Do public programs in ‘energy regions’ affect citizen attitudes and behavior?

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Abstract

In this paper we analyze the effect of regional and municipal measures for promoting energy transition on citizen attitudes and behavior. We compare one township that has successfully implemented a comprehensive and systematic energy-saving program (the so-called e5 program) with a township without such a program. The results indicate that despite the program’s ambitious aims, e5 implementation has almost no impact on citizen attitudes and behavior. In fact, there are some signs that it might even have slight negative side effects.

Keywords: energy efficiency, energy regions, e5 program, environmental awareness

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Introduction

The need to reduce emissions and increase energy efficiency has been voiced repeatedly at several political levels, e.g. on the international and European level, and also on the level of (federal) states, regions and municipalities. More and more communities are engaging in decentralized energy production (Brudermann et al., 2013; Rogers et al., 2008) or striving for energy autarky (Schmidt et al., 2012). Some communities are also forming regional alliances or setting up public initiatives with a view towards raising energy efficiency and promoting greater climate friendliness.

An increasing number of regions in Austria have also become engaged in such initiatives. These initiatives normally emerge bottom-up and are often initiated by local agents/politicians who believe in establishing or supporting a transformation process towards a more sustainable energy future. Subsequent diffusion of such programs to other regions is also quite frequent (Späth & Rohrer, 2010). The common elements of such initiatives are the development of energy strategies and visions, citizen participation, engagement in respective national and international projects, and measures aiming at constraining energy consumption, e.g. subsidization of building refurbishment and loft insulation.

The ‘e5 program for energy efficient municipalities’ represents one such initiative. Originally a local, bottom-up development, it was subsequently adopted by the ministry for the environment. One goal of the ‘e5 program’ is to set up so-called ‘energy regions’. The underlying idea is to strategically promote energy transition by means of mobilizing social actors and coordinating the actions of dispersed agents (Späth & Rohrer, 2010). The e5 program comprises six fields of action and 84 measures. These are designed, on the one hand, to support relevant infrastructure and technologies, and on the other hand, to raise public awareness, promote knowledge transfer and induce appropriate changes in behavior. The six fields of action include (1) regional development planning & spatial planning, (2) municipal buildings & facilities, (3) maintenance & disposal, (4) mobility, (5) internal organization, and (6) communication & cooperation. The program also provides support for the consistent and continuous implementation of energy efficiency measures. To name a few concrete examples, measures involve consumption-based district heating, departure from quantity discounts in water tariffs, information/awareness raising campaigns and events, cooperation initiatives and dialogues between business and schools in the field of energy, different forms of mobility management (e.g. speed reductions, carpooling, park & ride concepts), and promotion of soft mobility (e.g. ‘cyclist of the month’ award, improvement and expansion of cycle paths, bicycle training in schools etc.). Furthermore, energy checks and insulation are actively promoted, and citizens receive financial support for activities undertaken to reduce their energy footprint (e.g. through loft insulation, purchase of PV modules, or use of public transport).

The e5 program also includes a certification framework. The participating municipalities are rated on a 5-point scale; the highest rating (‘5e’) is awarded where 75% of the suggested measures are implemented; the second-best rating (‘4e’) is awarded where at least 62% of the measures are implemented, and so on³.

³ For details, see www.e5-gemeinden.at/index.php?id=20 (website in German, accessed November 16, 2013).

While in most cases such a systematic framework does improve the overall energy efficiency of a participating municipality, the effect on citizens is not yet clear. The research question we want to address is: Do the aims of this program get through to the citizens in respective regions? To what extent does the program affect attitudes? And even more important, does it affect the energy-related behavior of citizens at the end of the day?

