
Supplementary information

The interaction of descriptive and injunctive social norms in promoting energy conservation

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Supplementary Information

Supplementary Methods

The English (and Italian) versions of the randomized norm primes are as follows:

- Descriptive prime: Are you reducing energy consumption in your house? More than 80% of [name of utility] customers take actions in order to save energy. Even little deeds can have a large impact. Discover our tips to consume less and better. [*Italian version: Stai migliorando i consumi di casa tua? Più dell'80% dei clienti [name of utility] compie azioni volte a risparmiare energia. Anche un piccolo gesto può avere un grande impatto. Scopri i consigli per consumare meno e meglio.*]
- Injunctive prime: Is saving energy important to you? For more than [name of the utility] customers saving energy is an important value. Even little deeds can have a large impact. Discover our tips to consume less and better. [*Italian version: Risparmiare energia è importante per te? Per più dell'80% dei clienti [name of utility] risparmiare energia è un valore importante. Anche un piccolo gesto può avere un grande impatto. Scopri i consigli per consumare meno e meglio.*]

The eHER including the randomised primes is shown in Supplementary Figure 1.

Supplementary Note 1

Supplementary Table 1 shows sample balance statistics across customers assigned to the programme and control ones (Columns 1 to 4). In Columns 5 and 6, we compare customers assigned to receive the descriptive and injunctive primes, respectively. Overall, we find that the experimental samples are balanced along most of the characteristics considered, except for the geographical distribution in the North-East, where there are slightly more treated than control customers ($p = 0.064$).¹ The inclusion of individual fixed-effects as controls in all regression specifications run on panel data should deal with any issue related to unbalanced covariates.

We also check the balance across sub-groups of customers who received different environmental (November-December 2017) and normative (April-May 2018) primes. This results in a 2x2 design. In Supplementary Table 2 we report the means in the four sub-samples, the F-statistic and p-value of a test of joint significance (this comes from a regression where the observable is the dependent variable and the three sub-treatment dummies are the independent variables). All sub-groups appear balanced. The sample is represented by customers who received the eHERs augmented with the environmental (or placebo) and normative prime (descriptive vs injunctive). The sample differs with respect to the one who received the descriptive ($N = 127,899$) and the injunctive ($N = 128,588$) prime. In particular, 2,317 (1.8%) and 2,423 (1.9%) customers in the descriptive and injunctive arms did not receive the environmental prime, respectively. The difference in shares is not statistically significant ($p = 0.172$). The exclusion of

¹An overview of the geographical distribution of the the utility's customers is provided in Supplementary Figure 2.

these customers leads to a final sample size for this analysis of 251,747 (125,582 descriptive, 126,165 injunctive).

These results on randomization balance reassure us that the internal validity of the impact evaluation and of our experimental test is guaranteed. Issues related to the presence of eligibility criteria for receiving a report may, however, affect the external validity of results.

Supplementary Note 2

Main and heterogeneous impact of the programme on electricity usage are shown in Supplementary Table 3. Overall, receiving the eHER reduces electricity use by 0.35% compared to the control group (Column 1). High intensity users are more responsive than low ones to the programme (Column 2). The average treatment effect, but not the impact on high users, decreases if we consider the first two years of the programme. The results however are not robust if we adjust for multiple comparisons computing the sharpened two-stage q-values, proposed by⁴⁰ and reported in square brackets.

In Supplementary Table 4 we test the robustness of the impact of the programme on electricity usage when we restrict the sample to customers, for whom we have information on geographical location, and obtain similar results.

Supplementary Tables 5, 6, 7 show the average treatment effects over different time horizons, namely over the first 30, 36 and 42 months of the programme. We confirm that, while the average impact of the programme decreases over time and loses statistical significance after 36 months, the treatment effect on high users remains marginally significant ($p < 0.1$) even after controlling for multiple hypothesis.

Supplementary Table 8 reports LATE estimates of open and click along the extensive and intensive margin. Treatment effects are stronger for customers who open (+40% with respect to the ATE) and click (+294%) on the eHER. The contribution of opening one additional report, as a consequence of the treatment, is a reduction in electricity consumption of 0.1%. These results hold regardless of the proxy of engagement used.

Supplementary Table 9 shows the impact of different injunctive feedback dynamics. The treatment is correlated with larger decreases in consumption among customers whose feedback category is upgraded with respect to the previous report, relative to users whose category remains unchanged between reports. Similarly, consumption increases, relative to the reference category, for treated customers who are downgraded between reports. These patterns are confirmed when we examine users in each injunctive feedback category separately. While these results are correlational and affected by endogeneity, they suggest that the impact of the injunctive feedback is magnified when it is accompanied by a change in feedback category. This may be due to the fact that such changes draw greater attention on the report, or because an upgrade is perceived as a reward for previous conservation efforts (and viceversa for a downgrade).

Supplementary Note 3

We begin by providing a justification for the RDD approach adopted in the main text. Supplementary Table 10 shows individual correlates of users' injunctive feedback category in the April-May 2018 eHER. Baseline consumption is negatively correlated with the probability of receiving 3 and 2 thumbs-up. The opposite holds for the relationship between baseline consumption and the likelihood of being in the lowest feedback category.

To bring empirical support for the RD identification assumption, we check for the presence of a jump in the density of the running variable at the thresholds. Panel A of Supplementary Table 11 reports the p-value of the non-parametric density estimator based on local polynomial techniques⁴⁵. The test does not reject the null hypothesis that the density of customers is continuous at the 3 vs. 2 thumbs-up cut-off (Column 1) and 2 vs. 1 thumbs-up one (Column 3)². In both exercises the sample is represented by customers who received the eHER augmented with the normative prime and received either three versus two thumbs-up (Columns 1 and 2) or two versus one thumbs-up (Columns 3 and 4).

