Online appendix for:

**How Can Consumer Trust in Energy Utilities be Increased? The Effectiveness of Prosocial, Proenvironmental, and Service-Oriented Investments as Signals of Trustworthiness**

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Here we report five sets of additional results: (A) a Prolific study that included a smaller number of conditions (Study A). (B) a Prolific study exploring the effects of utility behavior that was closer to or more distant from the utility’s core mission (Study B). (C) a comparison of confidence in utilities relative to other actors in studies 1 through 3 (Confidence in Organizational Actors). (D) a discussion of an additional condition in Study 2 (Additional Analyses for Study 2). (E) Structural equation model estimations providing formal tests of the mediating effect of trust in studies 1 through 3 (Mediation Analysis).

A) Study A

Before conducting Study 2 reported in the main part of the paper, we conducted a similar study that included a smaller number of conditions – prosocial investments, pro-environmental investments, and a control (investments in electricity production) (also see footnote 2 in main part of the paper). Study A had approximately 50 participants per condition for a total of $N = 151$ participants.

Participants

Participants were mostly male (52.3%). Mean age was 36.1 years (S.D. = 10.3). Fifty-eight percent had graduated from college education. Eighty-one percent identified themselves as white. Sixty-six percent indicated that they are more likely to vote Democrat than Republican in U.S. presidential elections.

Experimental Manipulations

In this study, participants first read a description of a utility company and answered some questions about the company. Then they read about an app that the utility is providing to customers.

Part 1

“In recent years, a utility company has invested substantial resources [in increasing the amount of electricity it produces/in non-profit charitable organizations in the community/in renewable energy like wind and solar].”

Part 2

“We told you that the utility company has invested a lot. Now we will tell you a little more about the utility company. It is offering a new program. It is providing households with a free app that households can use to manage electricity consumption. The utility company information pamphlets say that the app can help households save money and help the environment.”

Measures
We asked participants how much they trusted the utility company described in the vignette, as well as how willing they were to use the app provided by the utility (1=not at all to 10=very much).

Results

Table A1 reports results of regression analyses looking at the effects of the experimental conditions on trust in the utility and willingness to use the app provided by the utility. The results show that type of investment matters (Model 1). Pro-environmental investments have statistically significant effects on trust. In contrast, prosocial investments have only a marginally significant effect on trust ($p = 0.100$). And a utility that invests in pro-environmental causes is trusted more than a utility that invests in prosocial causes ($F(1, 148) = 5.90, p = 0.016$). Further, utility investments have no effect on participant willingness to use the app (Model 2). But the statistically significant association between trust and willingness indicates that type of investment affects willingness indirectly through trust (Model 3).

Table A1: OLS regression models of trust and willingness to use app

|                | Model 1 Trust | Model 2 Willingness | Model 3 Willingness |
|----------------|---------------|---------------------|---------------------|
| Const.         | 5.824***      | 5.882***            | 1.556               |
|                | (0.242)       | (0.430)             | (0.944)             |
| Electricity    | ref.          | ref.                | ref.                |
| Prosocial      | 0.556         | 0.078               | -0.336              |
|                | (0.336)       | (0.561)             | (0.526)             |
| Pro-environment| 1.316***      | 0.478               | -0.500              |
|                | (0.319)       | (0.587)             | (0.628)             |
| Trust          |               |                     | 0.743***            |
|                |               |                     | (0.163)             |
| $N$            | 151           | 151                 | 151                 |
| adj. $R^2$     | 0.09          | -0.01               | 0.17                |

Notes: The table lists coefficient estimates from OLS regression models and robust standard errors in parentheses (*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, for two-sided tests). The three models test the effects of three different investment strategies employed by a utility on participants’ trust in the utility and their willingness to use a smart meter app provided by the utility. Both dependent variables are on a 10-point scale.

Figure A1 shows average trust scores across types of investments as well as willingness scores conditional on mean trust scores across the three types of investments. The figure illustrates that differences in trust levels due to different investment behaviors translate more or less proportionally to corresponding differences in willingness scores.
B) Study B

This study explored the effects of describing the experimental conditions in two ways – one that was closer to the utility’s core mission, and one that was more distant. We found no effects of these manipulations (see also footnote 2 in the main part of the paper). Most likely, these manipulations were too weak to produce effects.