The aim of this short communication is to investigate the potential of the objectives stated in the e5 program on the basis of a comparative case study. We compare citizen attitudes and behavior in two small, comparable townships in Styria/Austria, and place the focus on parents of schoolchildren. Both of the townships are regional capitals with 8,000-9,000 inhabitants. One of the townships (town A) heavily engages in energy efficiency measures and is part of the e5 program, and has a rating of '4e'. Town A, in fact, is the best-rated town in the province of Styria. The other township (town B) places no specific focus on changing energy-related behavior, and is not part of the e5 program. We investigated whether and how citizen attitudes and behavior across the two towns differ.

Methods and Case

The study was conducted among parents of school children at three schools in each of the towns (elementary school, secondary school, grammar school) in December 2012. Families are important catalysts for policy intervention strategies (Vaughan, Gack, Solorazano, & Ray, 2003), and therefore parents' reactions to intervention strategies are of particular interest. The questionnaires were handed out and collected during a school parents' evening. Respondents were asked to complete a standardized questionnaire carefully while waiting for individual meetings with teachers; anonymity and confidentiality were guaranteed. In total, 159 people participated in the survey, 98 from Town A and 61 from Town B⁴. The gender distribution was similar in both subsamples and showed an overrepresentation of female respondents (75.5%). Age distribution was also similar in both cities. Respondents in the sample were between 23 years and 60 years old and the average age was 40 years (SD 6.95). Demographic data shows that 32 percent of respondents live in a one or two-person household, 41.5 percent live in a three-person household and 24 percent live in a household of more than three persons. The average number of cars per household is 1.7 in both subsamples. The distance between the two towns is approximately 75km, or one hour by car, with the nearest urban agglomeration, Graz, lying in between. Detailed socio-economic and demographic data is reported in Table 1.

The questionnaire aimed to gather data about energy-related awareness and behavior of citizens. Items concerning energy-related awareness were classified into values, attitudes, social norms, personal norms, perceived behavioral control and intentions. Our classification builds upon the Motivation-Opportunity-Abilities model, a behavioral model that combines motivational variables, contextual variables (including habits and knowledge) and opportunities to act (Ölander & Thøgersen, 1995). Questionnaire items covering behavior include self-perceived energy-related behavior in the household (direct and indirect energy consumption) and environmental-friendly mobility. These particular aspects were selected since they represent activities occurring in normal everyday life. Such items have also been

⁴ In both subsamples, 22 respondents did not directly live in the town, but in near-by communities.

used in related surveys (Schahn, Damian, Schurig, & Fücksle, 1999; Thøgersen & Grønhøj, 2010). They were adjusted here to suit our population of interest. General knowledge about energy-related issues was also cross-checked by means of a small single-choice test.

A standard statistical software package, SPSS 20, was used to analyze the results. In a first step descriptive statistics were used to evaluate response frequencies. Then non-parametric tests were applied to compare the medians (calculated from grouped data) of the observed variables across the two groups – the Mann-Whitney U test for independent ordinal-scaled variables and the Chi-Square test for nominal variables. Additionally, the respective town responses on the knowledge measurement items were converted to numerical scores and compared.

The focus of the analysis was to find out whether the sample in the energy region Township A showed higher energy related awareness and behavior than the comparison sample in town B. In other words: Does the comprehensive policy intervention program run by the town actually have an effect on energy efficiency awareness and respective behavior? Items measuring these aspects were thus analyzed in order to ascertain whether there were any significant differences.

Township A: The ‘energy-aware’ Styrian e5 town

We chose a town with a comprehensive intervention program. Town A has been implementing different kinds of intervention strategies in the fields of energy and mobility for more than 20 years (e.g. promotion of cycling, energy awareness campaigns in schools, household information campaigns, subsidy programs for insulation and alternative energy etc.). In fact, a clear strategy for energy efficiency, together with the necessary measures, was introduced as early as 1996. Today the region exhibits the highest density of private PV installations in the state and 60% of households and industry in town A are connected to the local district heating grid. It is the highest rated member of the e5 program in the state of Styria (level 4 of 5), participates in a number of related EU energy programs (e.g. ‘Energy in Minds’⁵, ‘URBACT II’⁶, ‘viaNova’⁷), and supports the implementation of energy innovations (e.g. passive house office buildings). In fact, some of the implemented measures even exceed the requirements of the e5 standard. The township has received several awards in the field of energy efficiency, e.g. the ‘energy globe award’, a renowned international award for sustainability⁸.