The validity of the identifying assumption that pre-treatment covariates are continuous at the cut-off⁴² is tested following the procedure suggested by the literature⁴⁶. This procedure allows to test the null hypothesis of continuity of covariates at the cut-off both individually and jointly using Cramér Von Mises test statistic. Panel B of Supplementary Table 11 reports the p-values from such tests for our set of pre-determined covariates at the 3 vs. 2 thumbs-up (Column 1) and 2 vs. 1 thumbs-up (Column 3) cut-offs, respectively. For each test, the effective number of observations used is reported in Columns 2 and 4³. We do not reject the null hypothesis of continuity for most covariates and in the joint tests for the 3 vs. 2 cut-off and for all variables in the 2 vs. 1 cut-off. The null of continuity is rejected for three geographic dummies (Center, South and Islands) for the 3 vs. 2 thumbs-up cut-off.

Table 1 reports the main RD results. While there are no statistically significant changes in the effect of the eHER when crossing the threshold between one and two thumbs-up (Panel B), the discrete shift in the injunctive norm reduces electricity use when moving from two to three thumbs-up (Panel A). These results are robust to different estimate types (conventional or bias corrected), different bandwidth selection strategies (see Methods) and MHT correction.

Supplementary Table 12 shows RD estimates on the likelihood of opening and clicking the eHER augmented with the normative prime in the two months following its receipt. We observe no changes in the likelihood of opening the augmented eHER across any of the thresholds: this is reassuring, as the injunctive feedback categories are observable only once the eHER is opened, so changes in the eHER content should not affect open rates. The likelihood of clicking on the eHER also does not vary across feedback categories. This result is important, as it suggests that we can attribute to the social information

²The test is implemented using the `rddensity` package using the default values. In particular the following features are applied: local quadratic approximation, triangular kernel, optimal bandwidth selection implying two distinct bandwidths at the left and right of the cut-offs, reported in Columns 2 and 4.

³The test is implemented using the `rdperm` Stata package, using the default values as for the (same) number of effective observations from either side of the cut-off and the number of random permutations⁴⁶.

the impact of the injunctive feedback on consumption that we find. Indeed, the eHER that we study only features the neighbour comparison, while electricity saving tips can be accessed by clicking on the report to be directed to the utility's portal.

Supplementary Table 13 shows RD estimates over longer time horizons, namely six and twelve months from the prime. These results demonstrate the persistence of the effect of strengthening the injunctive feedback across the 3 vs. 2 threshold, particularly in combination with the descriptive prime.

Supplementary Note 4

Regression analysis of the main impact of the prime on electricity usage (Column 1) and of its heterogeneous effect by number of thumbs-up is presented in Table 3. Overall, the descriptive and injunctive primes have no differential effect on consumption in the following 3 months. This result masks heterogeneity by injunctive feedback category: users receiving three thumbs-up reduce consumption significantly more when exposed to the descriptive than to the injunctive norm prime. The effect is persistent over six, twelve and 18 months (Supplementary Table 14). This result, while influenced by selection bias in the assignment of thumbs-up, suggests that the overall impact of the descriptive prime on low users is consistent with the local effect that we obtain through the RD estimation by normative prime treatment, reported in Table 1. This result is robust to adjustments for multiple hypothesis testing.

Figure 5 shows further heterogeneity analysis of the effect of the descriptive prime with respect to the injunctive one, i.e., the coefficient attached to *Descr_Norm*Post* in equation 3, on electricity savings. The exercise is done on different sub-samples combining i) the number of thumbs-up received in the augmented eHER; ii) whether the injunctive feedback category is the result of an up- or downgrade relative to the previous report. Results show that the prime is most effective on customers receiving three thumbs-up when they represent an upgrade from the previous report.

Supplementary Note 5

The impact of the normative prime is assessed on a sample of 256,487 customers. We received the list of customers who were sent the augmented eHER from Opower. This sample is about 73% of those potentially eligible to receive the report at that time, which we compute starting from the sample of customers assigned to the programme and with available information on the geographical location (N = 413,113); excluding customers who left the utility before March 2018 (the month before the launch of the augmented eHER), equal to about 15.7% of the sample; and ending up with a set of eligible customers equal to 348,131. We analyze the correlates of receiving the augmented eHER in Supplementary Table 15. We find that customers with zero consumption and who opted out of the programme before April 2018 are significantly less likely to receive the augmented eHER. This analysis reveals that the normative prime experiment sample is somehow selected, which affects the external validity of the results. However, the internal validity is preserved.

Analysis of attrition is done in Supplementary Table 16. Attrition is not differential by treatment status in all time horizons. After the first year, attriters have on average lower pre-treatment usage, are more

likely to live in smaller municipalities and in the North.

