	1.94*
SD	1.650	0.610	
Future/political risk			
M	-0.222	0.030	3.64***
SD	0.693	0.172	
Technological developments			
M	0.000	1.131	4.65***
SD	1.020	2.248	
Direct life-risk			
M	-0.293	0.061	1.56
SD	2.191	0.240	
Unqualified			
M	-1.465	1.061	6.29***
SD	3.578	1.932	
Overall evaluation ^b			
M	-3.000	3.323	6.18***
SD	8.571	4.662	

* $p < 0.06$; ** $p < 0.05$; *** $p < 0.001$.

^aM—mean, SD—standard deviation. Means refer to the net evaluation of either technology on each dimension (positive minus negative evaluations).

^bThe overall evaluation refers to the net evaluation of all positive minus all negative evaluations per article.

Table 3. Evaluation of nuclear power and alternatives, comparing affected and unaffected samples.

Dimension ^a	Nuclear power			Alternatives		
	affected	unaffected	<i>F</i> (1, 937)	affected	unaffected	<i>F</i> (1, 937)
Short-term economic						
M	-0.426	-0.260	4.87**	-0.083	-0.169	4.53**
SD	1.150	1.020		0.433	0.625	
Long-term economic						
M	-0.138	0.099	8.47***	0.370	0.983	21.81***
SD	1.507	0.952		1.101	2.106	
Environmental risk						
M	-0.564	-0.355	3.74*	-0.007	0.019	1.48
SD	1.693	1.447		0.323	0.282	
Future/political risk						
M	-0.194	-0.172	<1	-0.194	-0.172	<1
SD	0.627	0.599		0.627	0.599	
Technological developments						
M	-0.059	-0.049	<1	0.419	1.191	30.61***
SD	0.661	0.837		1.115	2.252	
Direct life-risk						
M	-0.592	-0.563	<1	0.010	0.017	<1
SD	1.889	2.178		0.102	0.188	
Unqualified						
M	-1.246	-0.186	63.92***	0.246	0.348	1.68
SD	2.622	1.422		0.853	1.210	
Overall evaluation ^b						
M	-3.218	-1.488	18.62***	0.965	2.409	25.26***
SD	6.170	5.436		2.563	4.574	

* $p < 0.06$; ** $p < 0.05$; *** $p < 0.01$.

^aM—mean, SD—standard deviation. Means refer to the net evaluation of either technology on each dimension (positive minus negative evaluations).

^bThe overall evaluation refers to the net evaluation of all positive minus all negative evaluations per article.

Summary A fairly clear pattern emerges from the preceding figures and tables. The first and most obvious point is that overall nuclear power is evaluated negatively and alternatives are evaluated positively. Furthermore, there do not seem to be great differences between the seven descriptive dimensions in the pattern of these evaluations, although it appears that alternatives are hardly evaluated in either a positive or a negative direction on the 'risk' dimensions (figures 8, 10, and 14). With respect to the affected sample there is generally a greater weight of negative evaluations, both for nuclear and for alternative technology, compared with the rest of the sample.

Attention variables

Evaluation is not the only dimension on which to make comparisons between technologies, or between different subsamples, in media coverage. Attention variables, operationalised by the size of the headline and the space or length of articles, are important attributes which differentiate articles because they affect the likelihood of a given article being noticed and subsequently read. These variables were compared by performing 2 (technology) $\times$ 2 (sample) analyses of variance. For headline size there was a very significant main effect due to sample. Specifically, headline sizes in the affected sample were larger, averaging 5.35 column widths compared with 4.43 for the unaffected sample: $F(1, 790) = 12.33$, $p < 0.001$. There was no

significant main effect of technology nor any significant interaction between technology and sample ($F < 1$ in both cases). The comparable analysis of variance for space also resulted in a significant main effect due to sample. The affected sample produced longer articles, averaging 13.6 inches of column per article compared with 11.5 for the unaffected sample: $F(1, 790) = 9.44, p < 0.005$. There was also a very significant main effect of technology. Articles concerning alternatives were significantly larger (a mean of 13.91) than nuclear articles (a mean of 10.87); $F(1, 790) = 15.92, p < 0.001$. There was no significant interaction here ($F < 1$).