Township B: The ‘average’ Styrian town

As a basis for comparison we selected a town that bears a demographic and socio-economic resemblance to Town A and is at an equal distance from the next urban agglomeration, Graz (approximately 40 minutes by car). The chosen town can be considered an average Styrian town in terms of initiatives aiming at energy saving and climate change issues. While several initiatives and programs are either planned or in place (partly organized by NGOs), no specific focus has been placed on energy saving policies by the municipal government. There

⁵ See www.energy-in-minds.de (accessed November 16, 2013)

⁶ See www.urbact.eu (accessed November 16, 2013)

⁷ See www.eltis.org/index.php?id=13&study_id=810 (accessed November 16, 2013)

⁸ See www.energyglobe.com (accessed November 16, 2013)

is no systematic management framework for such initiatives, and Town B does not participate in the e5 program.

Table 1: Socio-economic makeup of the compared towns and samples

	Characteristics	Town A	Town B
Population (2013 data)	Total	8.920	8.172
	Men	4.249	3.872
	Female	4.671	4.255
Age structure (2009 data)	0-15 years	12.2%	14.3%
	15-29 years	18.9%	17.1%
	30-49 years	28.7%	31.4%
	50-64 years	18.8%	18.7%
	65-84 years	17.7%	15.8%
	>85 years	3.6%	2.7%
Labor force (2011 data)	Labor force participation rate	51.9%	50.6%
	Unemployment rate	4.3%	5.5%
	Retirees	25.0%	24.8%
Labor force per economic sector (2011 data)	Primary sector	0.6%	2.2%
	Secondary sector	37.0%	32.8%
	Tertiary sector	62.4%	65.1%
Highest educational achievement of citizens (aged > 14, 2011 data)	Primary school	26.2%	27.7%
	Apprenticeship/Training	35.9%	34.9%
	Vocational school/college	13.9%	14.1%
	High School	5.0%	4.5%
	Higher vocational school/college	9.6%	8.6%
	Post-secondary	2.3%	2.6%
	University	7.1%	7.6%
Surveyed sample (2012)	Number of respondents	98	61
	Mean age	40.34	40.82
	Mean household size	3.97	3.87
	Mean number of cars in household	1.69	1.70

Data sources: Statistics Austria and Federal Statistics Department Styria ('Landesstatistik Steiermark')

Results and Discussion

A first look at the results indicates that, in general, respondents in our sample report rather high awareness of environmental problems (Table 2). In both towns, respondents strongly agree that lifestyle changes are necessary in order to solve environmental problems. They also report a strong moral obligation to walk or cycle short distances, acknowledge the importance of saving energy (e.g. appliances, low fuel consumption) and experience a positive feeling when saving energy. Legal obligations enforcing the use of renewable energy in new buildings are also supported. As for self-reported behavior (Table 3), it appears that most

respondents always switch off computers when not in use, use a saucepan lid while cooking, and turn on the dishwasher or washing machine only when it is fully loaded. We are of course well aware of the fact that self-reported behavior may not entirely reflect actual behavior. In addition, while our samples are not likely to be representative of the general population, we nevertheless believe that results may be generalized in the sense that they can be used to reflect the behavior of parents of schoolchildren. The data used here was collected in similar settings and both samples consist of parents of schoolchildren. Thus, comparison should at least be feasible.

In a next step, we looked for differences between respondents from Town A and B. We thus tested for significant differences across the two communities with respect to responses concerning items measuring energy awareness and behavior. The majority of grouped median values indicate a higher energy awareness and more energy-efficient behavior for respondents from Town A. However, most of these differences are not statistically significant (Table 2).