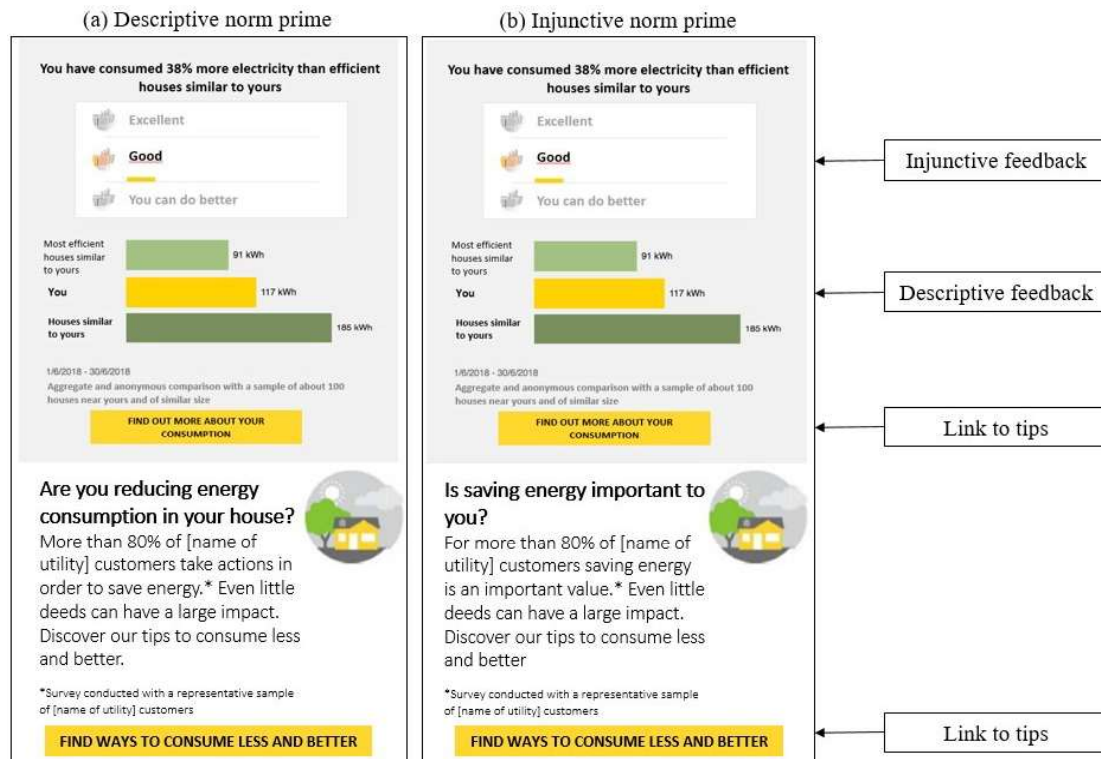
Supplementary Note 6

While implementing our main RD analysis on the augmented eHER allows us to conduct the RD analysis and the analysis of the impact of the primes on the same sample of customers, it leaves open the possibility that the overall RD results that we obtain are driven by the presence of the normative primes within the April-May 2018 eHER. To test the robustness of the RD in the absence of the primes, we repeat the RD estimation on the February-March 2018 eHER, i.e., on a standard report. We find support for the RD identification assumption (Supplementary Table 17) and similar estimation results, although the 3 vs. 2 threshold effect is smaller in magnitude (Table 2).

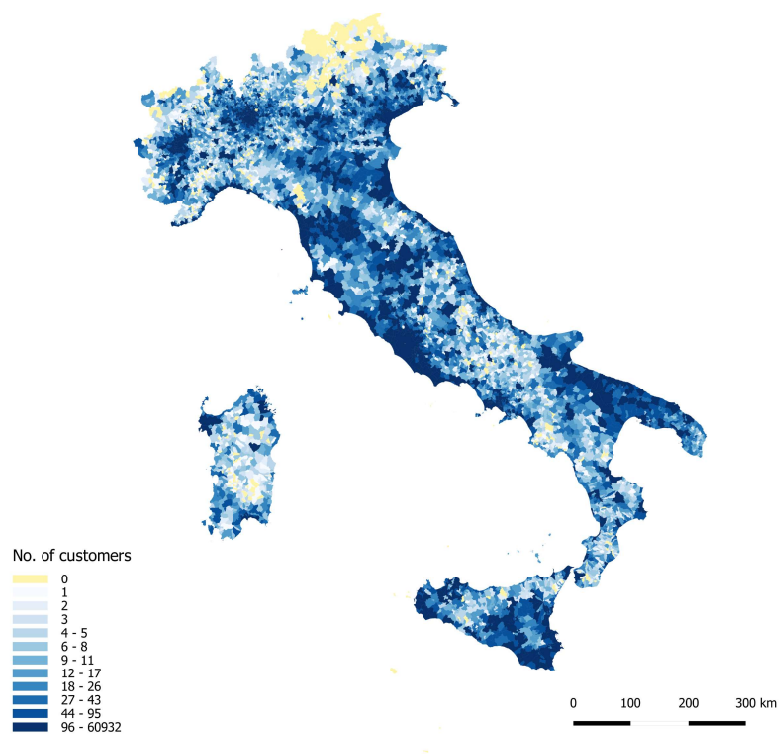
We also check that our main results are not due to the impact of the environmental identity prime administered to the same sample in November-December 2017. Supplementary Table 18 reports the impact of the descriptive prime, relative to the injunctive one, across customers who were exposed to the eHER augmented with the environmental identity prime: we find no interaction effects.⁴

⁴The effect of the environmental prime alone on consumption was limited and restricted to a specific sub-sample of customers¹⁹.

Supplementary Figures



Supplementary Figure 1. Home Energy Report and Randomized Norm Prime. Layout and content of a Home Energy Report for a user receiving the descriptive norm prime (a) and a user receiving the injunctive norm prime (b). Credit: Copyright 2016-2020 Oracle. All rights reserved



Supplementary Figure 2. Distribution of customers included in the trial across Italian municipalities. The scale of colors indicates deciles of the distribution of the number of customers included in the trial within each municipality.

Supplementary Tables

	Program	Control	Diff	p-value	Descr	Inj	Diff	p-value
N. observations	418,178	46,345			127,899	128,588		
Attriter after program start	0.215	0.215	0	0.882				
Attriter after augmented eHER					0.058	0.059	-0.001	0.353
Average pre-treat usage	6.35	6.358	-0.008	0.66	7.025	7.019	0.006	0.645
Population municipality	0.471	0.472	-0.001	0.744	0.499	0.498	0.001	0.86
North-West	0.29	0.287	0.002	0.292	0.298	0.298	-0.001	0.738
North-East	0.122	0.119	0.003	0.071	0.122	0.122	0	0.763
Centre	0.319	0.322	-0.003	0.191	0.325	0.325	-0.001	0.745
South	0.196	0.197	-0.002	0.393	0.186	0.186	0	0.828
Islands	0.073	0.073	-0.001	0.647	0.07	0.069	0.001	0.26
1 Thumbs-up					0.488	0.489	-0.001	0.645
2 Thumbs-up					0.36	0.361	-0.001	0.777
3 Thumbs-up					0.152	0.151	0.001	0.307

Notes: The table reports means in treatment sub-samples and p-values from two-sided t-tests. Population of municipality is in million, pre-treatment usage refers to the period July 2015-June 2016 and is expressed in KWh/day. Attriter after Genius identifies customers of whom we stop observing usage between July 2016 and August 2018. Attriter after augmented eHER identifies customers of whom we stop observing usage between April 2018 and August 2018. The sample of customers for which information on population and geographical location are available is 458,922 (413,113 program and 45,809 control).