Type of material: factual or polemical

Another relevant dimension along which to categorise articles on this issue is the 'fact-value' dimension. Material can be divided according to whether it makes declarative statements of fact alone, or whether it introduces polemic, debate, or points of subjective value. Chi squares were performed crossing this basic dichotomy (material type) with sample (affected, unaffected) and technology (nuclear, alternative), respectively.

For the breakdown of the 2×2 contingency table of material type with sample, 86.8% of articles from the affected sample fall into the 'polemical' category compared with 67.8% for the unaffected sample [χ^2 (df = 1) = 36.11, $p < 0.0001$, $n = 934$]. Thus there are significantly more polemical or value-based articles in the affected sample compared with the rest of the overall sample. For the breakdown of material type with technology, 83.2% of purely nuclear articles fall into the polemical category compared with 53.6% for purely alternative articles [χ^2 (df = 1) = 84.65, $p < 0.0001$, $n = 836$]. Thus there are significantly more polemical articles for nuclear power than for alternatives.

The development stage of the technology

In this section we examine the development stages which attract most media coverage in terms of the two technologies. In figure 19 the development of nuclear

Figure 19. Development stage of reported nuclear technology.

power is broken into eight stages. For the sample as a whole a small majority of nuclear articles (25.8%) refer to the before PLI policy stage. Almost as many nuclear articles (20.7%) are concerned with nuclear power when it is fully operational. However, this relationship is greatly distorted for the affected sample. Unlike the sample as a whole, the percentage of articles in the before PLI category is greater than the sum of all other categories put together. Nearly 62% of articles fall into this category compared with 13.1% for the 'fully operational' category.

For alternatives (figure 20), media attention is more evenly spread across development stages, with the greatest weight of coverage concerned with the early stages.

Figure 20. Development stage of reported alternatives.

Summary and discussion

Perhaps the first point of significance that can be made about the present data concerns the weight of coverage devoted to nuclear power compared with alternative options. Although articles concerned solely with nuclear power formed the majority of the sample as a whole, a large proportion were also concerned with alternatives. Indeed, when the 'affected' sample is excluded, the majority of articles are concerned solely with alternatives. This finding is of considerable interest when it is considered that the government pays little attention to alternative technology and devotes relatively few resources to its research and development; a negligible fraction of electricity in the UK national grid is produced by alternative technology. Thus, there seems to be a major discrepancy between current energy policy and the relative prominence given to alternative technology in local press coverage.

In terms of the geographical distribution of coverage, it is perhaps not surprising that the reporting of 'energy futures', particularly for nuclear power, is most concentrated in those localities containing possible sites for new nuclear development. The ongoing Sizewell debate and the demonstrations at Luxulyan in Cornwall (1980-1981) have both been well reported by the national press and television, so it is quite consistent that they should attract a great deal of local media coverage.

In evaluative terms, the overwhelming finding is that nuclear power is evaluated relatively negatively and alternative options are evaluated relatively positively. This holds both for headlines and for the actual content of articles. Furthermore, this evaluative pattern remains fairly constant across the seven descriptive dimensions used to break down the issue into different components (although the risk dimensions

seem irrelevant to alternative technology). In sum, evaluative factors seem to outweigh most descriptive differences in the dimensions of the issue.

As might have been expected, the affected sample contained a higher proportion of articles on nuclear power than did the rest of the sample. Evaluations of nuclear power were also more negative in the affected sample, both for headlines and for the main content of articles (compare Molotch and Lester, 1975). This is consistent with the finding that people are more opposed to building a nuclear power station in their area than to nuclear power in general (van der Pligt et al, 1984).