Table 2: Awareness-Items – Descriptive Statistics/Mann-Whitney U Test

Awareness-Items		Town A		Town B		asympt. Sign. ^b
		N	Median _a	N	Median _a	
Values	Lifestyle changes are necessary to solve environmental problems	96	1.30	59	1.32	0.803
	Scientific and technical progress will solve many environmental problems	95	2.50	59	3.46	0.004*
Social norms	Many peers are adopting renewable energy sources	96	2.92	60	2.81	0.641
	Saving energy is expected by peers	96	3.59	60	4.11	0.094
Attitudes	Importance of using energy saving appliances	95	1.24	60	1.36	0.154
	Support for legal obligation to use renewable energy in new buildings	96	1.36	60	1.41	0.615
	Importance of low fuel consumption and emissions (when purchasing a car)	96	1.55	60	1.69	0.350
	Importance of driving comfort (when purchasing a car)	96	4.43	59	5.17	0.205
Personal norms	Moral obligation to save energy	94	1.59	58	1.74	0.230
	Moral obligation to walk or cycle short distances	96	1.51	59	1.89	0.034*
	Experience a positive feeling when saving energy	96	1.54	59	1.68	0.412
	Experience a negative feeling when wasting water or energy	96	2.97	59	3.00	0.575
PBC	Saving energy is easy	96	2.75	57	3.03	0.345
	Using public transport instead of car is easy	96	4.63	59	3.89	0.250
	Switching off all appliances (no stand-by) is excessively time-consuming	96	3.19	60	5.00	0.245
	Prefer the car to a good public transport system	96	4.94	59	4.67	0.554

a) 7-point scale (1 fully agree – 7 fully disagree); calculated from grouped data

b) ** p < .01, *p < .05

Across the two samples, two items exhibit statistically significant differences. The first item involves the statement that environmental problems can be solved by scientific and technical progress without a change in lifestyle. Interestingly, the level of approval for this statement was significantly higher (2.5 vs. 3.46 on a 7-point scale, $p=.004<.01$) in the group of respondents from Town A.

The second item refers to the moral obligation to walk or cycle short distances. Respondents from Town A agreed to this statement more strongly (1.51 vs. 1.89 on a 7-point scale, $p=.034<.05$) and therefore appear to perceive a higher moral obligation to walk or go by bike for short distances when compared with respondents from Town B.

However, for the majority of items relating to energy awareness (i.e. values, attitudes, social and personal norms, perceived behavioral control and intention) no significant difference between the two towns was found⁹.

Table 3: Behavior-Items – Descriptive Statistics / Mann-Whitney U Test

Behavior-Items	Town A		Town B		asympt. sign. ^b
	N	Median ^a	N	Median ^a	
Using washing machine at 40° instead of 60°	97	2.05	60	2.46	0.235
Switching off the PC/Laptop when not in use	96	1.35	60	1.20	0.143
Use a lid for the pot while cooking	98	1.33	58	1.52	0.086
Switching off stand-by mode	96	1.85	59	1.74	0.940
Purchasing regional and seasonal food	98	2.10	59	2.12	0.895
Walking or cycling short distances	98	2.41	59	3.42	0.088
Turning on the washing machine/dishwasher only when full	98	1.22	60	1.20	0.780
Prefer to turn on the heating than put on warmer clothes	97	3.29	60	3.86	0.419
Decorate the house with Christmas lighting	98	5.45	59	6.22	0.088

a) 7-point scale (1 always – 7 never); calculated from grouped data

b) * $p < .05$

Table 3 shows the results of the analysis of energy-related behaviors in the two municipalities. The tested items do not exhibit a statistically significant difference. While the felt higher moral obligation to walk or cycle short distances appears to show up in the more frequent use of these modes in Town A, the difference remains statistically insignificant ($p=.088$). Only when respondents from the surroundings of the towns were excluded from the sample, did significantly more people from Town A report cycling or walking short distances instead of driving ($p=.045<.05$).