Supplementary Table 1. Descriptives and balance tests

	No Env + Inj	Env+ Inj	No Env+ Descr	Env+ Descr	F-stat	p-value
N.observations	63,188	62,977	62,744	62,838		
Average pre-treat usage	7.023	7.016	7.026	7.027	0.111	0.954
Population	0.497	0.493	0.498	0.495	0.488	0.69
North-West	0.299	0.297	0.298	0.297	0.446	0.72
North-East	0.121	0.123	0.124	0.12	1.738	0.157
Centre	0.324	0.326	0.324	0.326	0.38	0.768
South	0.188	0.184	0.185	0.187	1.419	0.235
Islands	0.068	0.069	0.069	0.07	0.631	0.595
1 Thumbs-up	0.488	0.488	0.487	0.489	0.239	0.869
2 Thumbs-up	0.361	0.361	0.361	0.359	0.123	0.946
3 Thumbs-up	0.151	0.151	0.153	0.152	0.396	0.756

Notes: The table reports the means of the observable characteristics across sub-treatment samples, the F-stat for joint significance and p-values from regressions where each of the observable characteristic is regressed on sub-treatment dummies. Population of municipality is in million, pre-treatment usage refers to the period July 2015-June 2016 and is expressed in KWh/day.

Supplementary Table 2. Descriptives and balance tests

	(1)	(2)	(3)	(4)	(5)	(6)
	Electricity usage					
	12-months impact			24-months impact		
Post	0.089 (0.121)	5.181*** (0.317)	3.666*** (0.179)	0.642*** (0.125)	7.650*** (0.309)	5.252*** (0.188)
Prog*Post	-0.353*** (0.113)	-0.211 (0.333)	-0.212 (0.177)	-0.298** (0.116)	-0.186 (0.334)	-0.193 (0.187)
			[0.536]			[0.824]
Post*Pre-treat usage		-0.801*** (0.054)			-1.129*** (0.052)	
Prog*Post*Pre-treat usage		-0.020 (0.057)			-0.025 (0.057)	
Post*Pre-treat usage Q2			-2.637*** (0.246)			-3.291*** (0.249)
Post*Pre-treat usage Q3			-4.487*** (0.247)			-5.765*** (0.259)
Post*Pre-treat usage Q4			-7.150*** (0.346)			-9.915*** (0.355)
Prog*Post*Pre-treat usage Q2			0.064 (0.258)			0.092 (0.261)
			[0.870]			[1]
Prog*Post*Pre-treat usage Q3			0.109 (0.260)			0.059 (0.272)
			[0.870]			[1]
Prog*Post*Pre-treat usage Q4			-0.698* (0.364)			-0.740** (0.373)
			[0.284]			[0.235]
Constant	123.4*** (0.098)	123.4*** (0.097)	123.4*** (0.097)	123.6*** (0.101)	123.6*** (0.100)	123.6*** (0.100)
Observations		11,671,631			16,441,876	
R-squared	0.069	0.071	0.071	0.067	0.070	0.069
N. of customers	464,523	464,523	464,523	464,523	464,523	464,523

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015-June 2016. All specifications include customer fixed effects and month by year fixed effects. Reference periods for the analysis: July 2015- August 2017 (12-months impact); July 2015- August 2018 (24-months impact). Standard errors clustered at the customer level in parentheses and FDR-adjusted q-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 3. Impact of the program on electricity usage, main and heterogeneous effects

	(1)	(2)	(3)	(4)
		Electricity usage		
	12-months impact		24-months impact	
Post	0.080 (0.122)	3.660*** (0.180)	0.637*** (0.126)	5.251*** (0.189)
Program*Post	-0.361*** (0.114)	-0.208 (0.178)	-0.319*** (0.117)	-0.202 (0.188)
Program*Post*Pre-treat usage Q2		0.065 (0.258)		0.092 (0.262)
Program*Post*Pre-treat usage Q3		0.082 (0.261)		0.045 (0.274)
Program*Post*Pre-treat usage Q4		-0.722** (0.367)		-0.779** (0.376)
Constant	123.4*** (0.098)	123.4*** (0.098)	123.5*** (0.101)	123.6*** (0.100)
Observations	11,538,961	11,538,961	16,267,241	16,267,241
R-squared	0.069	0.071	0.067	0.070
Number of customers	458,922	458,922	458,922	458,922

Notes: The sample is restricted to customers for whom information on population and geographical location is available. The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015- June 2016.

Columns 2 and 4 include interactions between Post and pre-treatment quartiles. All specifications include customer fixed effects and month by year fixed effects. Reference periods for the analysis: July 2015- August 2017 (12-months impact); July 2015- August 2018 (24-months impact). Standard errors clustered at the customer level in parentheses; *** p<0.01, ** p<0.05,

* p<0.1.

