## ONLINE APPENDIX

## Appendix A: Timeline of Critical Developments in Greenpeace's Advocacy for Solar Energy

The following information was sourced from Leggett (2001), Greenpeace International Annual Reports (several years), and internal Greenpeace documents from the Greenpeace International archive (available at the International Institute of Social History in Amsterdam).

| | |
|---|---|
| Background (1980s) | Concerns about acid rain in industrialized countries, the discovery of the Antarctic ozone hole in 1985, the meltdown of Chernobyl's nuclear reactor in 1986, and increasing recognition of global warming at the end of the 1980s formed the background on which energy issues began to figure prominently on European environmentalists' agenda. |
| 1990 | Energy formally becomes part of Greenpeace International activities, as the organization renames its Atmosphere campaign to Atmosphere & Energy (further divided into Energy Efficiency and Renewables, Greenhouse Effect, and Transport). |
| 1994 | Solar campaigns gain further traction in the organization, as a dedicated team for solar energy is formed under the direction of Dr. Jeremy Leggett. The team operates within the newly formed Climate campaign. |
| 1996 | Greenpeace sets the Climate and Biodiversity campaigns as its top two priorities. |
| 2001 | Greenpeace and the European Photovoltaic Industry Association (EPIA) release Solar Generation. The report receives widespread attention and is followed by four additional Solar Generation reports over the next ten years. Solar Generation reports promote the use of feed-in-tariffs. |
| 2005 | Solar advocacy moves to the new Climate & Energy (C&E) campaign, which incorporates the Nuclear Energy campaign (previously part of the Nuclear & Disarmament campaign) and the Climate campaign. The newly formed C&E campaign attracts the highest expenditure among all Greenpeace campaigns and has been attracting the highest spending since. |
| 2007 | Greenpeace and the European Renewable Energy Council publish the first Energy [R]evolution report, detailing long-term projections and scenarios for a "sustainable energy outlook." The report advocates for feed-in-tariffs as the most appropriate policy measure. By 2012, the two organizations release three more Energy [R]evolution reports. |
| 2009 | Greenpeace continues to promote solar PV by further increasing its expenditures on the C&E campaign, recognizing climate change as underpinning all its campaigns and naming it the organization's "clear global priority." |

## Appendix B: Additional Analyses

Additional analyses corroborated the study's findings but are not included in the paper to preserve space. These robustness checks are reported below in table B1 (main effects: H1 and H2), table B2 (interaction effect: H3), and table B3 (partitioned interaction: H4).

First, one alternative explanation for our main finding could be that density does not lead to policy support, but rather entrants anticipate support or react to the same conditions that the governments do. This is an unlikely explanation, however, for three reasons. First, this simultaneous reaction does not explain the other results we found. Second, we used a lagged structure and an instrumental variable approach, and we found significant results using this approach. Third, in a separate model (model B1) we used a more conservative lag of three years, and the results were substantively similar. Given that most solar PV manufacturing facilities take close to two years to be established, this test rules out the possibility that our results are due to firms entering because they anticipate policy support—they would have to anticipate it five years in advance, a highly unlikely explanation.

Second, we noted that the industry started to show signs of maturity around 2012. Yet figure 1 indicates that producers' density stabilized earlier in Europe and even declined in 2009. This was not a result of industry maturity, as can be seen by global industry trends shown by Kapoor and Furr (2015); rather, it was because of out-of-continent competition, as Europe was starting to lose its position as the manufacturing center for PV components. Two robustness tests show that these dynamics do not affect our conclusions: (a) we ended the analyses in 2009 instead of 2012; and (b) we controlled for *out-of-continent competition* using the share of solar PV cells produced outside Europe. The results of both tests were consistent with our primary findings (models B2 and B3). Model B3 also shows that out-of-continent competition did not significantly affect FITs, presumably because the aforementioned dynamics were relevant only for a short time toward the end of our observation period.