Participants

The $N=687$ participants in this study were mostly male (52.8 %), 29.4 years old on average (S.D. = 10.7), 41.3 % had completed college education, 71.8 % identified themselves as white and 73 % indicated that they would more likely vote Democrat in U.S. presidential elections.

Experimental Manipulations

The manipulation consisted of six treatment conditions and one control condition. In the control condition no further information about the utility’s behavior was included in the vignette, neither in the first nor in the second part.

Part 1

“In recent years, a utility company has invested substantial resources in electricity production. [The utility has a very good website and online customer tools./The utility produces very good smart phone apps and smart home technology./The utility has very
good programs for low income customers./The utility has a very good record of donating to local charitable organizations./The utility has a very good record of providing wind and solar power to customers./The utility has a very good record of protecting the environment.]

At this point we asked participants how much they trusted the utility as well as questions about their perceptions of the utility.

Part 2
“We told you that the utility company has invested in electricity production [and that it [has a very good website and online customer tools/produces very good smart phone apps and smart home technology/has very good programs for low income customers/has a very good record of donating to local charitable organizations/has a very good record of providing wind and solar power to customers/has a very good record of protecting the environment]]. Now we will tell you a little more about the utility company. It is offering a new program. It is providing households with a free app that households can use to manage electricity consumption. The utility information pamphlets say that the app can help households save money and help the environment.”

At this point, we asked participants about their willingness to use the app, their perceptions of utility claims regarding the app.

Measures
Measures were the same as for Study A.

Results
Model 1 in Table B1 shows that the effect of utility behavior on trust does not depend on the behavior’s closeness to the utility’s core business (prosocial: $F(1, 680) = 0.02, p = 0.894$; pro-environmental: $F(1, 680) = 0.72, p = 0.397$; customer service: $F(1, 680) = 1.46, p = 0.228$). We therefore pool the cases from the “close” and “distant” conditions within each type of utility behavior for the remainder of the analysis.

Model 2 shows that the type of utility behavior has a substantial and statistically significant effect on trust, and effect sizes are ordered as follows: Electricity only < customer service < prosocial ($F(1, 683) = 6.28, p = 0.012$) < pro-environmental ($F(1, 683) = 7.40, p = 0.007$). However, none of the utility behaviors has a direct effect on participants’ willingness to use the app provided by the utility (Model 3). Model 4 shows that once trust is controlled for, the types of behaviors have a negative effect on willingness scores. For some reason, keeping trust levels constant, respondents are less willing to use the app if the utility does more than merely investing in electricity production.
Table B1: OLS regression models of trust and willingness to use app

|                     | Model 1 Trust | Model 2 Trust | Model 3 Willingness | Model 4 Willingness |
|---------------------|---------------|---------------|---------------------|---------------------|
| Const.              | 6.184***      | 6.184***      | 8.061***            | 5.061***            |
|                     | (0.169)       | (0.169)       | (0.180)             | (0.376)             |
| Electricity         | ref.          | ref.          | ref.                | ref.                |
| Prosocial           |               |               |                     |                     |
| × close             | 1.173***      | -0.137        | -0.707**            |                     |
|                     | (0.196)       | (0.233)       | (0.233)             |                     |
| × distant           | 1.160***      |               |                     |                     |
|                     | (0.216)       |               |                     |                     |
| Pro-environmental   |               |               |                     |                     |
| × close             | 1.565***      | 0.011         | -0.749**            |                     |
|                     | (0.199)       | (0.231)       | (0.239)             |                     |
| × distant           | 1.476***      |               |                     |                     |
|                     | (0.216)       |               |                     |                     |
| Customer service    |               |               |                     |                     |
| × close             | 0.816***      | -0.056        | -0.452*             |                     |
|                     | (0.197)       | (0.225)       | (0.224)             |                     |
| × distant           | 0.940***      |               |                     |                     |
|                     | (0.223)       |               |                     |                     |
| Trust               |               |               |                     | 0.485***            |
|                     |               |               |                     | (0.051)             |
| N                   | 687           | 687           | 686                 | 686                 |
| adj. $R^2$          | 0.10          | 0.10          | -0.00               | 0.13                |

Notes: The table lists coefficient estimates from OLS regression models and robust standard errors in parentheses (*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, for two-sided tests). The four models test the effects of four different types of utility behavior on participants’ trust in the utility and their willingness to use a smart meter app provided by the utility. The first model moreover divides the three main types of utility behavior in behaviors that are close to or distant from the utility’s core mission. Both dependent variables are on a 10-point scale.