Supplementary Table 4. Impact of the program on electricity usage, main and heterogeneous effects, robustness check

	(1)	(2)	(3)
	Electricity usage 30-months impact		
Post	0.693*** (0.112)	5.477*** (0.279)	4.076*** (0.159)
Prog*Post	-0.211** (0.098)	0.081 (0.301)	0.007 (0.154)
Prog*Post*Pre-treat usage		-0.049 (0.051)	[1]
Prog*Post*Pre-treat usage Q2			-0.110 (0.220)
Prog*Post*Pre-treat usage Q3			[1] -0.091 (0.228)
Prog*Post*Pre-treat usage Q4			[1] -0.742** (0.312) [0.075]
Constant	123.7*** (0.102)	123.7*** (0.101)	123.7*** (0.101)
Observations		17,844,914	
R-squared	0.066	0.068	0.068
Number of customers	464,523	464,523	464,523

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015- June 2016. Columns 2 and 3 include interactions between Post and pre-treatment usage and pre-treatment usage quartiles, respectively. All specifications include customer fixed effects and month by year fixed effects. Reference periods for the analysis: July 2015- December 2017 (30-months impact); July 2015- August 2019 (36-months impact); July 2015- December 2019 (42-months impact) . Standard errors clustered at the customer level in parentheses and FDR-adjusted q-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 5. Impact of the program on electricity usage, main and heterogeneous effects, 30-months impact

	(1)	(2)	(3)
	Electricity usage 36-months impact		
Post	0.747*** (0.107)	3.633*** (0.325)	2.856*** (0.145)
Prog*Post	-0.103 (0.089)	0.321 (0.340)	0.108 (0.135) [0.777]
Prog*Post*Pre-treat usage		-0.067 (0.057)	
Prog*Post*Pre-treat usage Q2			-0.122 (0.203) [0.777]
Prog*Post*Pre-treat usage Q3			-0.112 (0.204) [0.777]
Prog*Post*Pre-treat usage Q4			-0.619** (0.281) [0.125]
Constant	123.8*** (0.102)	123.8*** (0.102)	123.8*** (0.102)
Observations		20,404,260	
R-squared	0.062	0.062	0.062
Number of customers	464,523	464,523	464,523

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015- June 2016. Columns 2 and 3 include interactions between Post and pre-treatment usage and pre-treatment usage quartiles, respectively. All specifications include customer fixed effects and month by year fixed effects. Reference periods for the analysis: July 2015- December 2017 (30-months impact); July 2015- August 2019 (36-months impact); July 2015- December 2019 (42-months impact) . Standard errors clustered at the customer level in parentheses and FDR-adjusted q-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 6. Impact of the program on electricity usage, main and heterogeneous effects, 36-months impact

	(1)	(2)	(3)
	Electricity usage 42-months impact		
Post	0.791*** (0.108)	2.620*** (0.353)	2.330*** (0.146)
Prog*Post	-0.038 (0.090)	0.432 (0.367)	0.183 (0.136) [0.366]
Prog*Post*Pre-treat usage		-0.074 (0.061)	
Prog*Post*Pre-treat usage Q2			-0.140 (0.208) [0.555]
Prog*Post*Pre-treat usage Q3			-0.092 (0.205) [0.555]
Prog*Post*Pre-treat usage Q4			-0.649** (0.283) [0.096]
Constant	123.9*** (0.103)	123.9*** (0.103)	123.9*** (0.103)
Observations		21,562,846	
R-squared	0.062	0.062	0.062
Number of customers	464,523	464,523	464,523

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015- June 2016. Columns 2 and 3 include interactions between Post and pre-treatment usage and pre-treatment usage quartiles, respectively. All specifications include customer fixed effects and month by year fixed effects. Reference periods for the analysis: July 2015- December 2017 (30-months impact); July 2015- August 2019 (36-months impact); July 2015- December 2019 (42-months impact). Standard errors clustered at the customer level in parentheses and FDR-adjusted q-values in brackets;

*** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 7. Impact of the program on electricity usage, main and heterogeneous effects, 42-months impact

	(1) Opened at least once OLS	(2) N. of eHER opened OLS	(3) Clicked at least once OLS	(4) N. of eHER clicked OLS	(5) Mean electricity usage OLS	(6) IV
Program	0.712*** (0.001)	3.781*** (0.007)	0.339*** (0.001)	0.664*** (0.002)	-0.332*** (0.117)	
Opened at least once						-0.466*** (0.164)
N. of eHER opened						-0.088*** (0.031)
Clicked at least once						-0.978*** (0.344)
N. of eHER clicked						-0.500*** (0.176)
Observations	464,523	464,523	464,523	464,523	464,523	464,523
R-squared	0.222	0.113	0.080	0.054	0.842	0.842
F-stat	439,858	169,040	88,892	52,555		
Mean Dep Var	0.641	3.403	0.305	0.597		

Notes: Columns 1 to 4 report the OLS first stage regressions: the program dummy is regressed on the variables in the heading. The unconditional mean of the dependent variable and the F-stat of the first stage regressions are reported at the bottom of the table. Column 5 reports the Intention to Treat Effect (ITT) of the program on energy usage. Column 6 reports the Local Average Treatment Effect (LATE) of engagement variable on mean electricity usage, via Instrumental Variable (IV). Each cell is estimated separately. In columns 5 and 6 the dependent variable is the mean daily electricity usage (KWh) in the two years following the launch of the program, normalized by average control group consumption in the Post period. All dependent variables are calculated over the entire period monitored. All specifications include pre-treatment electricity usage. Pre-treat usage is calculated as the average daily electricity usage in a month, over the period July 2015- June 2016. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 8. LATE of open and click on electricity usage

	(1)	(2)	(3)	(4)
	Average electricity usage in the three months following the eHER			
	All	1 Thumbs-up	2 Thumbs-up	3 Thumbs-up
Switch-up	-1.346*** (0.048)		-8.614*** (0.077)	-7.284*** (0.093)
Switch-down	3.572*** (0.053)	10.819*** (0.096)	5.111*** (0.079)	
Order of the report	-1.560*** (0.075)	1.400*** (0.167)	-0.971*** (0.100)	-2.705*** (0.087)
Constant	115.6*** (0.119)	145.0*** (0.257)	94.7*** (0.164)	64.8*** (0.224)
Observations	2,569,355	1,253,199	911,663	404,493
R-squared	0.094	0.122	0.139	0.098
Number of customers	360,969	238,722	233,958	128,520