However, articles derived from the affected sample also tended to be slightly more negative in their evaluation of alternatives than those from the unaffected sample. It is as if an air of scepticism prevails in the affected localities which tares both technologies. Conversely, it could be that alternative technology is more critically scrutinised when the prospect of nuclear power in the area becomes a real possibility (especially by the pro-nuclear lobby).

The finding that, overall, nuclear power tends to attract less factual and more value-based or polemical coverage reflects the general controversy surrounding the nuclear issue. Furthermore, since controversy is likely to be greater in affected areas, it is consistent that the proportion of polemical coverage should be highest in the affected sample. These trends support Frankena's (1983) assertion that controversy provokes a shift from fact-based to value-based issues in energy policy. Following a similar line of argument, the finding that articles in the affected sample have significantly larger headlines and are significantly longer may have been predicted if it is considered that nuclear power is a more salient and important issue in the 'threatened' localities.

Examination of the development stage of the two technologies reveals that whereas most nuclear articles tend to be concerned either with the before PLI planning stage or with the actual operation of nuclear power stations, most of the articles concerned with alternatives deal with the formative stages of the technology. In this sense, comparing evaluations of the two technologies may not be entirely fair because an extant and operational technology is pitted against one which is as yet largely unimplemented. The relative increase in the before PLI category for nuclear power in the affected sample confirms that a large majority of articles in this sample are concerned with planned new nuclear developments (that is, specifically, a new nuclear power station in the South West or the PWR at Sizewell).

In summary then, the present data provide a fairly consistent and clear-cut picture of nuclear power as it is portrayed in local media coverage. Nuclear power is evaluated negatively, whereas alternatives are very favourably evaluated. Furthermore, compared with alternatives the great weight of 'nuclear' coverage contains polemical or controversial elements. All these trends are exacerbated for the affected sample, where residents are likely to be most receptive to coverage on this issue, and where for presentational reasons (headline size, space) articles are likely to receive more attention.

The relation between press coverage and attitudes to nuclear power

It is important now to relate these findings to public attitudes, and the clear shift towards the antinuclear pole since Three Mile Island in particular (for example, Nealy et al, 1983).

The relation between mass media and public opinion remains a thorny issue. Although it may be true that these are reciprocal sources of influence (Wirth, 1948; Breed, 1955; Murdock, 1974), Lemert (1981) indicates that change in attitude produced by the media may be negligible. However, local newspapers do

represent a significant channel of information serving local communities, especially as certain developments do not always achieve 'national' coverage (as suggested by the decreased coverage in unaffected areas). When the exigency and involvement associated with nuclear power are taken into account, how and even whether nuclear issues are reported may have a critical bearing on local reactions. Thus, the local media may influence attitudes indirectly by determining what is read and made salient—in short, by 'setting the agenda' (McCombs and Shaw, 1972). Making the public aware of the issue by increased coverage may also provoke greater thought and discussion, both of which have been shown to polarise attitudes (for example, Tesser, 1978; Forgas, 1981). Moreover, there is evidence that greater knowledge of nuclear issues can lead to more opposed attitudes because of the increased salience of potentially catastrophic consequences (Clelland and Bremseth, undated). Local media are also likely to provide 'mobilising information' (Lemert et al, 1977; Lemert and Larkin, 1979; Lemert and Cook, 1982) and to form a vital link in the 'two-step flow of communication' by informing 'opinion leaders' (Katz and Lazarsfeld, 1955; Katz, 1957). As such they may be important in arousing local opinion or activity, and this opposition may become newsworthy itself.

These factors suggest that public opinion may bear quite a close relation to local press coverage, especially in the affected communities⁽¹⁾. This is borne out by attitude research. Warren (1981) found that residents were opposed to the construction of a further nuclear power station at Sizewell, and Eiser et al (1985) obtained similar findings in Dorset—those very areas which comprise the affected sample in the present study.