⁹ On excluding people who live in nearby communities, one additional item was found which revealed statistically significant differences. According to the analysis, respondents from Town A report that it is more difficult to always switch off all electrical appliances completely (2.86 vs. 5.33 on a 7-level scale, $p=.034<.05$).

We also asked respondents about their most commonly used means of transport. Everyday mobility behavior was not significantly different between the ‘energy region’ Town A and Town B (car use 78% vs. 73%, bicycle 25% vs. 23%, walk 28% vs. 25%). Responses regarding holiday travel mode unexpectedly suggested the presence of more energy-friendly travel behavior in Town B (car 74.7% vs. 80.0%, public transport 8.8% vs. 16.4%, airplane 28.6% vs. 18.2%), but again, these differences were not significant ($p > .05$). The Chi-square test revealed that both samples were similar with respect to the most commonly used mode of transport.

Respondents were also asked whether they purchase green electricity. While as many as 38.7% of the respondents from Town A stated that they bought green electricity, the number was only 13.8% in Town B. On the other hand, 41% of the respondents in Town B did not even know whether they obtained green electricity or not. The respective figure for Town A was only 23.7%. These differences were found to be significant in a Chi-square test ($p = 0.003$, $\chi^2 11.752$ ($df = 2$)). The results of the multiple choice test, which aimed at testing general knowledge concerning questions relating to energy, did not yield significant differences between the two towns¹⁰.

Conclusion and Policy Implications

The reported results underline how difficult it is to change attitudes and habits. Even substantial effort may fail to bring about a desirable response, at least over the short run. There is no doubt that policies such as e5 implementation generate positive effects. However, this is still no reason for blind optimism. As the results of this study indicate, program implementation is not necessarily accompanied by large-scale change in underlying attitudes. In fact, one continuing area of concern is the possibility that implementation of such programs may backfire in that it generates a false sense of security among participants. For example, it was interesting to find that respondents from the e5 town were willing to place more trust in technical solutions, and saw less need for behavior changes. A similar observation was made in a study of farmers. The perceived need for a change in behavior differed depending on whether the farmer was an adopter of PV or not (Brudermann et al., 2013). Thus, energy efficiency initiatives might unintentionally communicate that as a lot is already being done, there is no further need for individual effort with respect to energy saving. This appears to be a problematic side effect of programs that promote technological progress, even if they do not explicitly communicate technology-only solutions. For policy makers it is therefore crucial that specific focus be placed on carefully integrating awareness raising policies into technical and structural interventions, instead of merely adopting a series of individual approaches in isolation. To date, the latter approach has not been particularly successful (Burgess, Harrison, & Filius, 1998; Kollmuss & Agyeman, 2002).

Another shortcoming of many energy efficiency programs in general, and of the e5 program in particular, is the lack of measurement with respect to the behavioral reactions associated with interventions. So far, the main focus has been on establishing or conducting ‘technical’

¹⁰ The small test involved six questions each with three possible answers. One point was gained for each correct answer, and minus one point for each wrong answer, entailing possible scores between -6 and +6. On average, respondents from Town A scored 2.77 points, and respondents from Town B scored 2.56 points.

measures in order to assess the effectiveness of policy intervention. The degree to which the interventions influence the general public and how they affect awareness is usually not part of the control process. In order to avoid possible unintended side effects and to help maximize the benefits of interventions, we recommend measuring the impact on citizen behavior, as has been suggested by Gatersleben, Steg, & Vlek (2002), Steg & Vlek (2009) and Revell (2013), and integrating respective feedback loops into the framework. Where interventions are found to fail in generating the desired behavioral effect, they need to undergo redesign. However, we also have to keep in mind that behavior change requires time and that the impact of several types of policy intervention may only become visible after a certain period of time has lapsed. Clearly, setting up initiatives such as the e5 program is not likely to be an easy task and taking behavioral aspects into consideration will certainly make it even more challenging.

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