C) Confidence in organizational actors

In Studies 1 through 3, we also asked respondents how much confidence they have in different types of organizational actors. This measure comes from Pew Research Center surveys on trust in which they ask about confidence in various actors (Kennedy 2016). Figures C1, C2 and C3 report the results for Studies 1, 2 and 3, respectively. These figures show the average confidence scores; confidence patterns are by and large consistent across the three samples.
Figure C1: Respondents’ confidence in different types of actors (Study 1)

Figure C2: Respondents’ confidence in different types of actors (Study 2)
Figure C3: Respondents’ confidence in different types of actors (Study 3)

The figures are based on OLS regression models with cluster-robust standard errors accounting for the repeated confidence measures obtained from the same respondents. Except for state government agencies in Study 1 (t = -0.86, p = 0.391) and Study 2 (t = 0.43, p = 0.668), and city officials in Study 3 (t = 0.82, p = 0.414), average confidence scores of all organizational actors are significantly different from the average confidence score for utilities. Note that since cluster-robust standard errors are estimated, overlapping confidence intervals do not necessarily imply statistically insignificant differences between coefficient estimates.

We looked at respondent confidence in various types of organizational actors to provide an additional test of our assumption that people have little trust in utility companies. In line with our assumption, the results show that people have a bit more confidence in utilities than they have in the government, and less than in other types of actors, including technology companies, environmental non-profits, university researchers, engineers, and scientists.

D) Additional analyses for Study 2

Finally, as we noted in our discussion of Study 2, the vignette manipulations originally included five conditions – control, prosocial, pro-environmental, investing in maintaining good customer service, and simply maintaining good customer service. We included the investing in maintaining service condition in the main part of the paper to have wording consistent with the
other conditions. But, we thought it possible that participants might think that a company that invests too much is actually not being responsible, so we also included a condition in which the utility was described as maintaining good customer service. Because we find no difference across these conditions, in the main paper we report the results for the customer service condition that is worded the same as the other conditions. Here we report the results for all five conditions. According to this model, respondents do not seem to distinguish between a utility that invests in maintaining and one that maintains a good website and online tools. That is, the difference between the last two coefficient estimates is insignificant ($F(1, 497) = 0.23, p = 0.629$).

Table D1: OLS regression models of trust

|              | Coef.   | SE    |
|--------------|---------|-------|
| Const.       | 5.863***| (0.199)|
| Electricity  | ref.    |       |
| Prosocial    | 0.910***| (0.275)|
| Pro-environmental | 1.667***| (0.263)|
| Customer service |        |       |
| $\times$ invest | 1.267***| (0.247)|
| $\times$ maintain | 1.157***| (0.263)|
| $N$          | 502     |       |
| adj. $R^2$   | 0.08    |       |

Notes: The table lists coefficient estimates from a OLS regression model and robust standard errors in parentheses (*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, for two-sided tests). The model tests the effects of four different types of utility behavior on participants’ trust in the utility. The model moreover divides the third type of utility behavior (customer service) in investment behavior and maintenance behavior. The dependent variable is on a 10-point scale.

E) Mediation Analysis

This section provides the formal tests of the mediating effects of trust in Studies 1 through 3. The tests are based on an estimation of the indirect effect of the multi-categorical treatment variable on respondents’ willingness scores in a structural equation model with bootstrapped standard errors of the coefficient estimates (Kline 2010; Hayes and Preacher 2014). The estimation of the standard errors is based on 5000 bootstrap replications in each case. We use the `bsweights` command in Stata to account for the sample weights used in Study 3 in the estimation process (Kolenikov 2010).