Notes: The dependent variable is the average daily electricity usage (KWh) in the three month following the receipt of each eHER, normalized by average control group consumption in the Post period. The analysis includes months when the eHER was received and customers who received at least two. Switch-up is a dummy equal to one if the customer improved her performance with respect to the previous eHER, e.g. passes from 2 to 3 Thumbs-up. Switch-down is a dummy equal to one if the customer worsened her performance with respect to the previous eHER, e.g. passes from 2 to 1 Thumbs-up. The omitted category is "no-switch". Order of the report indicates the ordinal number of each report. Column 1 presents the results for the entire sample, while in Columns 2 to 4 the exercise is repeated across different thumbs-up categories. All specifications include customer fixed effects and month by year fixed effects. Standard errors clustered at the customer level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 9. Program impact by upgrades and downgrades in injunctive feedback category

	(1) 3 Thumbs-up	(2) 2 Thumbs-up	(3) 1 Thumbs-up
Average pre-treat usage	-0.044*** (0.000)	-0.042*** (0.000)	0.086*** (0.000)
Population of municipality	0.001 (0.001)	0.002* (0.001)	-0.003*** (0.001)
North-West	-0.059*** (0.003)	-0.074*** (0.004)	0.133*** (0.004)
North-East	-0.032*** (0.003)	-0.037*** (0.004)	0.069*** (0.004)
Centre	-0.045*** (0.003)	-0.069*** (0.004)	0.114*** (0.004)
South	-0.041*** (0.003)	-0.052*** (0.004)	0.093*** (0.004)
Constant	0.503*** (0.003)	0.711*** (0.004)	-0.214*** (0.004)
Observations	256,487	256,487	256,487
R-squared	0.169	0.086	0.332

Notes: The dependent variable takes the value of one if the customer received 3 Thumbs-up (column 1), 2 Thumbs-up (column 2), 1 Thumbs-up (column 3) feedback in the eHER sent in April-May 2018 and 0 otherwise. Population of municipality is in million, pre-treatment usage refers to the period July 2015-June 2016 and is expressed in KWh/day. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The unit of analysis is the household.

Supplementary Table 10. Determinants of the injunctive message (n. of thumbs)

	3 vs. 2 Thumbs-up		2 vs. 1 Thumbs-up	
	p-value	Eff. N obs	p-value	Eff. N obs
<i>Panel A</i>				
RD Manipulation Test (local polynomial density)	0.710	17,344/17,120	0.420	19,834/20,342
<i>Panel B</i>				
Average pre-treat usage	0.34	515	0.76	1133
Population of municipality	0.35	606	0.4	1506
North-East	0.19	606	0.45	1506
North-West	0.74	606	0.89	1506
Centre	0.03	606	0.13	1506
South	0.02	606	0.27	1506
Islands	0.03	606	0.79	1506
Joint Test - cvm statistic	0.31	515	0.73	1132
Joint Test - Max statistic	0.86	515	0.49	1132

Notes: Panel A reports the p-value of the non-parametric density estimator based on local polynomial techniques⁴⁵. The null hypothesis is that the density of customers is continuous at the 3 vs. 2 Thumbs-up cut-off (column 1) and 2 vs. 1 Thumbs-up (column 3). The test is implemented using the `rddensity` package using the default values. In particular the following features are applied: local quadratic approximation, triangular kernel, optimal bandwidth selection implying two distinct bandwidths at the left and right of the cut-offs, reported in columns 2 and 4. In both exercises the sample is represented by customers who received the eHER augmented with the normative prime and received either 3 or 2 Thumbs-up symbol (columns 1 and 2) [N=132,168] or 2 or 1 Thumbs-up symbol (columns 3 and 4) [N=219,170]. Panel B reports the p-values from the test of the continuity of the distribution of pre-determined covariates at the 3 vs. 2 Thumbs-up (column 1) and 2 vs. 1 Thumbs-up (column 3) cut-off⁴⁶, respectively. For each test the effective number of observations used is reported in columns 2 and 4. The null hypothesis is that the distribution of covariates is continuous at the threshold. The test is implemented using the `rdperm` package⁴⁶ using the default values as for the (same) number of effective observations from either side of the cut-off and the number of random permutations.

Supplementary Table 11. Manipulation density test at the cut-offs and continuity of the distribution of pre-determined covariates

	(1)	(2)	(3)	(4)	(5)	(6)
	Open eHER in the following 2 months			Click eHER in the following 2 months		
	All	Descr	Inj	All	Descr	Inj
<i>Panel A: 3 vs. 2 Thumbs-up</i>						
Conventional	0.003	-0.009	0.015	-0.005	-0.004	-0.005
	-0.008	-0.011	-0.011	-0.004	-0.006	-0.006
Robust bias-corrected	0.003	-0.009	0.016	-0.005	-0.003	-0.006
	-0.008	-0.011	-0.011	-0.004	-0.006	-0.006
Observations	130,466	65,091	65,305	130,466	65,091	65,305
BW above	43.19	41.54	47.56	48.41	47.36	44
BW below	43.19	41.54	47.56	48.41	47.36	44
Effective n. obs above	45,658	21,668	25,267	30,969	25,108	23,457
Effective n. obs below	29,250	14,245	15,241	51,564	15,352	14,740
<i>Panel B: 2 vs. 1 Thumbs-up</i>						
Conventional	0.004	0.007	-0.000	0.000	-0.007	0.007
	(0.007)	(0.009)	(0.009)	(0.004)	(0.005)	(0.006)
Robust bias-corrected	0.005	0.009	0.001	0.002	-0.006	0.009
	(0.007)	(0.009)	(0.009)	(0.004)	(0.005)	(0.006)
Observations	216,328	107,729	108,477	216,328	107,729	108,477
BW above	50	54.28	53.09	43.42	52.98	49.27
BW below	50	54.28	53.09	43.42	52.98	49.27
Effective n. obs above	49,838	31,197	26,316	44,298	30,558	28,768
Effective n. obs below	58,132	26,590	30,754	50,868	26,059	24,670