Similarly, the generally negative coverage of nuclear power found here could be related to the growing level of opposition concerning nuclear power nationwide. In this respect, our findings reveal an interesting departure from those of Molotch and Lester (1975). They found that away from the affected area, coverage of the Santa Barbara 'oil spill' became dramatically weighted in favour of the oil industry, and they related this to the 'differential access' of this lobby, and the federal executive, to the news media. Our data suggest that the electricity supply industry, and the national government, both of which strongly back the nuclear option, are far less able to control its image. In the local press at least, the corporate aspirations and the media image of nuclear power seem to have become seriously dislocated. [For more direct evidence of this see Spears et al (1985), where we examine the various sources of evaluation concerning nuclear power and alternatives.] However, there may be significant differences between the local and the national press in the 'manufacture' of news and in the coverage of nuclear power in particular. Specifically, the national media may be more susceptible to the corporate "access to event creating processes" (Molotch and Lester, 1975, page 257). This may be because such organisations, like the national media, tend to be centralised and are established in the 'hierarchy of credibility' (Becker, 1967). These ties are likely to be far less well drawn in the local context, however, where local pressure groups (for example, antinuclear protesters, conservationists) may have equal or even superior access to the press because of their activity in situ. Thus, although certain events may never break the threshold of national newsworthiness, they may often find a responsive local press. For these reasons, it could well be that local press coverage is more closely related to opinion and attitudes than is the national media.

⁽¹⁾A direct examination of the causal relation between attitudes and the editorial policies and coverage of the local press is beyond the scope of the present study. In further research, a more fine-grained analysis of these relationships could be attempted.

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APPENDIX

Example extracts from articles

- (1) Taken from *Eastern Evening News*, Norwich, 1 February 1981
<i>Headline</i>	<i>Evaluation</i>
"Safety warning over nuclear station"	negative, nuclear
<i>Text of article</i>	
S1 "Only near perfect inspections spanning 40 years could ensure the safety needed in a pressurised reactor nuclear power station—the type Sizewell may get."	negative environmental risk (nuclear), negative physical risk (nuclear)
S2 That was today's warning from an all-party committee of MPs.	as above
S3 The CEBG is planning a series of American-style PWRs—and wants to build the first at Sizewell, near Aldeburgh, alongside the existing Magnox Nuclear Station."	no code
- (2) Taken from *Evening News*, Worcester, 1 February 1981
<i>Headline</i>	<i>Evaluation</i>
"Energy plan under fire"	negative, nuclear
<i>Text of article</i>	
S1 "The government's energy strategy was sharply criticised today for putting too much emphasis on nuclear power—and not enough on conservation and coal."	negative, unqualified (nuclear), positive unqualified (alternatives)
- (3) Taken from *Dorset Evening Echo*, 23 February 1981
<i>Headline</i>	<i>Evaluation</i>
"Solar panels heating for swim pool"	neutral
<i>Text of article</i>	
S1 "Swimmers at Bridports Colfox school can look forward to an active summer thanks to a progressive plan to heat their pool through solar panels."	positive, unqualified (alternatives)
S2 The scheme will enable swimmers to use the pool for a maximum period and will overcome the difficulty of trying to heat the water with gas.	positive, technology (alternatives)
S3 Last year, the pool had to be closed down as a result of the combined effects of a breakdown in the existing heating system and the high fuel costs.	no code
S4 The new scheme will ensure heated water for many years to come, with energy worth £1,000 on today's prices being supplied each year free of charge."	positive long-term economic benefits (alternatives)
- (4) Taken from *Mail*, Hartlepool, 26 May 1981
<i>Headline</i>	<i>Evaluation</i>
"'Friend' disputes claims of nuclear power"	negative, nuclear
<i>Text of article</i>	
S1 "I was interested to see claims by the North East Electricity Board that nuclear power is clean, safe, reliable, and cheaper than fossil fuel powered generation (Mail, May 19)	positive physical risk (nuclear), positive technology (nuclear), positive long-term economic benefit (nuclear)
S2 How can something be called clean when there is no satisfactory method of dealing with radio-active waste from nuclear power stations?"	negative environmental risk (nuclear), negative physical risk (nuclear).