Tables E1, E2 and E3, list the direct, indirect and total effects of the multi-categorical treatment variable and trust on respondents’ willingness scores. Since trust is the mediating variable in our models, there is no indirect effect of the treatment variable on trust; the direct effect on trust corresponds the total effect. We therefore only report the direct effect of the treatment variable on trust. Note that trust also has only a direct effect on willingness.

A formal test of the mediating effect of trust is provided in columns three and four in Tables...
E1 through E3. In all three tables, these columns show that only trust has a direct effect on willingness (column 3) whereas the effect of the treatment variable on willingness is indirect (column 4).

Finally note that the coefficients listed in tables E1, E2 and E3 are virtually the same as the corresponding coefficients listed in tables 1, 2 and 3, respectively.

| Table E1: Mediation analysis (Study 1) |
|---------------------------------------|
|                                       |
|                                       |
|                                       |
| Trust                                 |
| Direct effects on trust                |
| Direct effects on willingness          |
| Indirect effects on willingness        |
| Total effects on willingness           |
| Trust                                 |
| 0.764***                              |
| (0.055)                               |
| Google                                |
| 1.098**                               |
| (0.420)                               |
| Tech. start-up                        |
| 0.265                                 |
| (0.408)                               |
| Env. non-profit                       |
| 1.471***                              |
| (0.391)                               |
| Uni researcher                        |
| 1.872***                              |
| (0.365)                               |
| Fed. gov. agency                      |
| -0.243                                |
| (0.441)                               |
| State gov. agency                     |
| -0.023                                |
| (0.403)                               |
| Local city council                    |
| 0.118                                 |
| (0.411)                               |
| Notes: N = 400. The table lists coefficient estimates from structural equation model with bootstrapped standard errors in parentheses (**p < 0.01, ***p < 0.001, * p < 0.05, for two-sided tests). The effects are decomposed in direct, indirect and total effects. The dependent variable (willingness) and the mediating variable (trust) are on a 10-point scale. |
### Table E2: Mediation analysis (Study 2)

|                      | Direct effects on trust | Direct effects on willingness | Indirect effects on willingness | Total effects on willingness |
|----------------------|-------------------------|-------------------------------|---------------------------------|-------------------------------|
| Trust                | 0.739***                | (0.061)                       |                                 | 0.739***                     |
| Electricity          | ref.                    | ref.                          | ref.                            | ref.                          |
| Prosocial            | 0.910**                 | -0.226                        | 0.672**                         | 0.446                         |
| Pro-environmental    | 1.667***                | -0.1816                       | 1.232***                        | 1.051**                       |
| Customer service     | 1.267***                | -0.156                        | 0.937***                        | 0.781*                        |

Notes: N = 403. The table lists coefficient estimates from structural equation model with bootstrapped standard errors in parentheses (*** p < 0.001, ** p < 0.01, * p < 0.05, for two-sided tests). The effects are decomposed in direct, indirect and total effects. The dependent variable (willingness) and the mediating variable (trust) are on a 10-point scale.

### Table E3: Mediation analysis (Study 3)

|                      | Direct effects on trust | Direct effects on willingness | Indirect effects on willingness | Total effects on willingness |
|----------------------|-------------------------|-------------------------------|---------------------------------|-------------------------------|
| Trust                | 0.544***                | (0.038)                       |                                 | 0.544***                     |
| Electricity          | ref.                    | ref.                          | ref.                            | ref.                          |
| Prosocial            | -0.223                  | 0.089                         | -0.121                          | -0.032                        |
| Pro-environmental    | 0.465**                 | -0.225                        | 0.253**                         | 0.028                         |
| Customer service     | -0.124                  | 0.329                         | -0.067                          | 0.262                         |

Notes: N = 2000. The table lists coefficient estimates from structural equation model with bootstrapped standard errors in parentheses (*** p < 0.001, ** p < 0.01, * p < 0.05, for two-sided tests). The effects are decomposed in direct, indirect and total effects. The dependent variable (willingness) and the mediating variable (trust) are on a 10-point scale.
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