Notes: This table conducts regression discontinuity estimation of the probability of opening and clicking the eHER augmented with the normative prime in the two months following its receipt around the 3 vs. 2 Thumbs-up (Panel A) and 2 vs. 1 Thumbs-up (Panel B). Estimations in Columns 1 and 4 are on the whole sample, in Columns 2 and 5 are on the sample of customers receiving the descriptive norm prime, in Columns 3 and 6 are on the sample of those receiving the injunctive norm prime. The first row shows the conventional RD estimate, while the second corrects for bias. Bandwidths are selected minimizing the mean squared error (MSE). In all columns the same bandwidth on either side of the cut-off is used. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Supplementary Table 12. RD estimates of the impact of the injunctive norm (n.of thumbs) on open and click, main and heterogeneous effect by normative prime message

	(1)	(2)	(3)	(4)	(5)	(6)
	Mean electricity usage in the 6 months following the prime			Mean electricity usage in the 12 months following the prime		
	All	Descr	Inj	All	Descr	Inj
<i>Panel A: 3 vs. 2 Thumbs-up</i>						
Conventional	-1.226*** (0.435)	-2.377*** (0.582) [0.001]	-0.0646 (0.631) [1]	-1.172*** (0.394)	-1.773*** (0.557) [0.006]	-0.529 (0.543) [0.98]
Bias-corrected	-1.129*** (0.435)	-2.164*** (0.582) [0.001]	0.0174 (0.631) [1]	-1.042*** (0.394)	-1.546*** (0.557) [0.023]	-0.433 (0.543) [1]
Observations	130,468	65,093	65,305	130,468	65,093	65,305
BW above	30.19	32.68	30.09	30.18	29.64	32.44
BW below	30.19	32.68	30.09	30.18	29.64	32.44
Effective n. obs above	31,206	16,720	11,559	23,209	15,121	16,626
Effective n. obs above	23,210	12,177	15,551	31,206	11,347	12,099
<i>Panel B: 2 vs. 1 Thumbs-up</i>						
Conventional	-0.0766 (0.490)	-0.504 (0.660) [1]	0.015 (0.632) [1]	-0.184 (0.458)	-0.424 (0.623) [0.985]	-0.195 (0.587) [1]
Bias-corrected	0.135 (0.490)	-0.207 (0.660) [1]	0.189 (0.632) [1]	0.0215 (0.458)	-0.144 (0.623) [1]	-0.00612 (0.587) [1]
Observations	216,332	107,731	108,479	216,332	107,731	108,479
BW above	30.40	35.30	34.69	29.07	33.65	32.97
BW below	30.40	35.30	34.69	29.07	33.65	32.97
Effective n. obs above	32,437	20,747	18,256	34,506	19,794	17,468
Effective n. obs above	36,034	18,492	20,514	31,148	17,752	19,552

Notes: This table conducts regression discontinuity estimation of average daily energy usage (KWh) in the 6 (Column 1-3) and 12 (Columns 4-6) months following the receipt of the eHER augmented with the normative prime, normalized by average control group consumption in the Post period, around the 3 vs. 2 Thumbs-up (Panel A) and 2 vs. 1 Thumbs-up (Panel B). Estimations in Columns 1 and 4 are on the whole sample, in Columns 2 and 5 are on the sample of customers receiving the descriptive norm prime, in Columns 3 and 6 are on the sample of those receiving the injunctive norm prime. The first row shows the conventional RD estimate, while the second corrects for bias. Bandwidths are selected minimizing the mean squared error. In all specifications the same bandwidth on either side of the cut-off is used. FDR-adjusted q-values in brackets. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Supplementary Table 13. RD estimates of the impact of the injunctive norm (n.of thumbs) on electricity usage, main and heterogeneous effect by normative prime message

	(1)	(2)	(3)	(4)
	Electricity usage			
	All	1 Thumbs-up	2 Thumbs-up	3 Thumbs-up
<i>Panel A: 6-months impact</i>				
Post prime	-0.283*** (0.105)	-0.035 (0.179)	-0.428*** (0.120)	-1.243*** (0.202)
Descr norm * Post prime	0.089 (0.130)	0.179 (0.220)	0.266* (0.154)	-0.713*** (0.256)
Constant	102.3*** (0.044)	133.6*** (0.075)	81.6*** (0.054)	50.3*** (0.082)
Observations	3,720,520	1,816,907	1,340,226	563,387
R-squared	0.108	0.167	0.091	0.037
<i>Panel B: 12-months impact</i>				
Post prime	-0.313*** (0.107)	-0.081 (0.183)	-0.446*** (0.123)	-1.243*** (0.207)
Descr norm * Post prime	0.088 (0.133)	0.147 (0.225)	0.284* (0.159)	-0.656** (0.263)
Constant	102.3*** (0.047)	133.6*** (0.080)	81.6*** (0.057)	50.3*** (0.087)
Observations	4,819,262	2,354,356	1,735,753	729,153
R-squared	0.109	0.164	0.093	0.034
<i>Panel C: 18-months impact</i>				
Post prime	-0.319*** (0.107)	-0.097 (0.183)	-0.420*** (0.127)	-1.191*** (0.211)
Descr norm * Post prime	0.091 (0.116)	0.111 (0.196)	0.279** (0.139)	-0.489** (0.232)
Constant	102.3*** (0.050)	133.6*** (0.085)	81.7*** (0.063)	50.402*** (0.095)
Observations	6,222,953	3,041,094	2,241,638	940,221
R-squared	0.086	0.128	0.075	0.039
N. of customers	256,487	125,249	92,407	38,831

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Reference period for the analysis: Oct 2017- December 2018 (6-months impact) in Panel A; Oct 2017- May 2019 (12-months impact) in Panel B; Oct 2017- December 2019 (18-months impact) in Panel C. All specifications include customer fixed effects and month by year fixed effects. Standard errors clustered at the customer level in parentheses and FDR-adjusted q-values in brackets; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 14. Impact of the descriptive vs injunctive message on electricity usage, main and heterogeneous effects, long-term analysis