Third, although our control variables account for a number of alternative explanations, we also reestimated the models with additional control variables. Their inclusion did not substantially affect the coefficients of theoretically relevant variables, so they are only discussed here.

- In the paper we accounted for "horizontal" EU pressures (between countries) with our measure of diffusion effects. To control for "vertical" EU pressures (from the EU to

individual countries) we added *RE objective*, a variable that ranks countries according to their renewable energy objectives, as set by the EU renewable energy directives 2001/77/EC and 2009/28/EC.[1] This variable did not have a significant effect on the outcome (see model B4), a result consistent with prior work on EU renewable energy policies, which has concluded that policy changes were driven mainly by domestic factors and not European integration impulses (Lauber, 2005; De Lovinfosse, 2008).

- High unemployment may urge policy-makers to implement industrial policy initiatives or, conversely, dissuade them from passing policies that may seem costly in the face of more urgent needs. To consider this possibility, we added the variable *unemployment share*. To account for the influence of demographic factors, we also added *population change*. The results were virtually unaffected (see model B5).

**REFERENCES**

De Lovinfosse, I.
2008 How and Why Do Policies Change? A Comparison of Renewable Electricity Policies in Belgium, Denmark, Germany, the Netherlands, and the UK. Brussels: Peter Lang.

Kapoor, R., and N. R. Furr
2015 "Complementarities and competition: Unpacking the drivers of entrants' technology choices in the solar photovoltaic industry." Strategic Management Journal, 36: 416–436.

Lauber, V.
2005 Switching to Renewable Power: A Framework for the 21st Century. New York: Earthscan.

Leggett, J. K.
2001 The Carbon War: Global Warming and the End of the Oil Era. New York: Routledge.

[1] The value of the *RE objective* was set based on the difference between the target and the baseline for each EU country. But we could not include this difference directly in the analysis because the targets from the two directives are not comparable: (a) the 2001 directive listed indicative targets, and the 2009 directive requested binding targets; (b) the former referred to share of *electricity* while the latter to share of *energy* produced by renewable sources; (c) the former set targets for 2010 and the latter for 2020. To overcome this problem, we created a time-varying measure that ranks countries according to the ambitiousness of their targets at a given point in time, with higher values for more ambitious targets. The variable is zero for the years before the first directive and for countries with no target in a given year.

**Table B1. Additional Robustness Tests (Main Effects)***

| Variable | Model B1 | Model B2 | Model B3 | Model B4 | Model B5 |
|---|---|---|---|---|---|
| *Industry* | | | | | |
| Categorical density (H1) | .581•• | .880•• | .664••• | .689••• | .597••• |
| | (.180) | (.269) | (.188) | (.181) | (.167) |
| Industry coherence (H2) | 2.290••• | 2.657••• | 2.054•• | 2.080••• | 2.028•• |
| | (.678) | (.566) | (.656) | (.632) | (.670) |
| *Additional control variables* | | | | | |
| Out-of-continent competition | | | .000 | | |
| | | | (.000) | | |
| RE objective | | | | –.092 | |
| | | | | (.082) | |
| Unemployment share | | | | | –.003 |
| | | | | | (.031) |
| Population change | | | | | .475 |
| | | | | | (1.199) |
| Constant | –1.852••• | –2.578••• | –2.279••• | –2.456••• | –2.153••• |
| | (.387) | (.671) | (.504) | (.436) | (.439) |
| N | 597 | 541 | 624 | 624 | 624 |

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Instrumental variable (IV) probit model estimates. The adjustment variable for *industry coherence* is included in all models but not shown. All other controls, as well as period dummies, are included in all models. All continuous variables were centered prior to estimation. Heteroscedasticity and auto-correlation (HAC) robust standard errors are in parentheses.