	(1)	(2)
	RDD sample	
Pre-treat usage	0.035*** (0.000)	0.004*** (0.000)
Population of municipality	0.022*** (0.001)	0.006*** (0.001)
Nort-West	0.087*** (0.003)	0.046*** (0.002)
North-East	0.074*** (0.003)	0.049*** (0.003)
Centre	0.038*** (0.003)	0.018*** (0.002)
South	0.016*** (0.003)	-0.004 (0.002)
N. of eHER by March 18		0.084*** (0.000)
N. of months with zero usage		-0.089*** (0.001)
Optout by March 18		-0.185*** (0.004)
Constant	0.452*** (0.003)	0.115*** (0.002)
Observations	348,131	348,131
R-squared	0.093	0.485

Notes: The dependent variable takes the value of one if the customer received the augmented eHER with the normative primes and 0 otherwise. The sample includes all customers eligible to receive the augmented eHER, i.e. non-attriter treated customers by March 2018, with available information on population, geographical information and contents of the report. Population of municipality is in million, pre-treatment usage refers to the period July 2015-June 2016 and is expressed in KWh/day. N. of months with zero usage refer to the three months preceding the receipt of the report. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The unit of analysis is the household.

Supplementary Table 15. Determinants of being in the RDD analysis sample

	(1)	(2)	(3)	(4)
	Attrition			
	12-months	24-months	36-months	42-months
Program	0.001 (0.001)	0.000 (0.002)	0.001 (0.002)	0.001 (0.002)
Pre-treat usage	-0.000 (0.000)	-0.002*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Population	-0.001** (0.000)	-0.011*** (0.001)	-0.017*** (0.001)	-0.013*** (0.001)
North-East	0.012*** (0.002)	0.051*** (0.003)	0.077*** (0.003)	0.082*** (0.003)
North-West	0.003** (0.002)	0.006** (0.003)	0.014*** (0.003)	0.021*** (0.003)
Centre	0.000 (0.002)	-0.011*** (0.003)	-0.015*** (0.003)	-0.019*** (0.003)
South	-0.003* (0.002)	-0.011*** (0.003)	-0.006** (0.003)	-0.006** (0.003)
Constant	0.063*** (0.002)	0.225*** (0.003)	0.299*** (0.003)	0.344*** (0.004)
Observations	458,922	458,922	458,922	458,922
R-squared	0.000	0.004	0.006	0.006
Mean Dep Var	0.0650	0.212	0.296	0.342

Notes: The dependent variable is a dummy taking the value of one if the customer leaves the sample within the period indicated in the heading and zero otherwise. Population of municipality is in million, pre-treatment usage refers to the period July 2015-June 2016 and is expressed in KWh/day. Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1. The unit of analysis is the household.

Supplementary Table 16. Attrition from the program in different periods

	3 vs. 2 Thumbs-up		2 vs. 1 Thumbs-up	
	p-value	Eff. N. obs	p-value	Eff. N. obs
<i>Panel A</i>				
RD Manipulation Test (local polynomial density)	0.377	93,523/42,724	0.915	132,506/93,539
<i>Panel B</i>				
Average pre-treat usage	0.58	506	0.04	1013
Population of municipality	0.01	607	0.58	1429
North-East	0.32	607	1	1429
North-West	0.68	607	0.64	1429
Centre	1	607	0.31	1429
South	0.14	607	1	1429
Islands	1	607	0.12	1429
Joint Test - cvm statistic	0.62	506	0.21	1013
Joint Test - Max statistic	0.17	506	0.15	1013

Notes: Panel A reports the p-value of the non-parametric density estimator based on local polynomial techniques⁴⁵. The null hypothesis is that the density of customers is continuous at the 3 vs. 2 Thumbs-up cut-off (Column 1) and 2 vs. 1 Thumbs-up (Column 3). The test is implemented using the `rddensity` package using the default values. In particular the following features are applied: local quadratic approximation, triangular kernel, optimal bandwidth selection implying two distinct bandwidths at the left and right of the cut-offs, reported in columns 2 and 4. In both exercises the sample is represented by customers who received the eHER in February-March 2018 (i.e. the one preceding the augmented with the normative prime), and received either 3 or 2 thumb symbol (Columns 1 and 2) [N=134,964] or 2 or 1 thumb symbol (Columns 3 and 4) [N=223,863]. Panel B reports the p-values from the test of the continuity of the distribution of pre-determined covariates⁴⁶ at the 3v2thumb (column 1) and 2v1 thumb (column 3) cut-off, respectively. For each test the effective number of observations used is reported in columns 2 and 4. The null hypothesis is that the distribution of covariates is continuous at the threshold. The test is implemented using the `rdperm` package⁴⁶ using the default values as for the (same) number of effective observations from either side of the cut-off and the number of random permutations.

Supplementary Table 17. Manipulation density test at the cut-offs and continuity of the distribution of pre-determined covariates, February-March 2018 eHER

	(1)	(2)	(3)
	Electricity usage		
	All	Env	No Env
Post	-0.184 (0.155)	-0.303* (0.163)	-0.213 (0.160)
Descr. Prime * Post	0.083 (0.211)	0.025 (0.214)	0.083 (0.211)
Env Prime * Descr. Prime * Post	-0.058 (0.300)		
Constant	102.2*** (0.044)	102.2*** (0.063)	102.2*** (0.062)
Observations	2,732,055	1,365,414	1,366,641
R-squared	0.109	0.109	0.109
Number of customers	251,747	125,815	125,932

Notes: The dependent variable is the average daily electricity usage (KWh), normalized by average control group consumption in the Post period. Reference period for the analysis: Oct 2017- August 2018 (3-months impact). All specifications include customer fixed effects and month by year fixed effects. Standard errors clustered at the customer level in parentheses; *** p<0.01, ** p<0.05, * p<0.1.

Supplementary Table 18. Impact of the descriptive vs injunctive message on electricity usage, across environmental prime treatment