**Table B2. Additional Robustness Tests (Interaction Effect)***

| Variable | Model B1 | Model B2 | Model B3 | Model B4 | Model B5 |
|---|---|---|---|---|---|
| *Industry* | | | | | |
| Categorical density | 1.123••• | 1.260••• | 1.133••• | 1.158••• | 1.165••• |
| | (.228) | (.220) | (.229) | (.226) | (.314) |
| Rival sector concentration | .023• | .018 | .020• | .020• | .022• |
| | (.010) | (.011) | (.010) | (.010) | (.011) |
| *Interaction effect* | | | | | |
| Categorical density × Rival sector concentration [H3] | .044••• | .044••• | .041••• | .041••• | .042••• |
| | (.010) | (.012) | (.010) | (.010) | (.011) |
| *Additional control variables* | | | | | |
| Out-of-continent competition | | | –.000 | | |
| | | | (.000) | | |
| RE objective | | | | –.079 | |
| | | | | (.080) | |
| Unemployment share | | | | | .008 |
| | | | | | (.041) |
| Population change | | | | | –.442 |
| | | | | | (1.658) |
| Constant | –1.076•• | –1.583•• | –1.490•• | –1.562••• | –1.325•• |
| | (.417) | (.487) | (.500) | (.428) | (.469) |
| N | 597 | 541 | 624 | 624 | 624 |

• $p < .05$; •• $p < .01$; ••• $p < .001$.

* Instrumental variable (IV) probit model estimates. All continuous variables were centered prior to estimation. All other controls, as well as period dummies, are included in all models. Heteroscedasticity and auto-correlation (HAC) robust standard errors are in parentheses.

**Table B3. Additional Robustness Tests (Partitioned Interaction)***

| Variable | Model B1 | Model B2 | Model B3 | Model B4 | Model B5 |
|---|---|---|---|---|---|
| *Industry* | | | | | |
| Categorical density | 1.111••• | 1.211••• | 1.144••• | 1.217••• | 1.187•• |
| | (.250) | (.254) | (.290) | (.306) | (.436) |
| Coherent industry | .958+ | .912 | .731 | .733 | .703 |
| | (.493) | (.572) | (.564) | (.510) | (.608) |
| Rival sector concentration | –.018 | –.022 | –.016 | –.014 | –.017 |
| | (.013) | (.015) | (.013) | (.014) | (.018) |
| *Interaction effects* | | | | | |
| Categorical density × Coherent industry | .367 | –.090 | –.064 | –.169 | –.287 |
| | (.491) | (.362) | (.393) | (.419) | (.476) |
| Rival sector × Coherent industry | .043• | .058• | .046• | .042• | .046+ |
| | (.021) | (.026) | (.020) | (.020) | (.025) |
| *Interaction effects comparison (H4)* | | | | | |
| Rival sector concentration × Categorical density × Coherent industry | .074••• | .044•• | .046••• | .043••• | .039••• |
| | (.016) | (.014) | (.011) | (.011) | (.010) |
| Rival sector concentration × Categorical density × Incoherent industry | .001 | .006 | .003 | .006 | .003 |
| | (.012) | (.013) | (.012) | (.012) | (.015) |
| Out-of-continent competition | | | –.000 | | |
| | | | (.000) | | |
| RE objective | | | | –.079 | |
| | | | | (.090) | |
| Unemployment share | | | | | –.010 |
| | | | | | (.040) |
| Population change | | | | | .329 |
| | | | | | (1.979) |
| Constant | –1.293• | –1.865• | –1.646• | –1.627• | –1.404+ |
| | (.582) | (.840) | (.785) | (.655) | (.782) |
| N | 597 | 541 | 624 | 624 | 624 |

+ $p < .10$; • $p < .05$; •• $p < .01$; ••• $p < .001$.

* Instrumental variable (IV) probit model estimates. All continuous variables were centered prior to estimation. All other controls, as well as period dummies, are included in all models. Heteroscedasticity and auto-correlation (HAC) robust standard errors are in parentheses. These models are meant to compare interaction effects, to evaluate H4. In the presence of higher-order interactions, no conclusions can be drawn regarding the unconditional main effects or lower-order interaction terms. Refer to table B1 for tests that assess H1 and H2 and to table B2 for tests that assess H3.